

NASoftware Limited
Incorporating InfoSAR

VS IPL

Performance Graphs

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Chapter 1. Introduction

This document presents graphs illustrating the performance of the functions in the NAS DSP library. Many functions are not included, for example where performance is not considered critical. All the support functions and scalar functions are excluded.

The graphs present performance as cycles per element on the y-axis. This was chosen over a more familiar GFlop/s measure because it applies simply to all the functions.

Care should be taken when interpreting the graphs. For example, the performance of some functions depends greatly on the actual data used, and the NAS Test Suite, which provides the performance data for this document, is designed primarily to check function correctness rather than performance. One example of such a situation is the function [vsip_valtrue_bl](#).

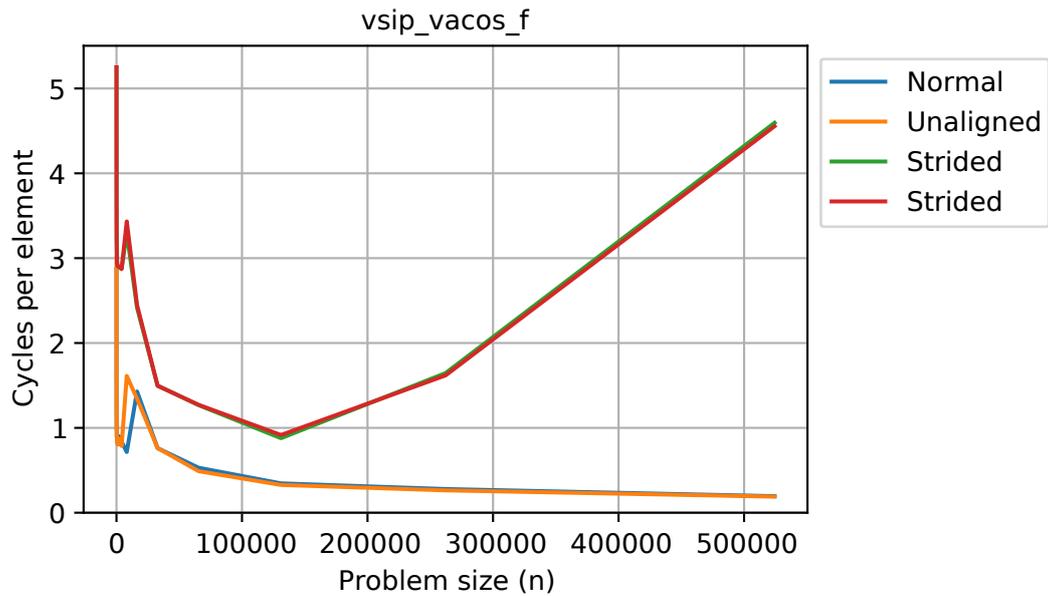
Chapter 2. Elementwise Functions

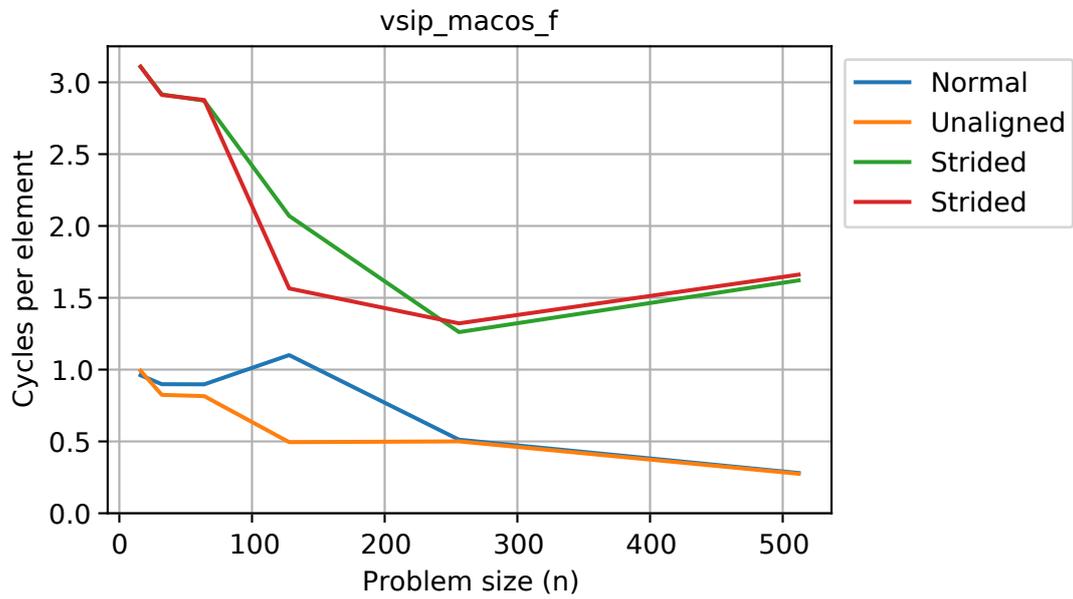
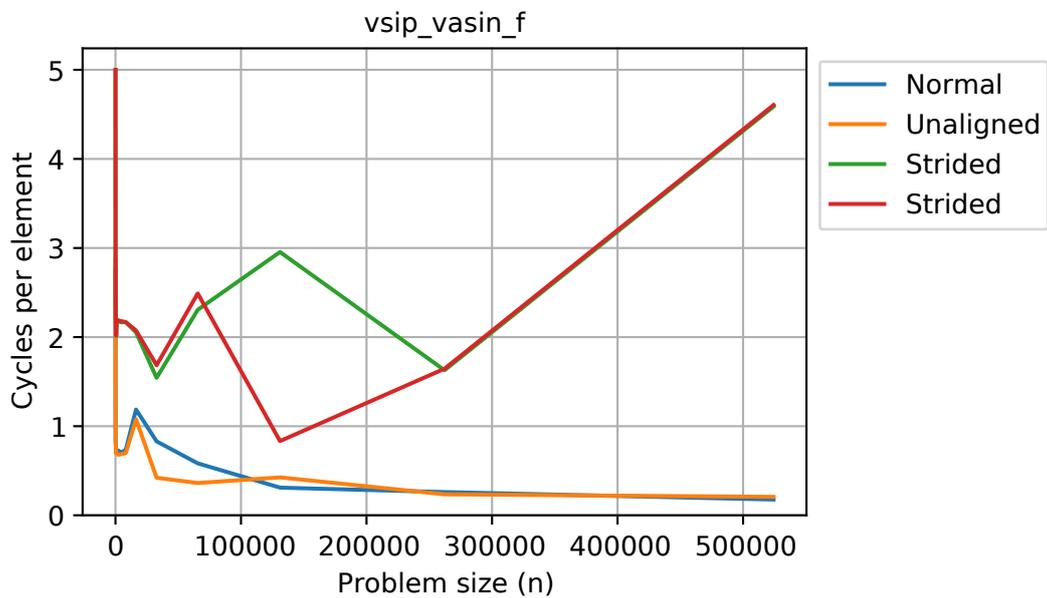
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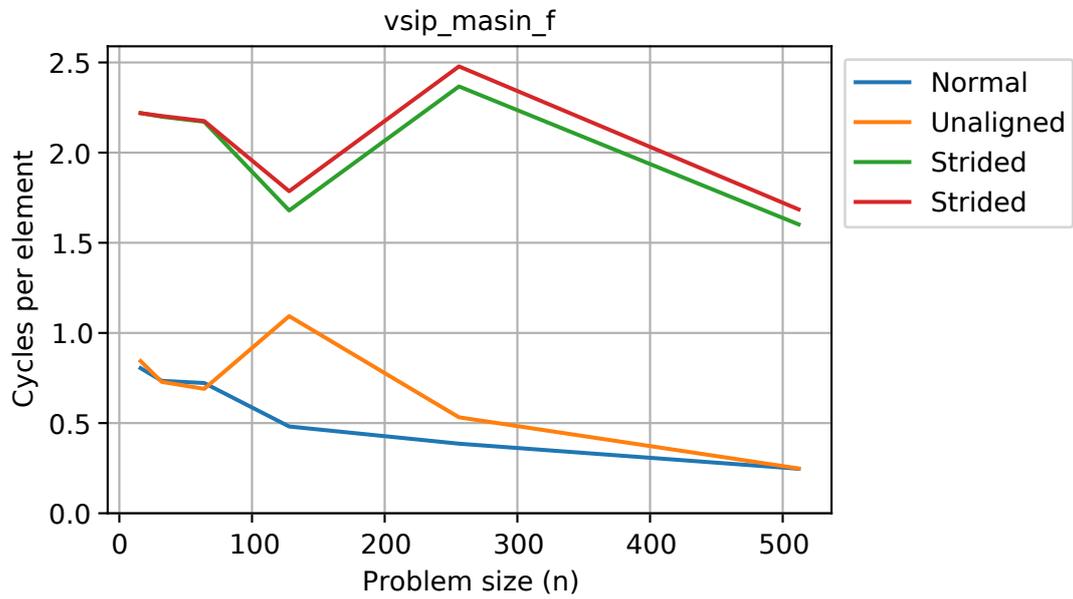
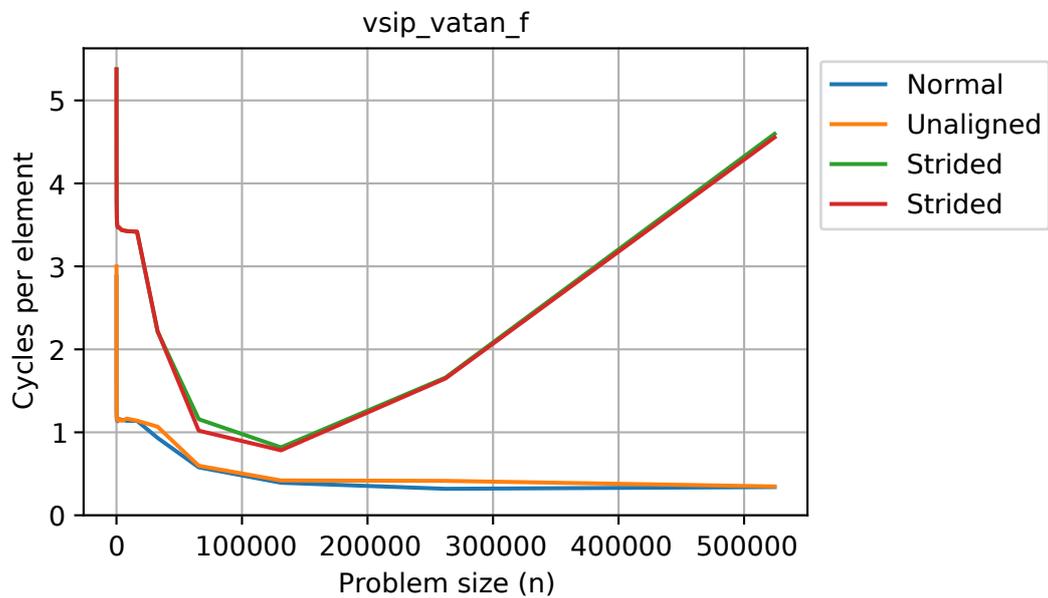
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- `vsip_vsin_f`
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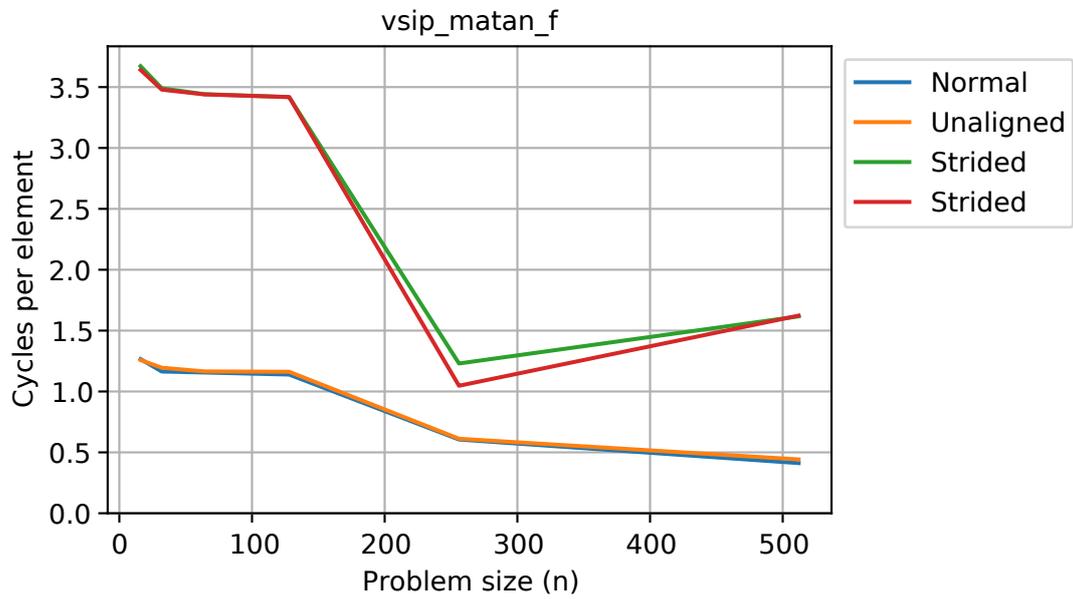
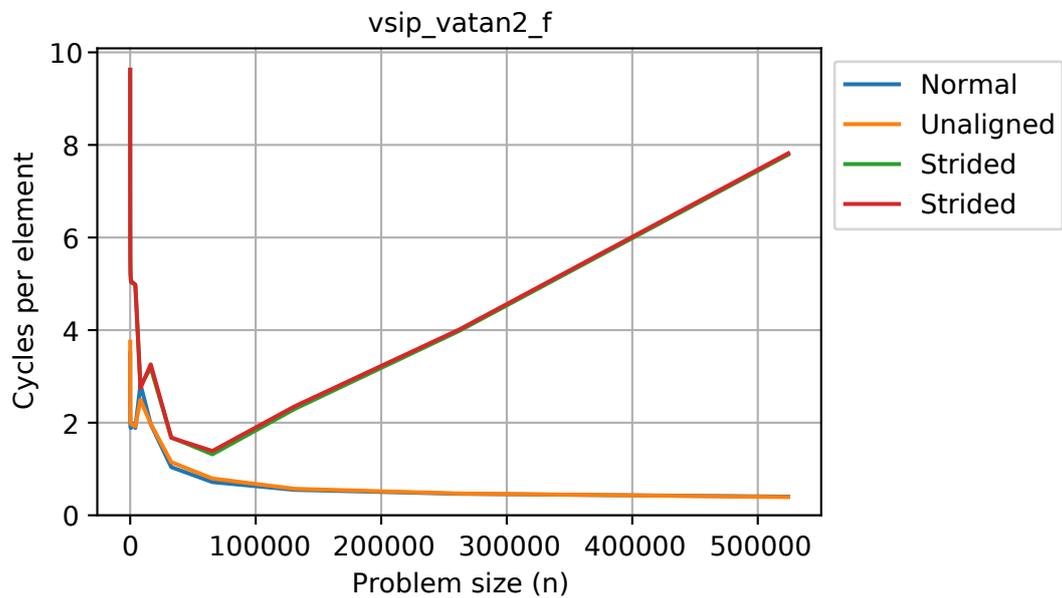
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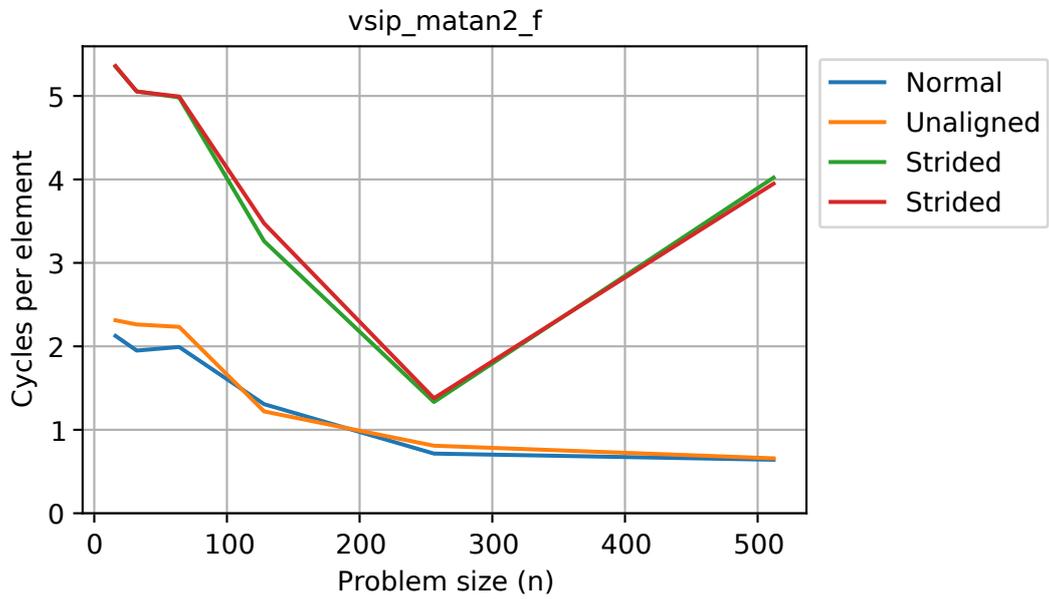
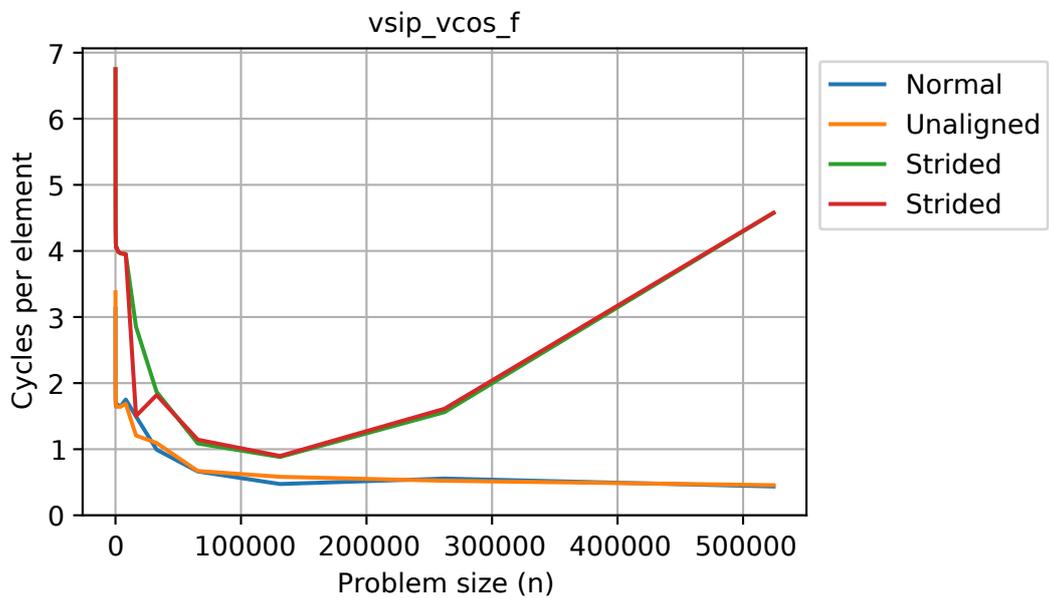
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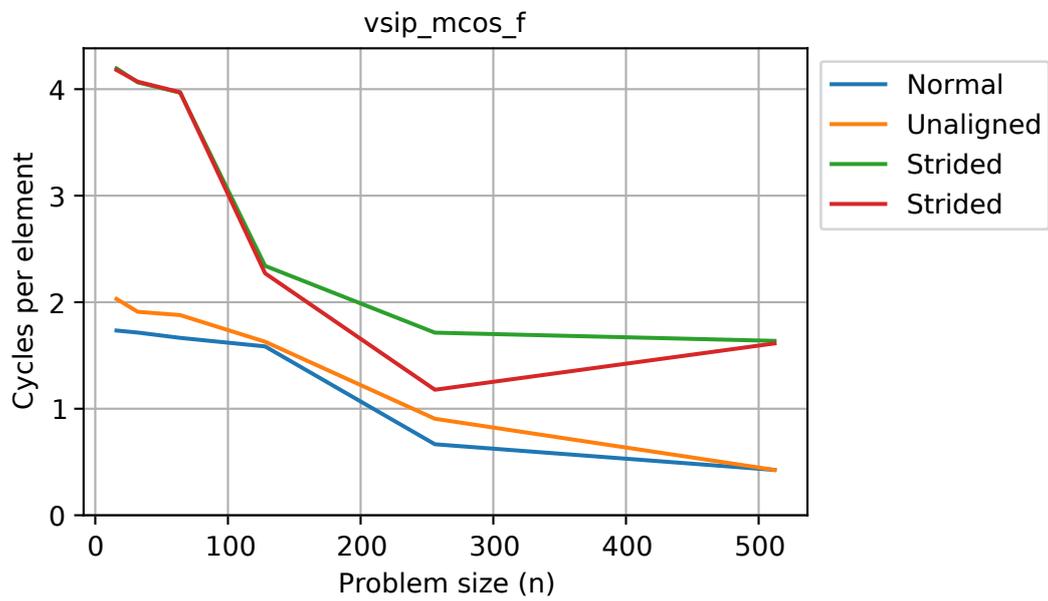
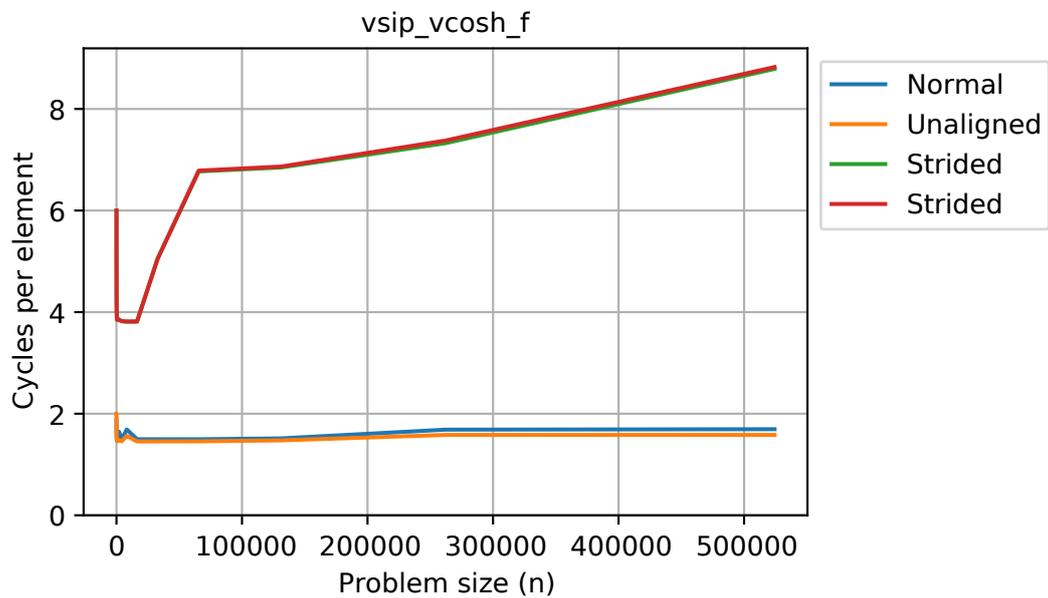


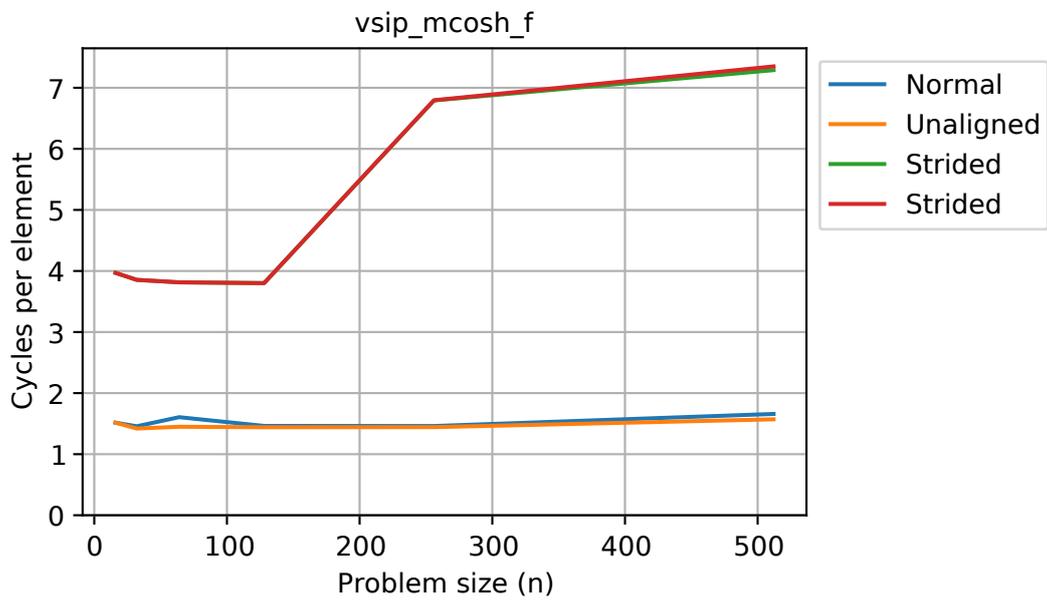
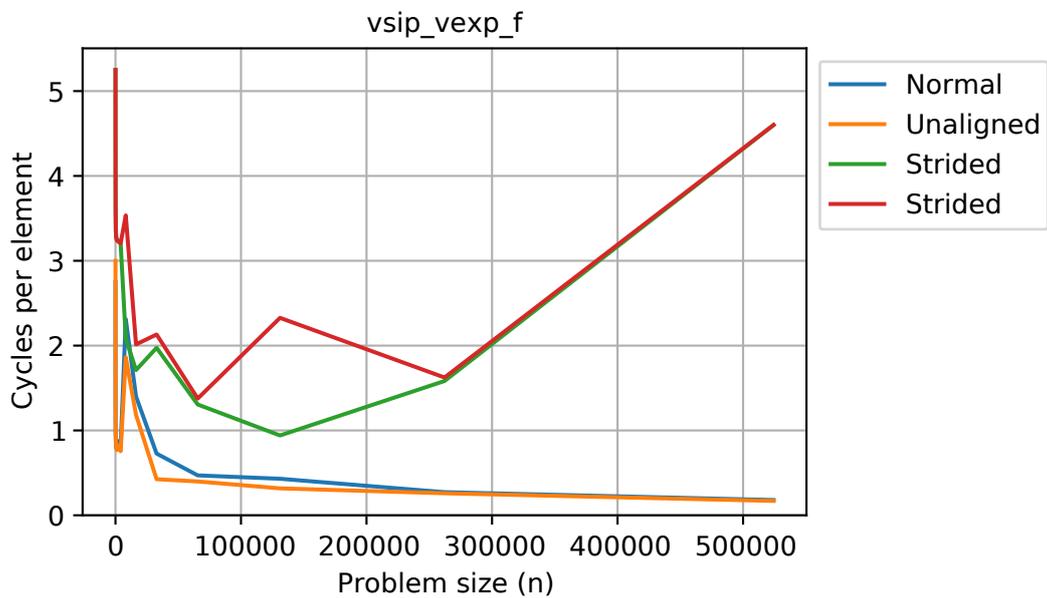
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vsip_masin_f**vsip_vatan_f**

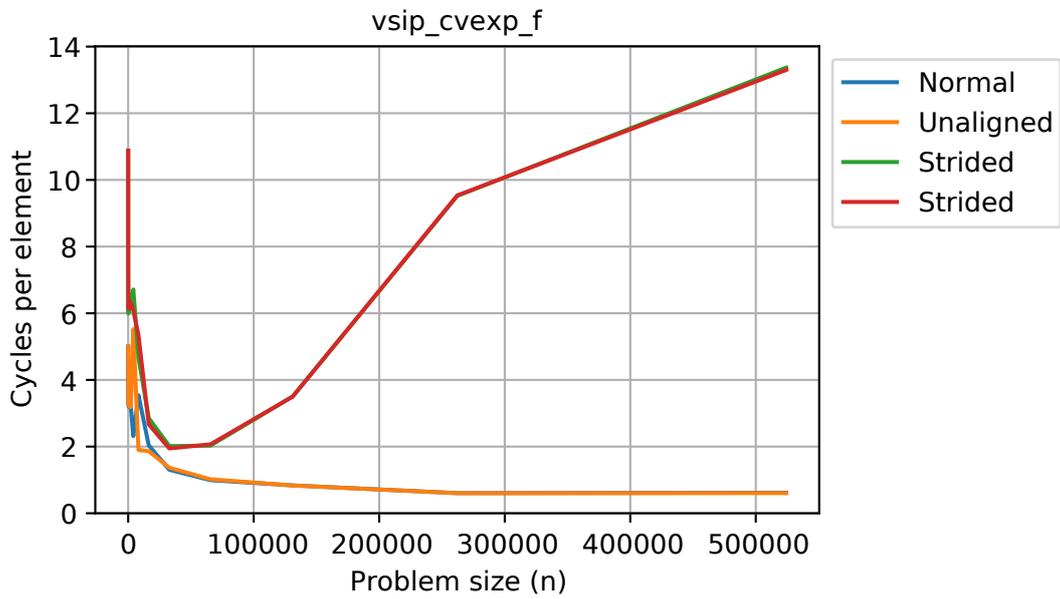
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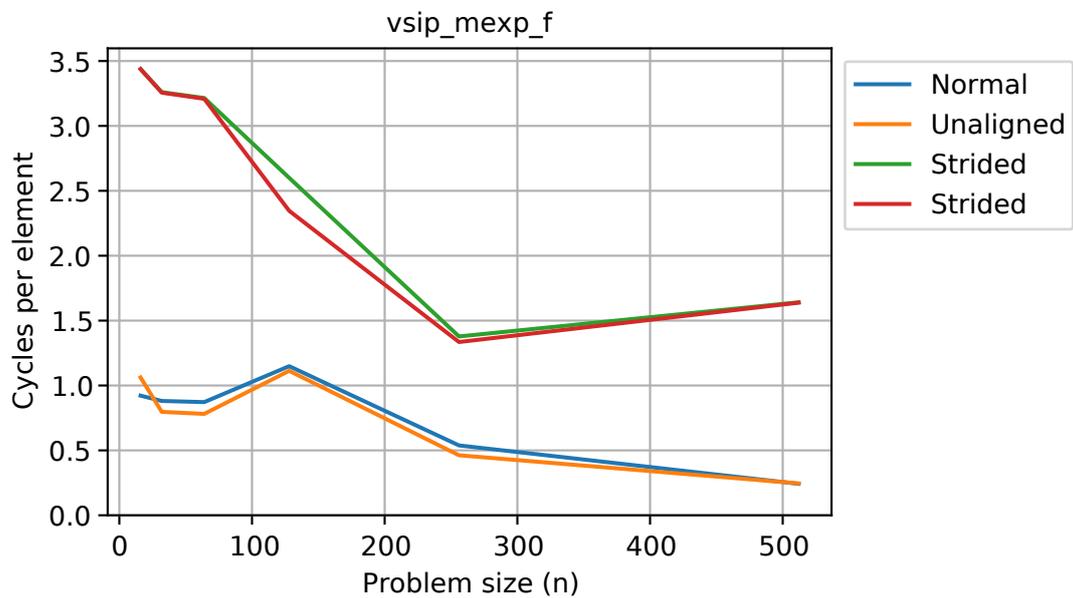
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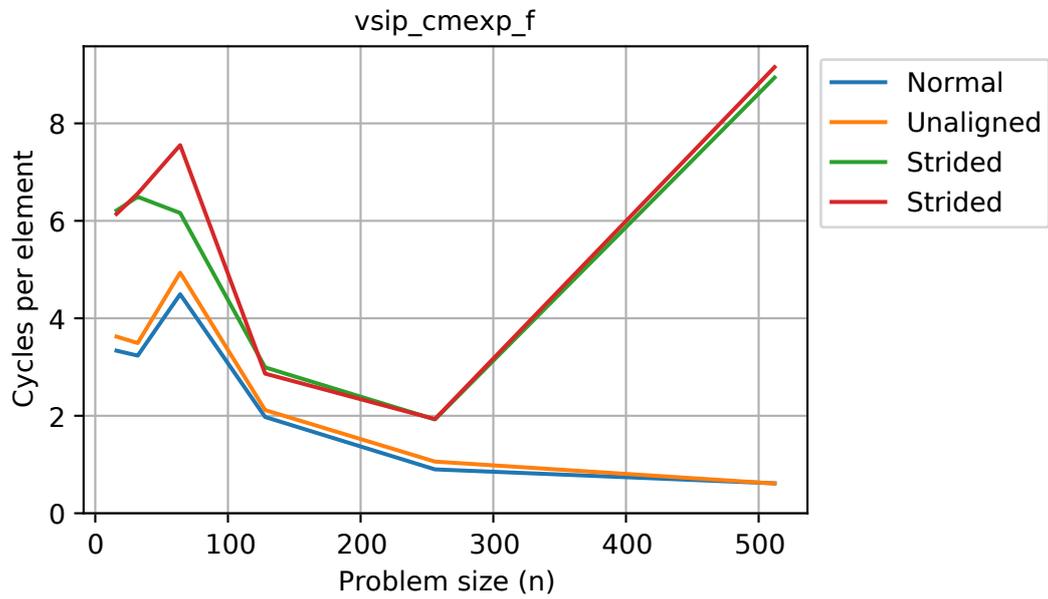
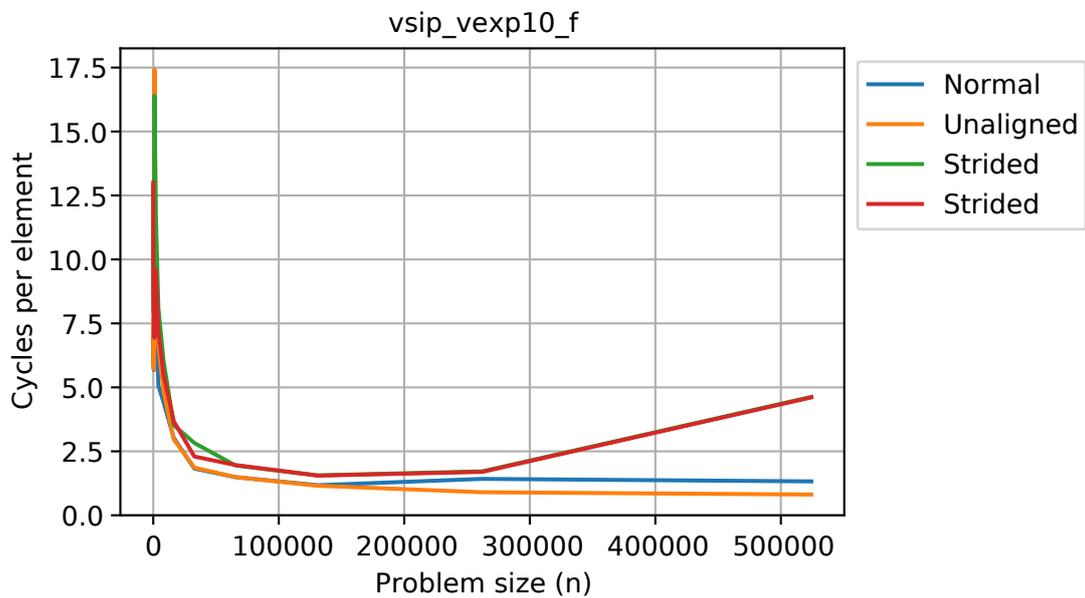
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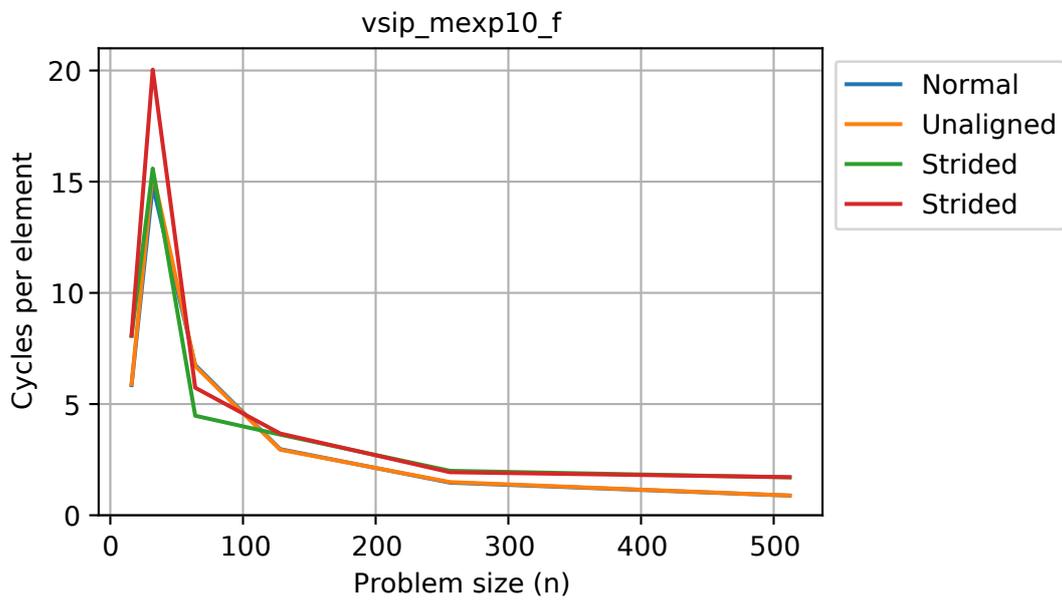
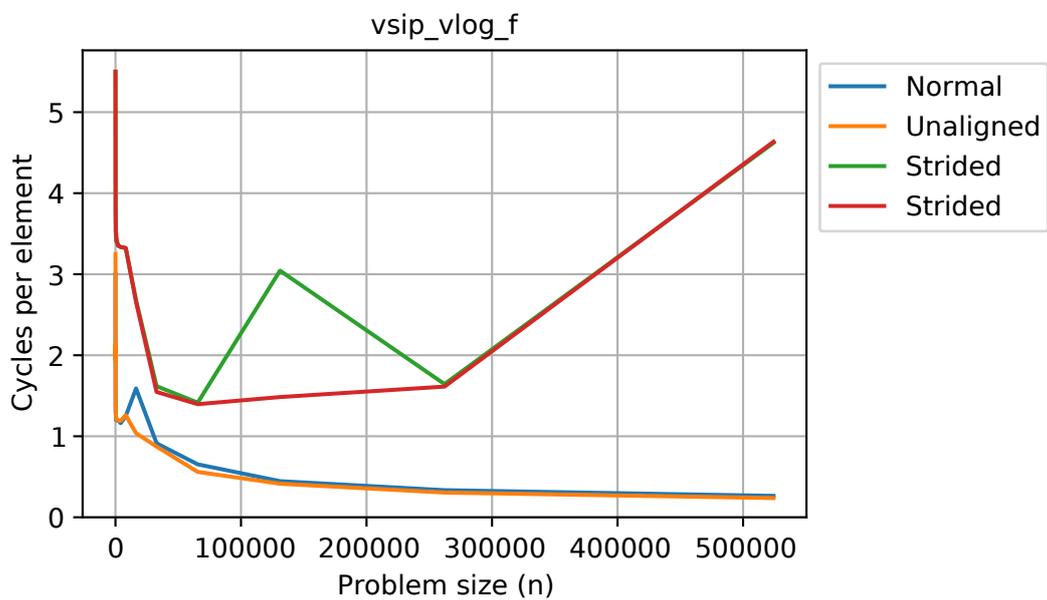
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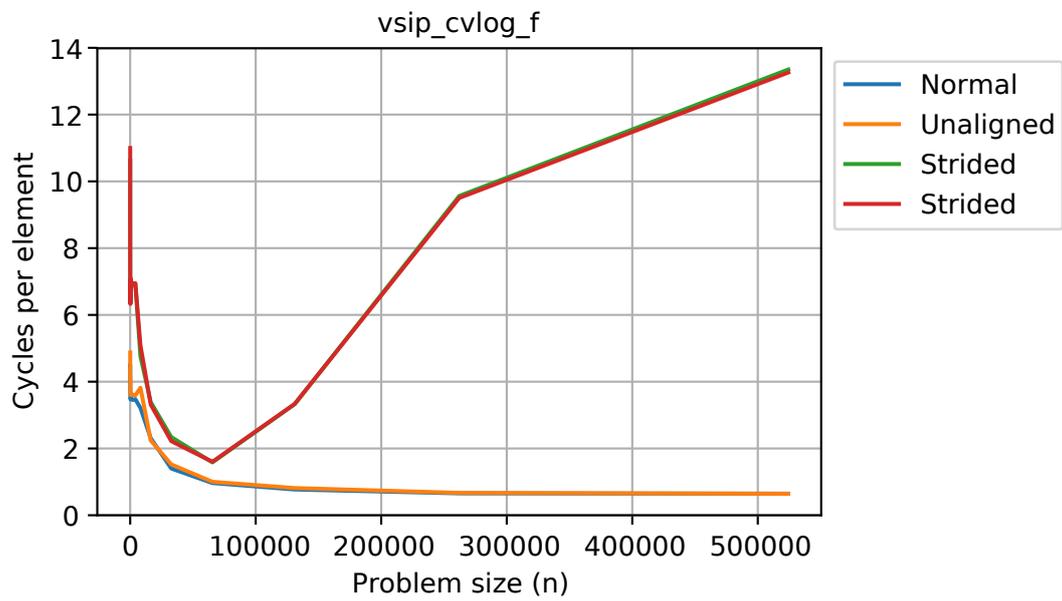
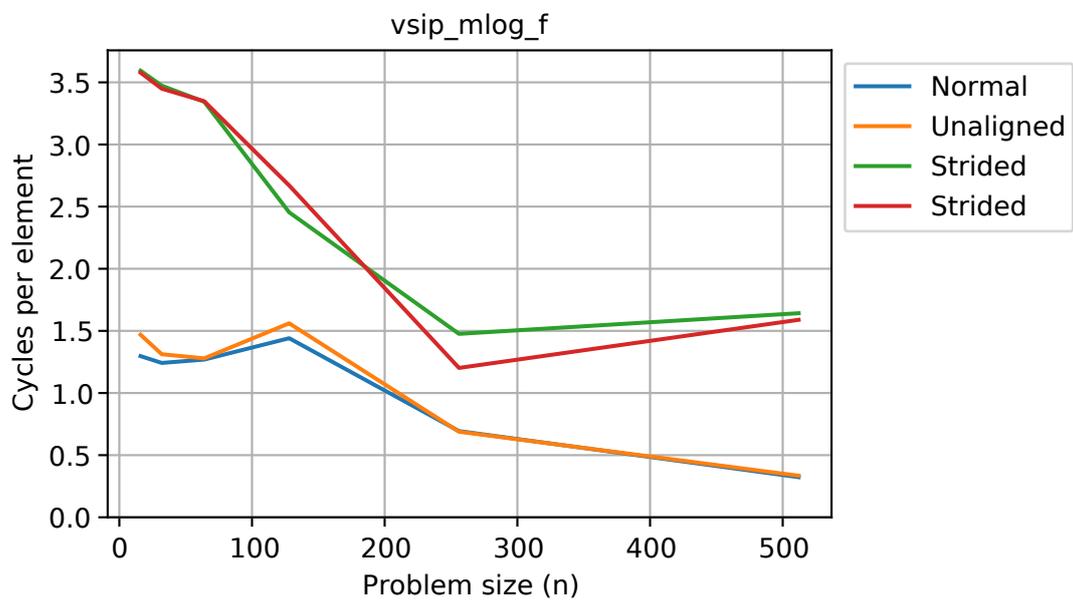


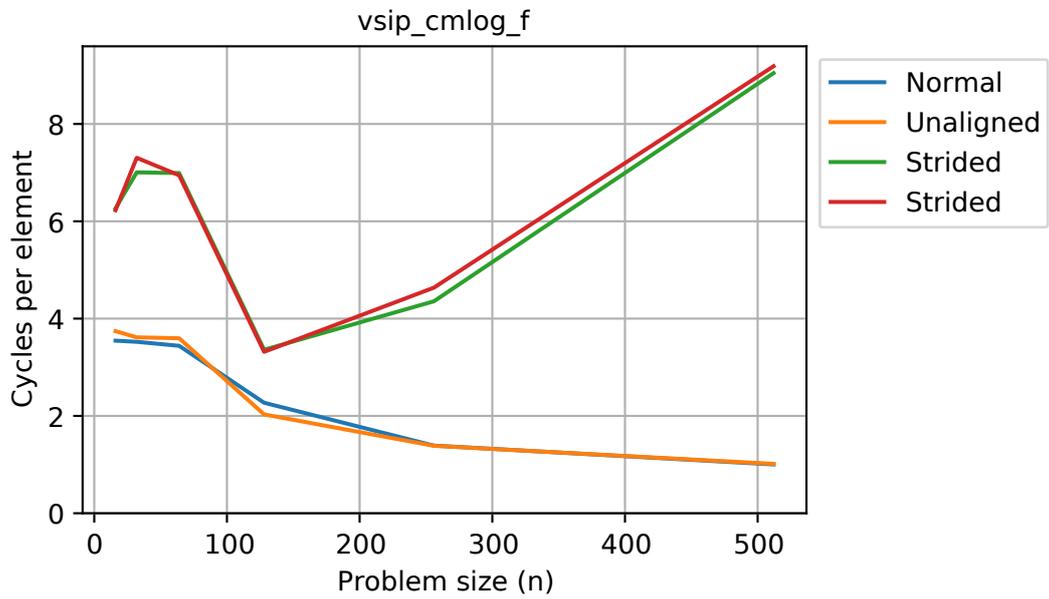
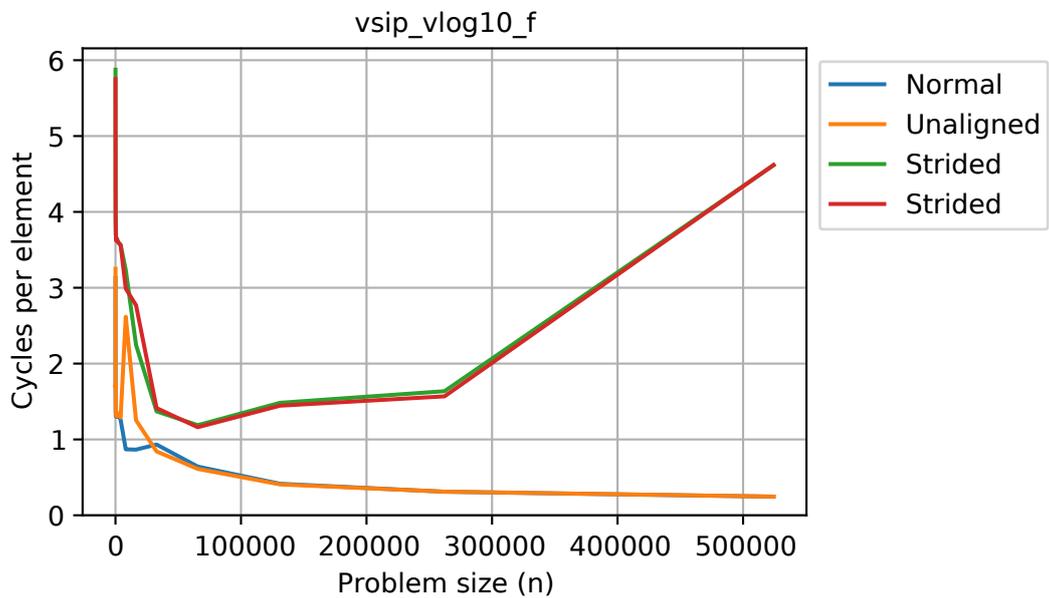
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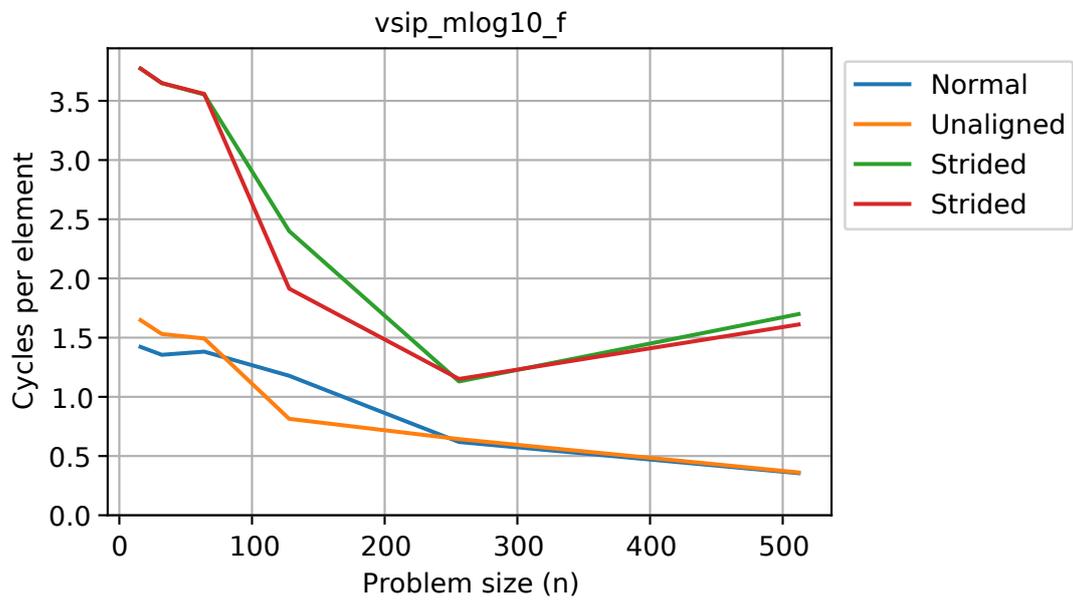
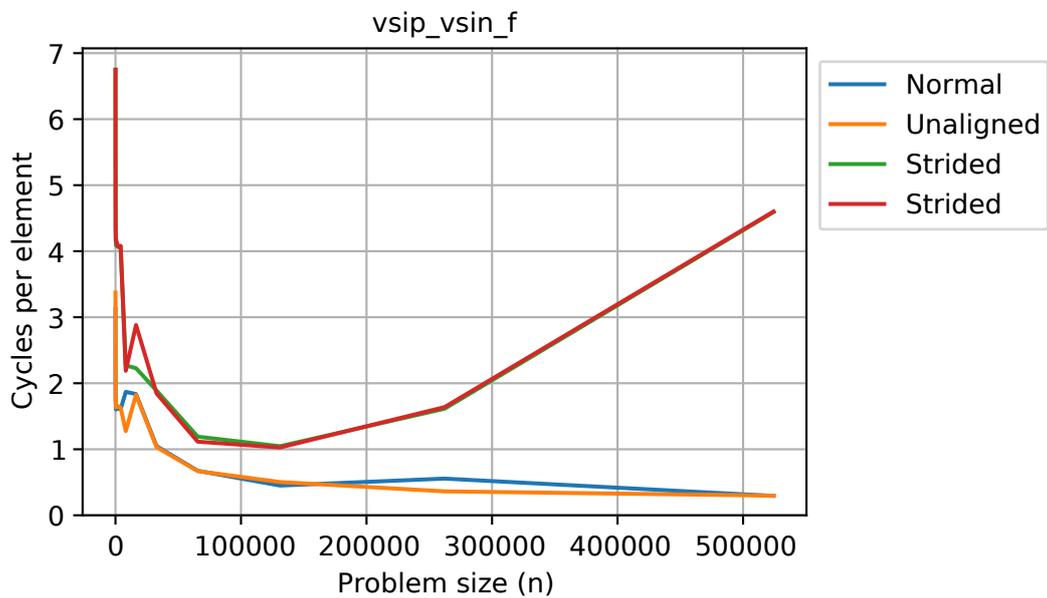


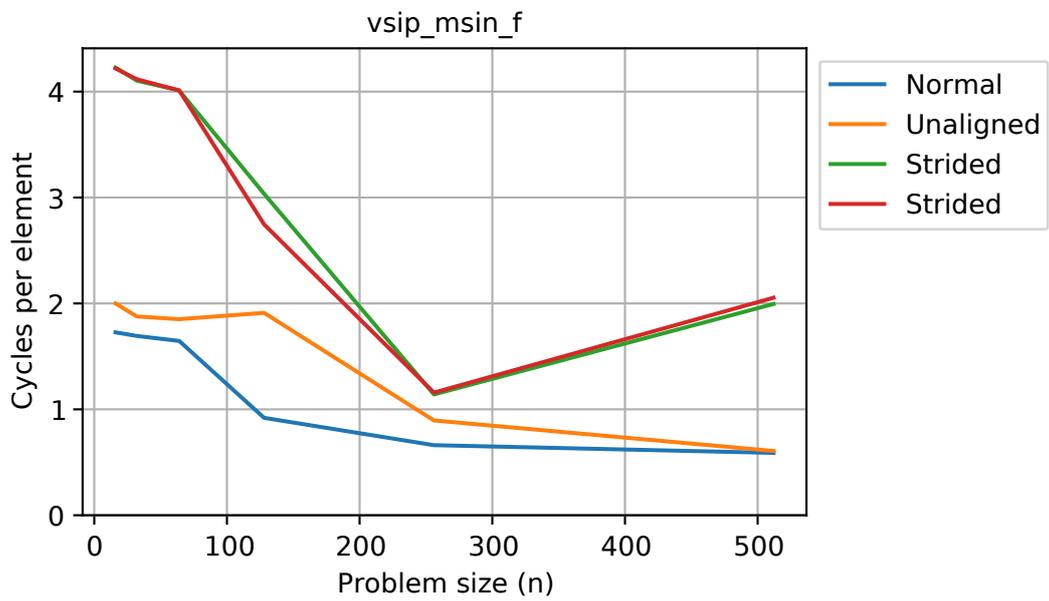
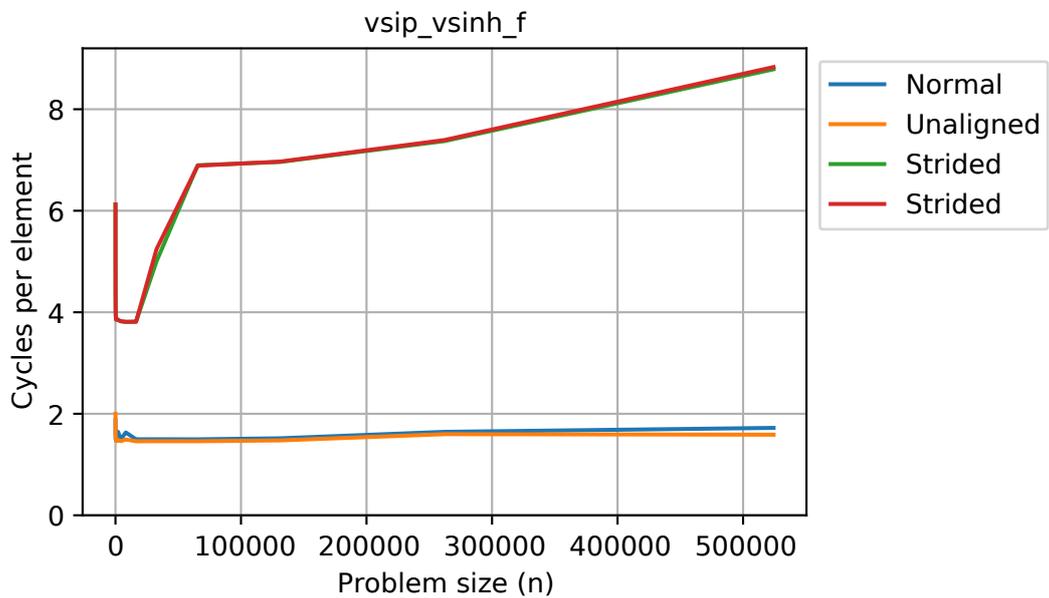
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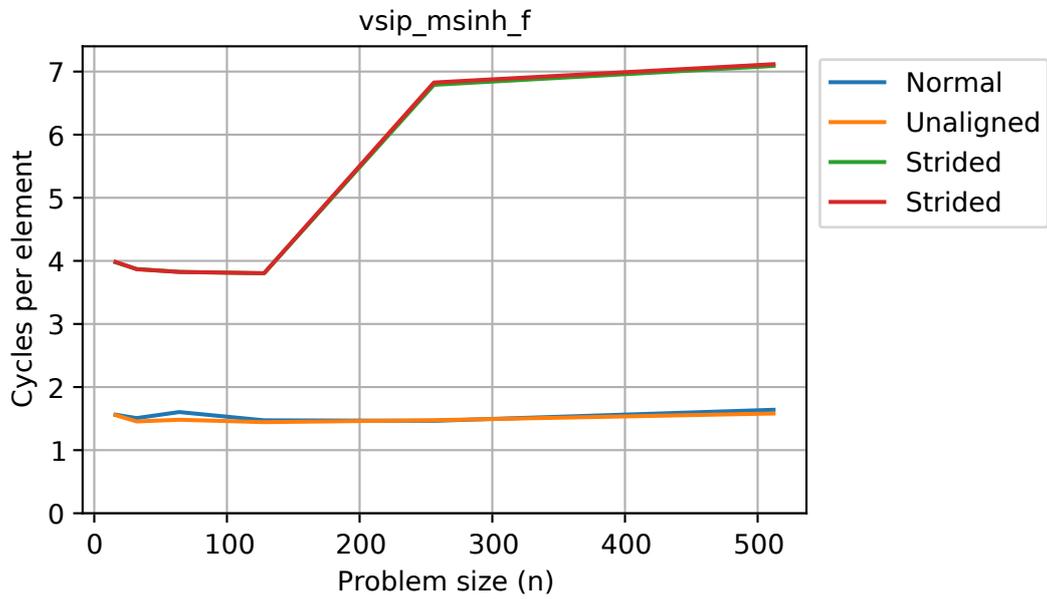
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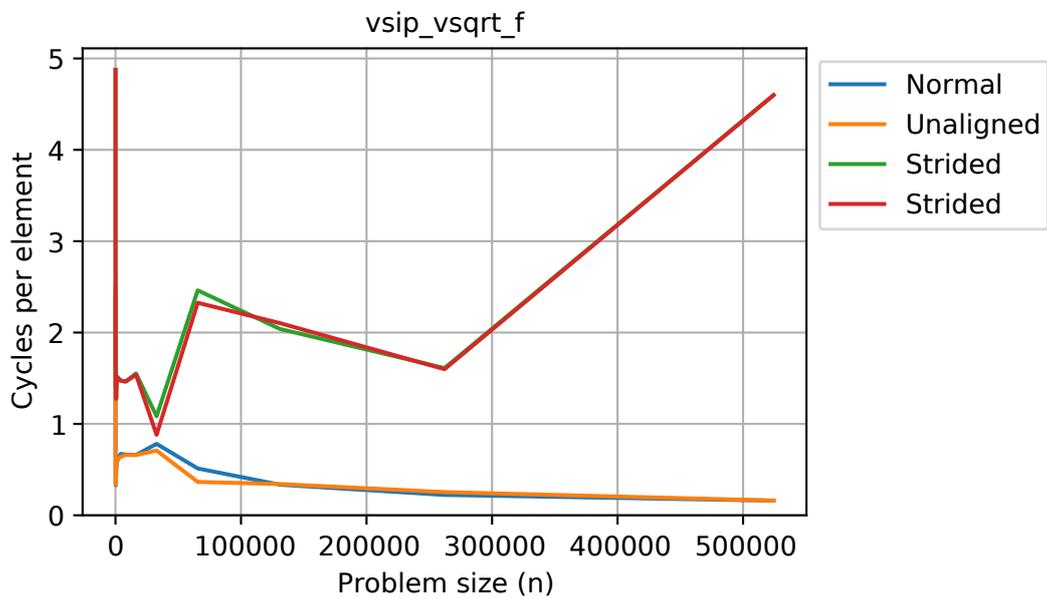
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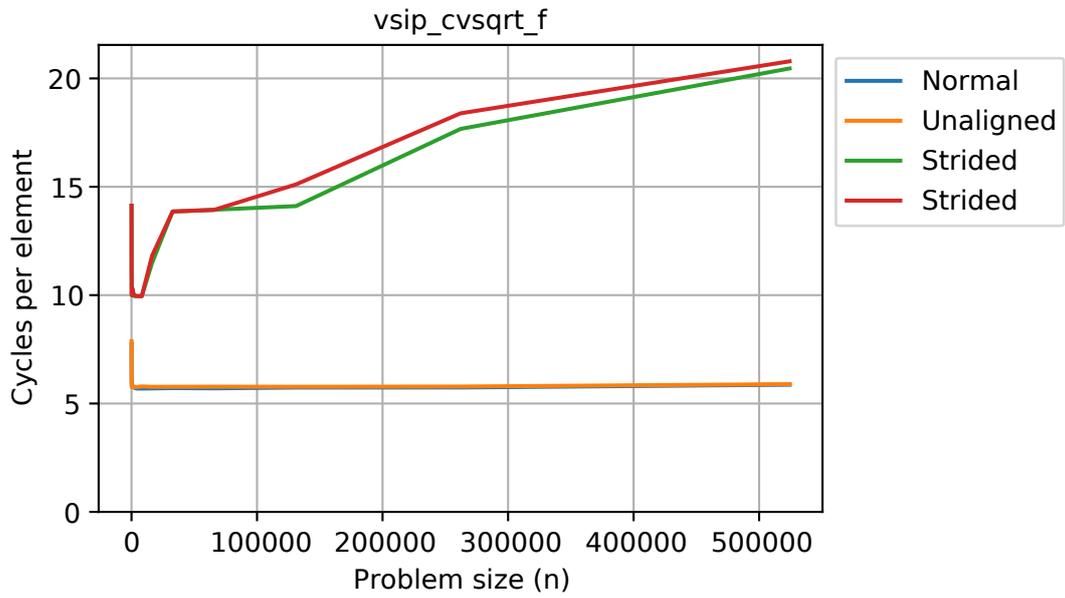
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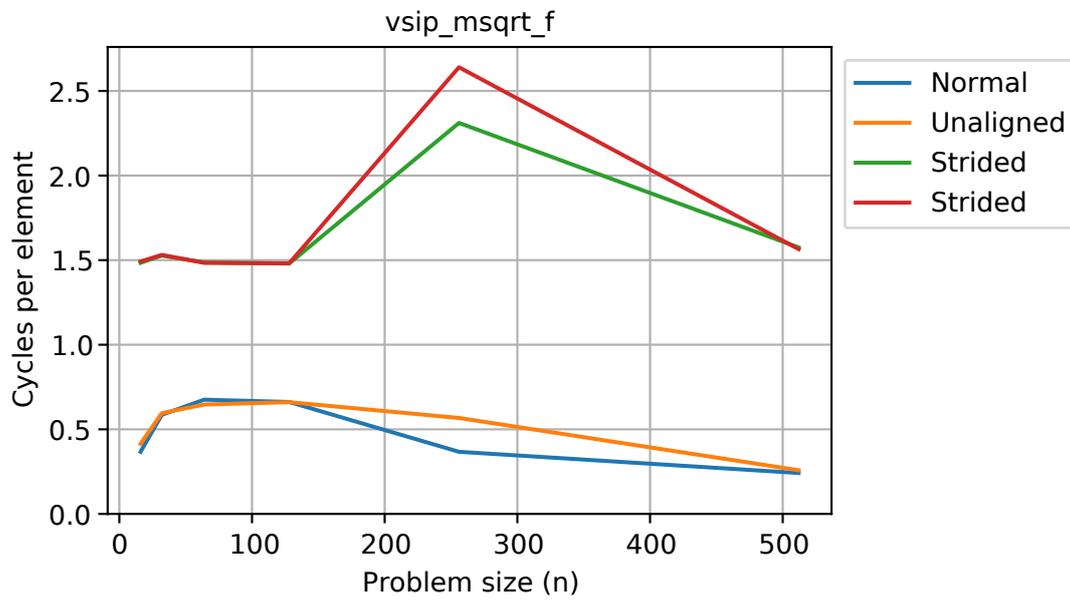


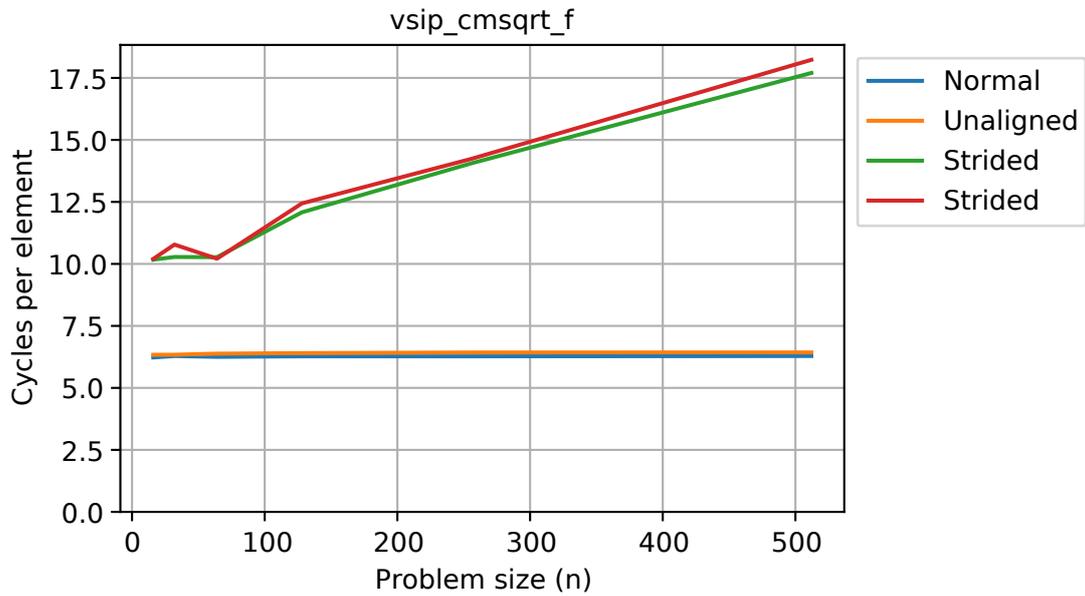
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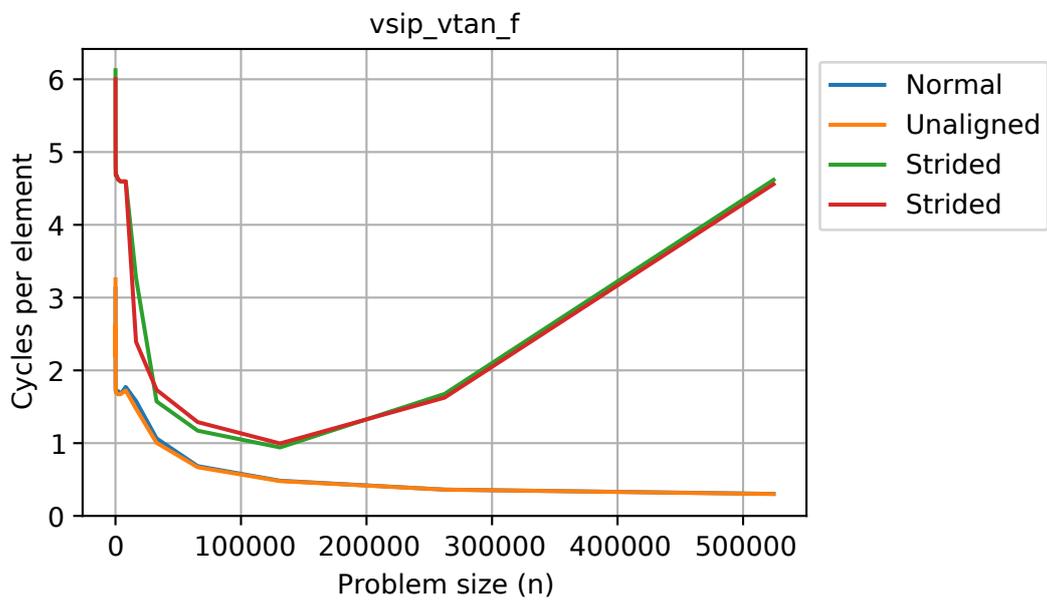


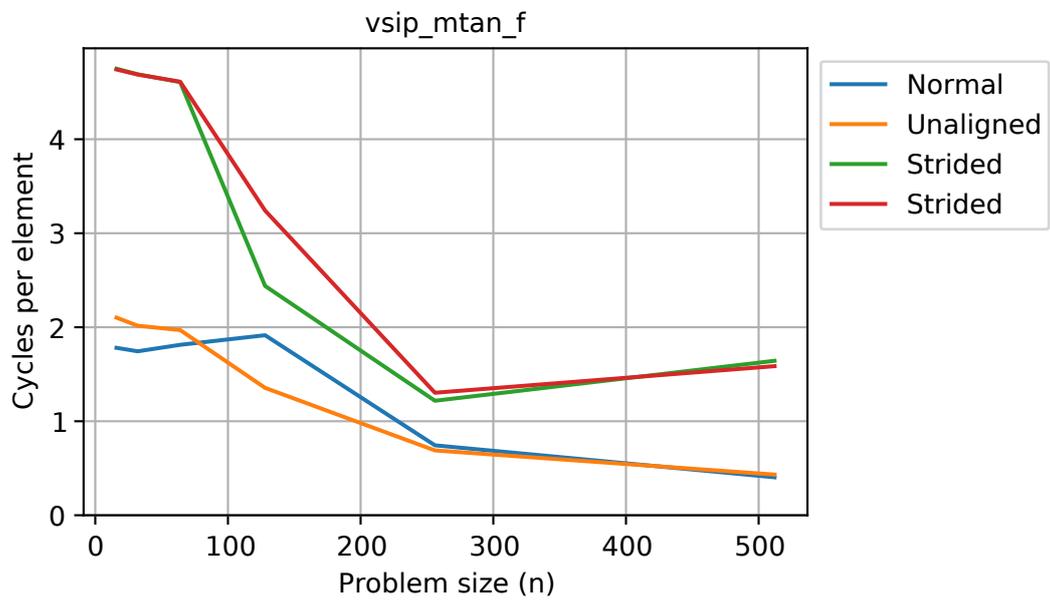
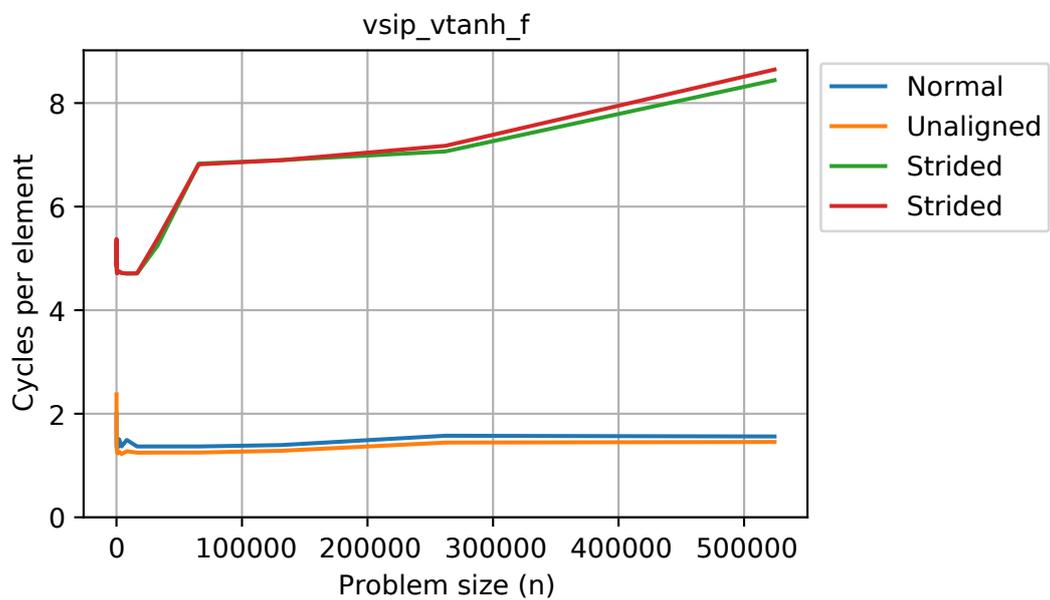
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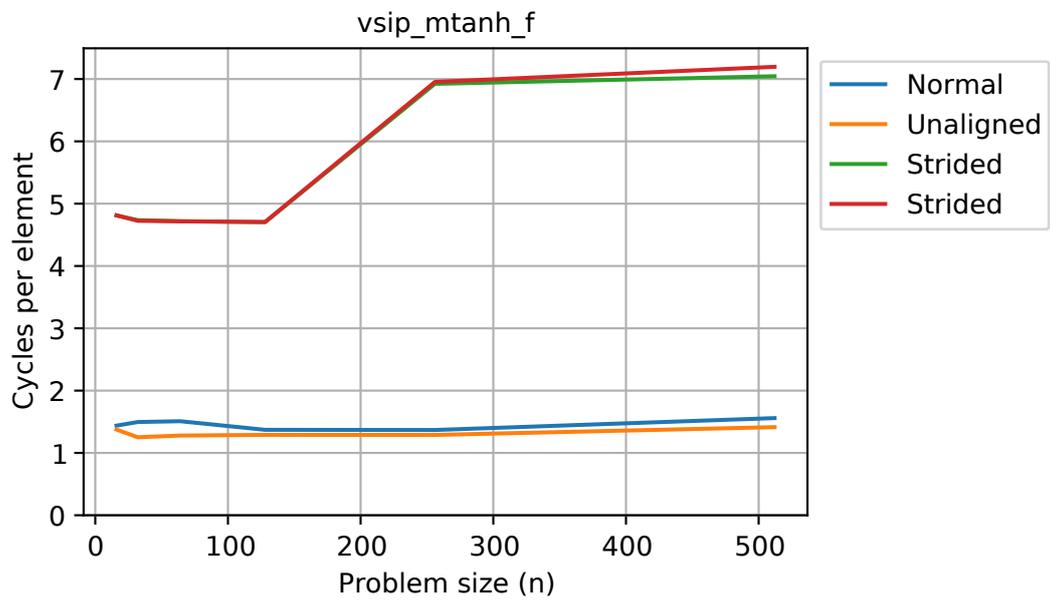


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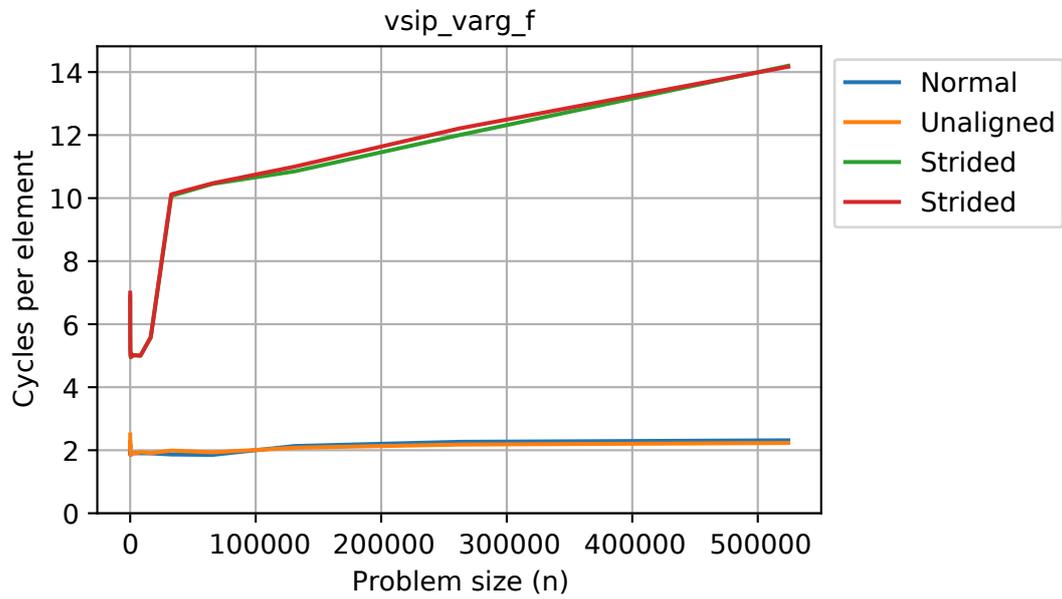
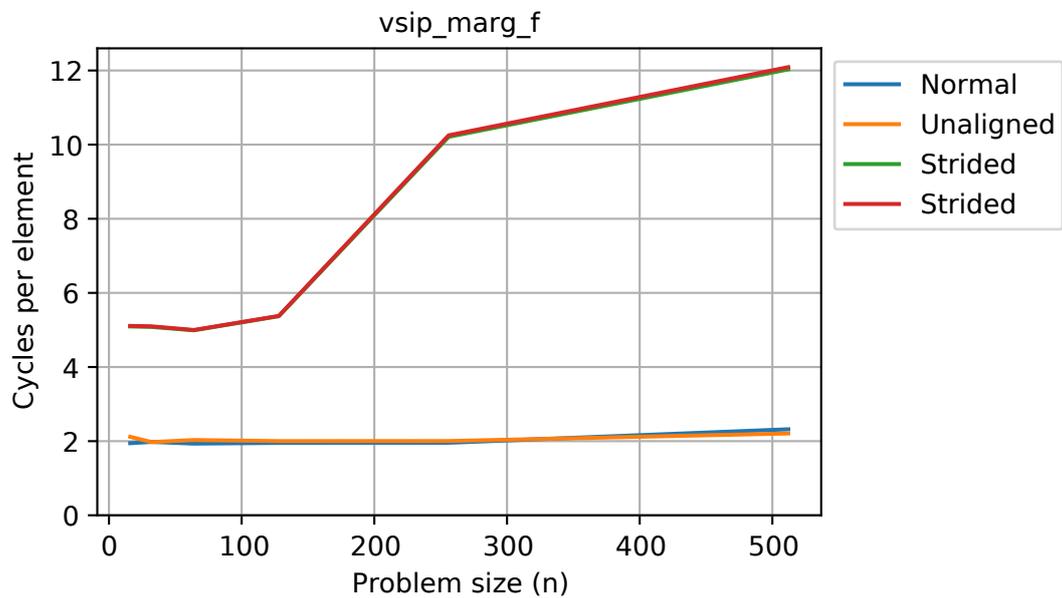
vsip_mtanh_f**vsip_vtanh_f**

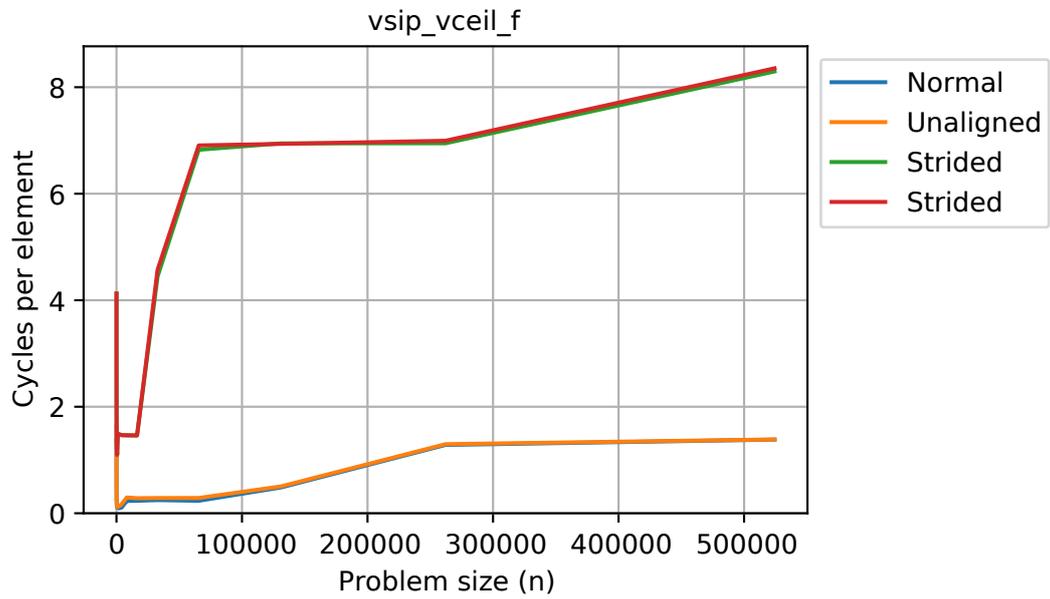
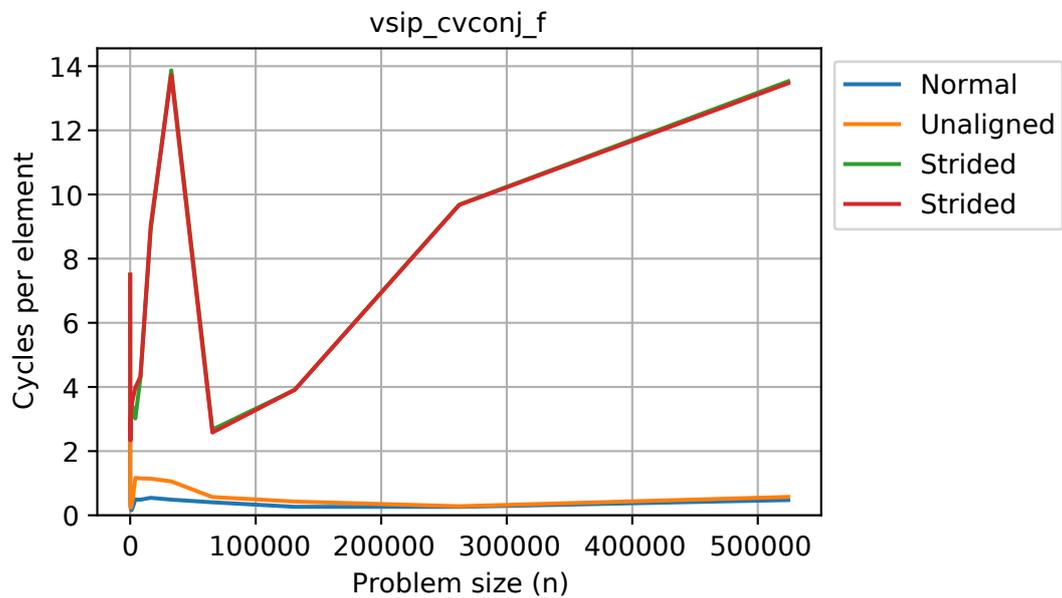
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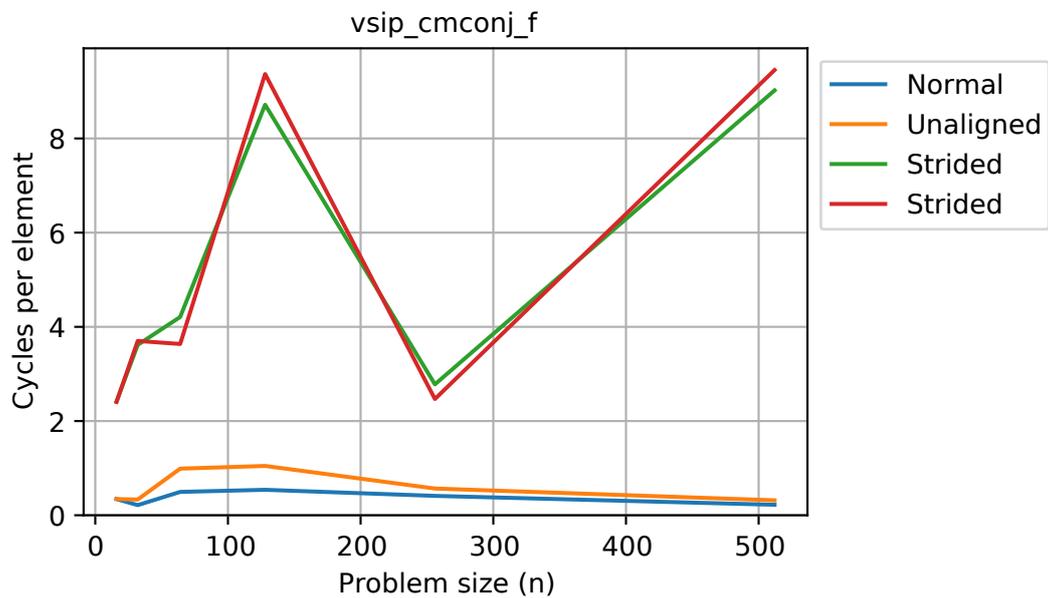
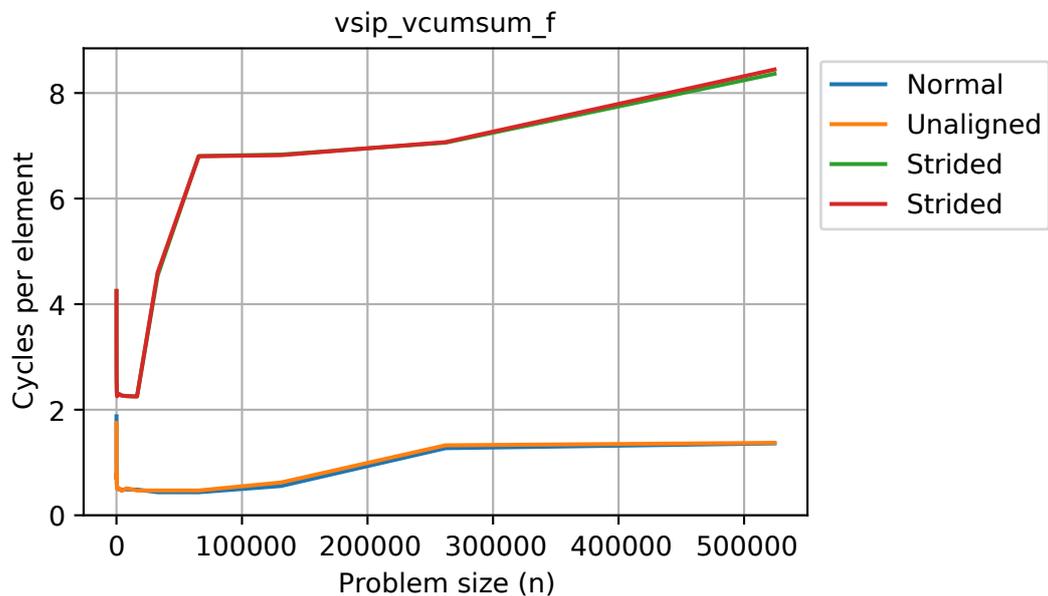


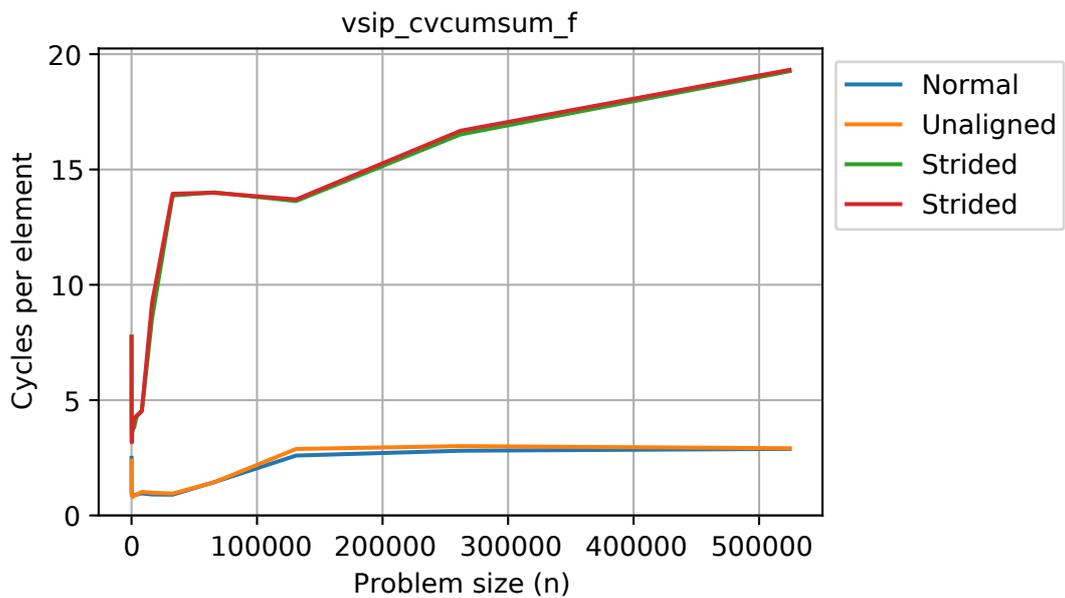
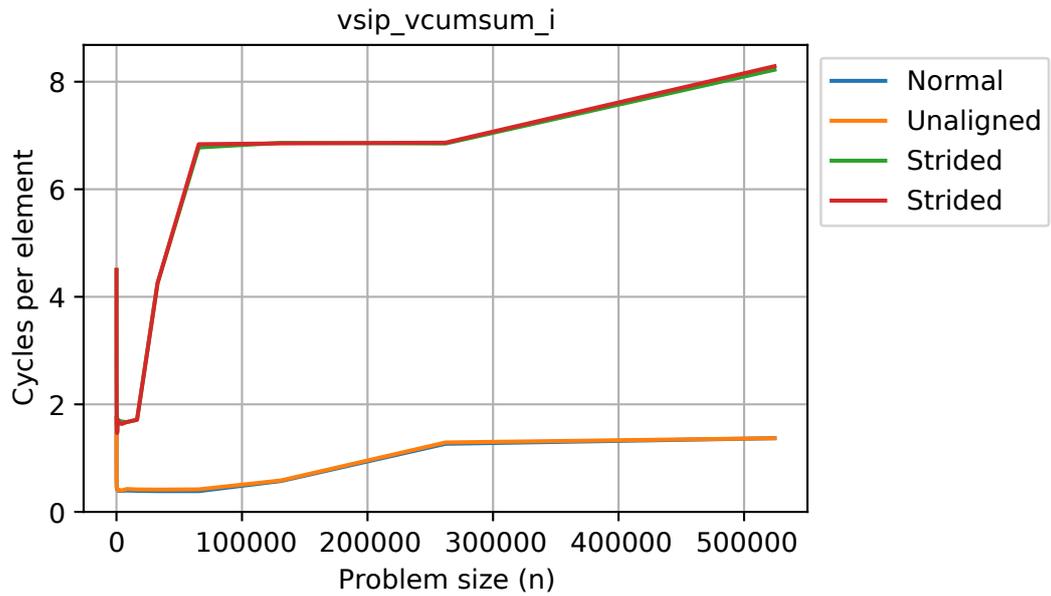
2.2 Unary Operations

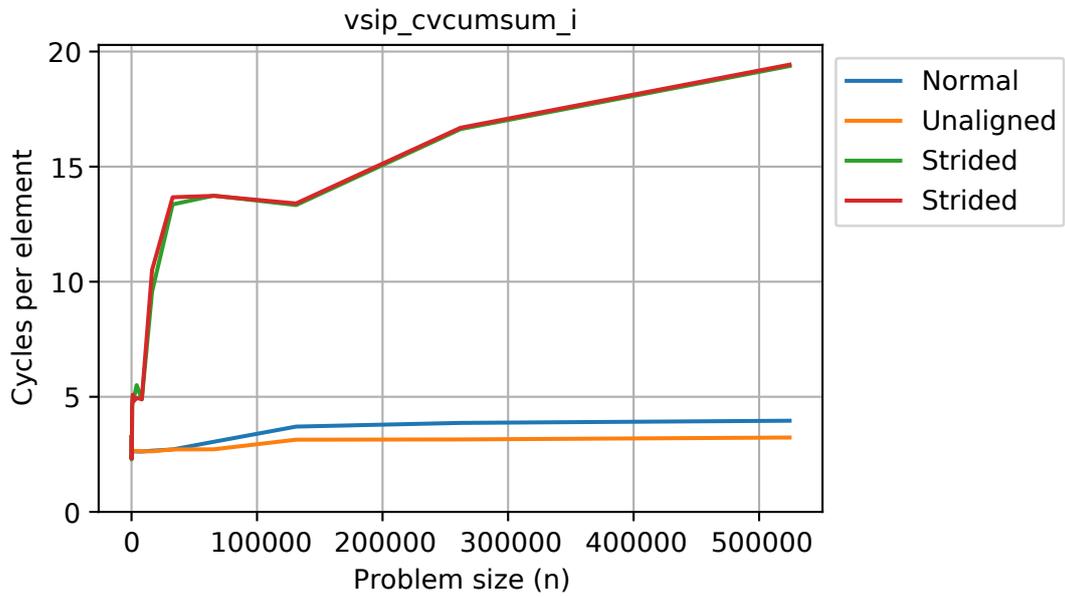
- `vsip_varg_f`
- `vsip_marg_f`
- `vsip_vceil_f`
- `vsip_cvconj_f`
- `vsip_cmconj_f`
- `vsip_Dvcumsum_P`
- `vsip_Dmcumsum_P`
- `vsip_veuler_f`
- `vsip_meuler_f`
- `vsip_vfloor_f`
- `vsip_Dvmag_P`
- `vsip_Dmmag_P`
- `vsip_vcmagsq_f`
- `vsip_Dvmeanval_P`
- `vsip_Dmmeanval_P`
- `vsip_Dvmeansqval_P`
- `vsip_Dmmeansqval_P`
- `vsip_Dvmodulate_P`
- `vsip_Dvneg_P`
- `vsip_Dmneg_P`
- `vsip_Dvrecip_P`
- `vsip_Dmrecip_P`
- `vsip_vrsqrt_f`
- `vsip_mrsqrt_f`
- `vsip_vsq_f`
- `vsip_msq_f`
- `vsip_Dvsumval_P`
- `vsip_Dmsumval_P`
- `vsip_vsumsqval_f`
- `vsip_msumsqval_f`

vsip_varg_f**vsip_marg_f**

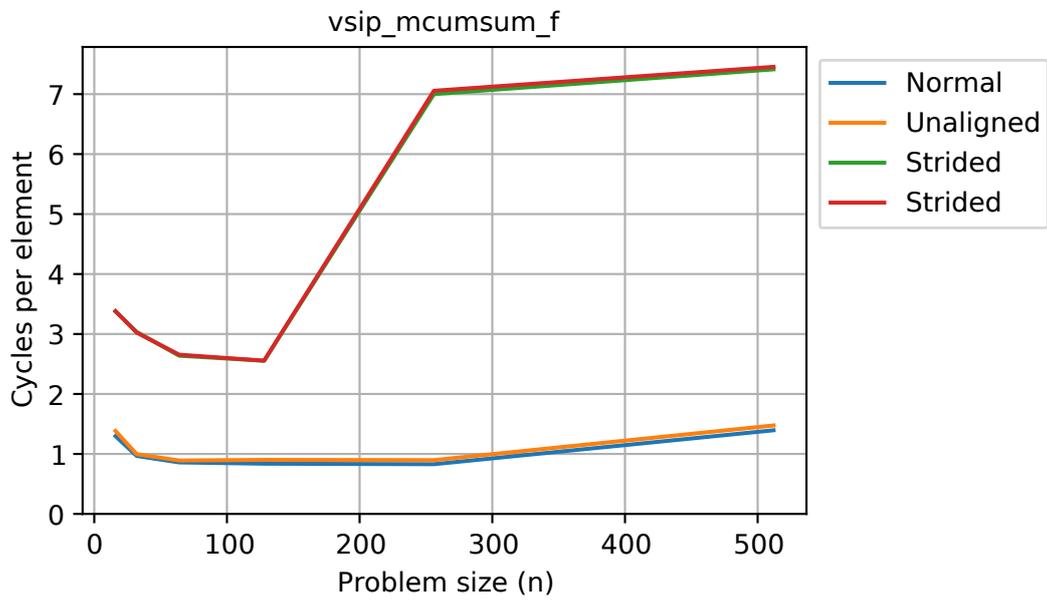
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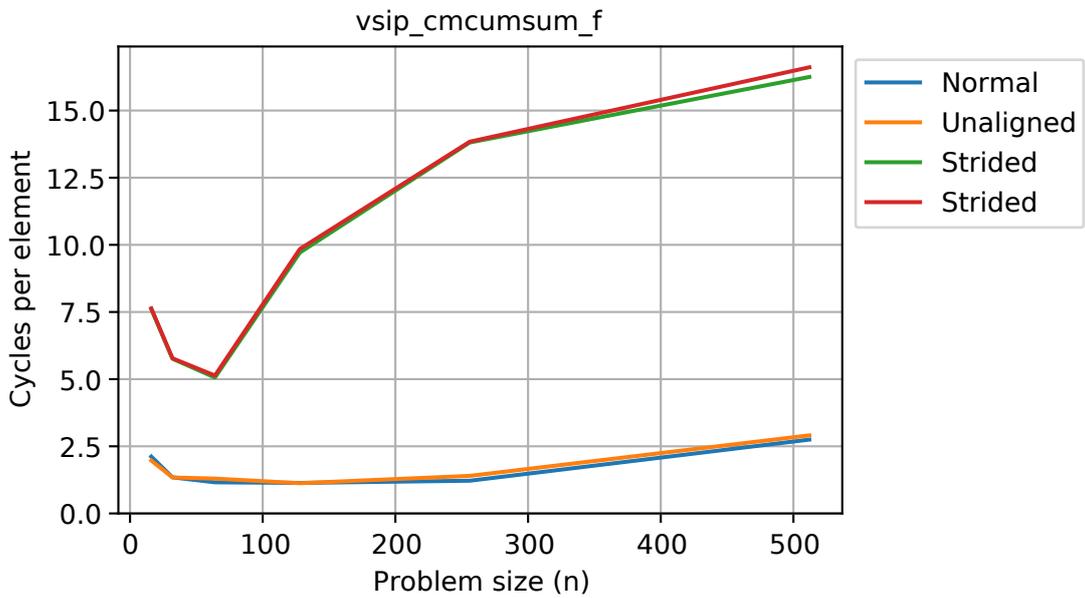
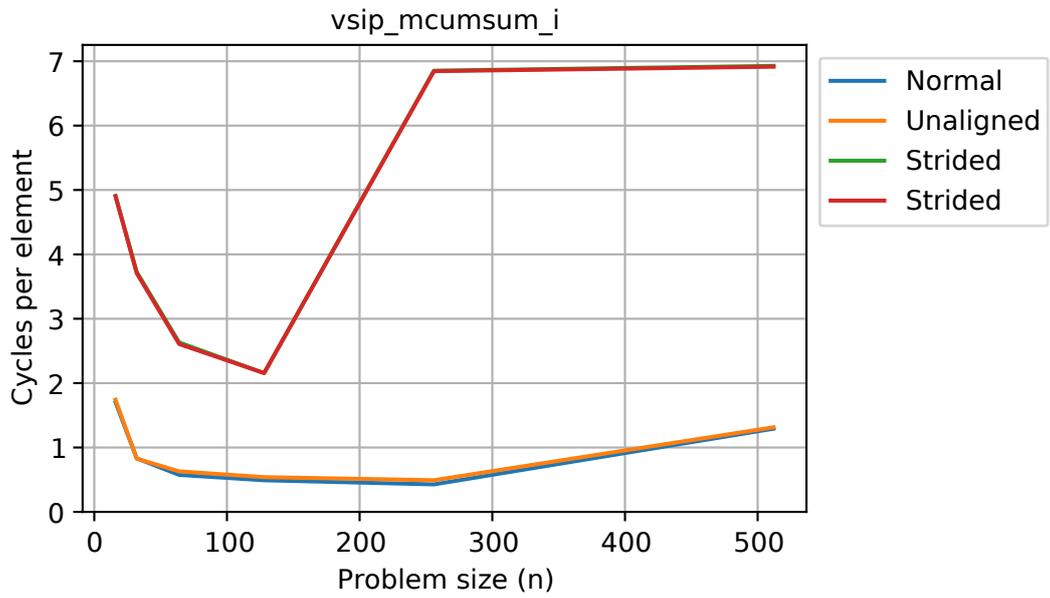
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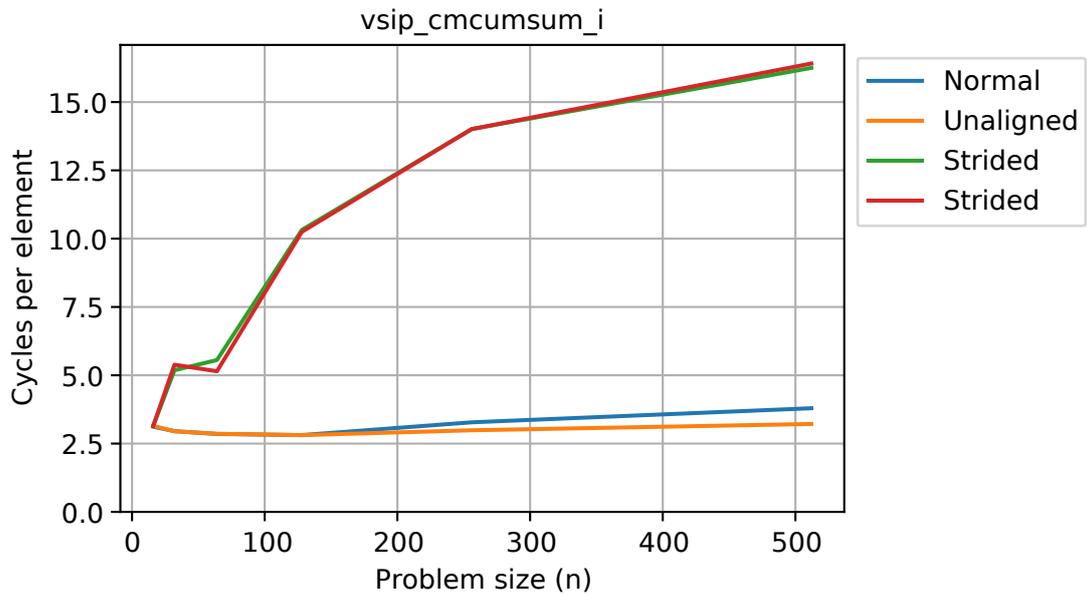




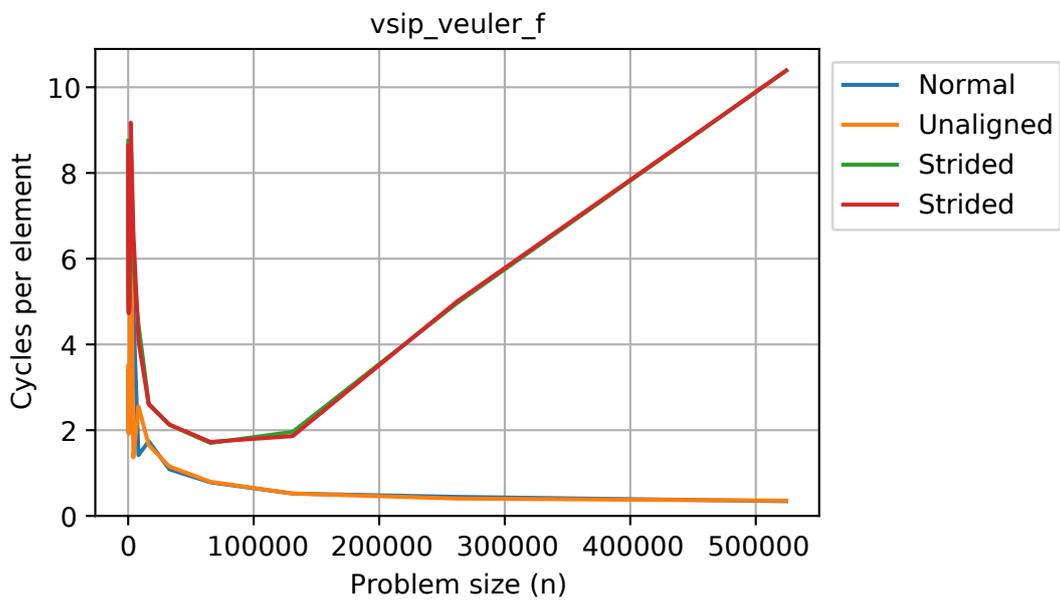
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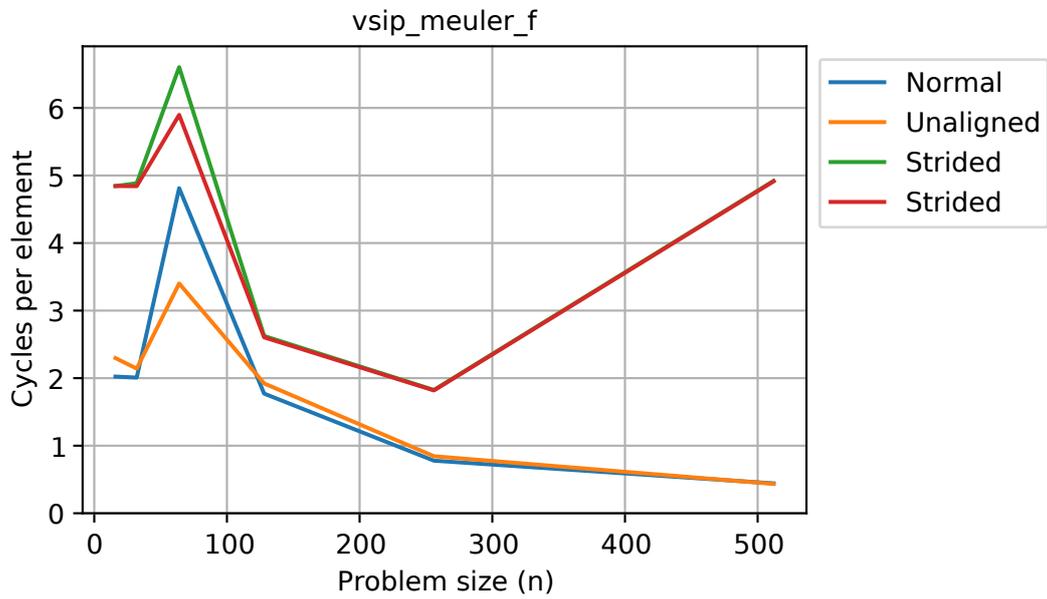
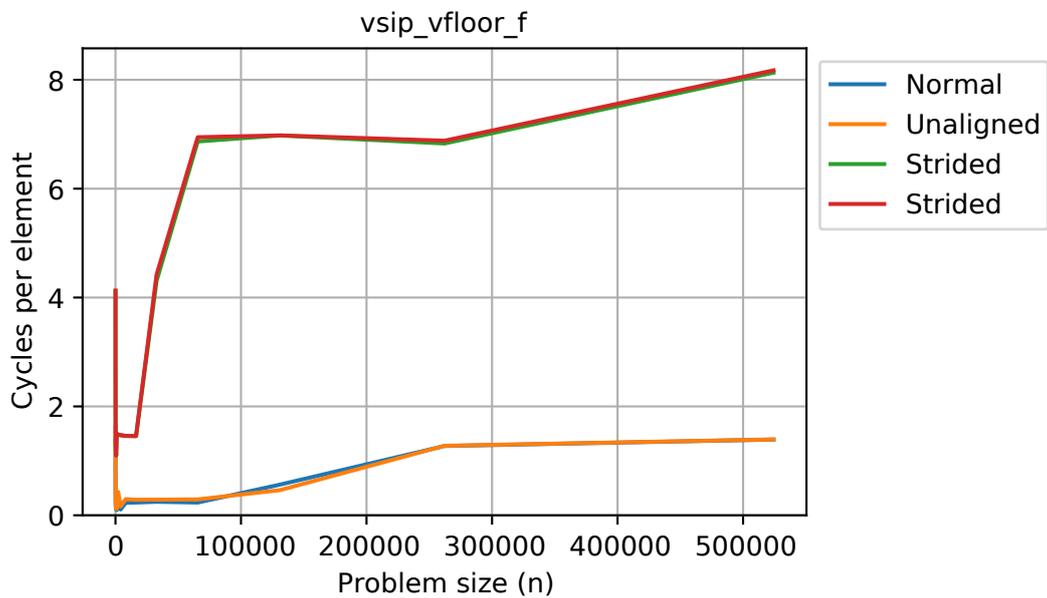




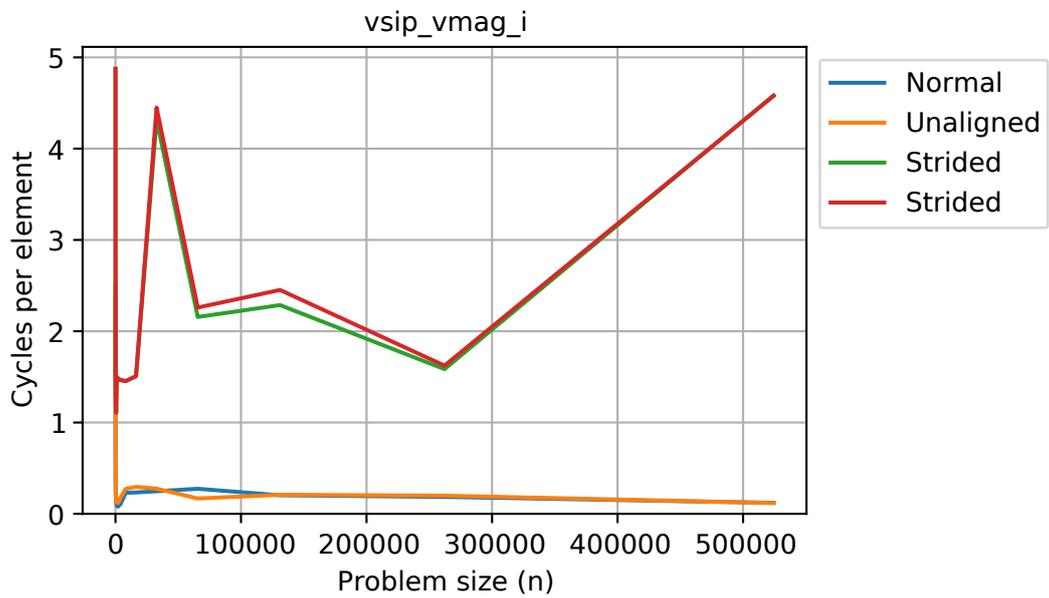
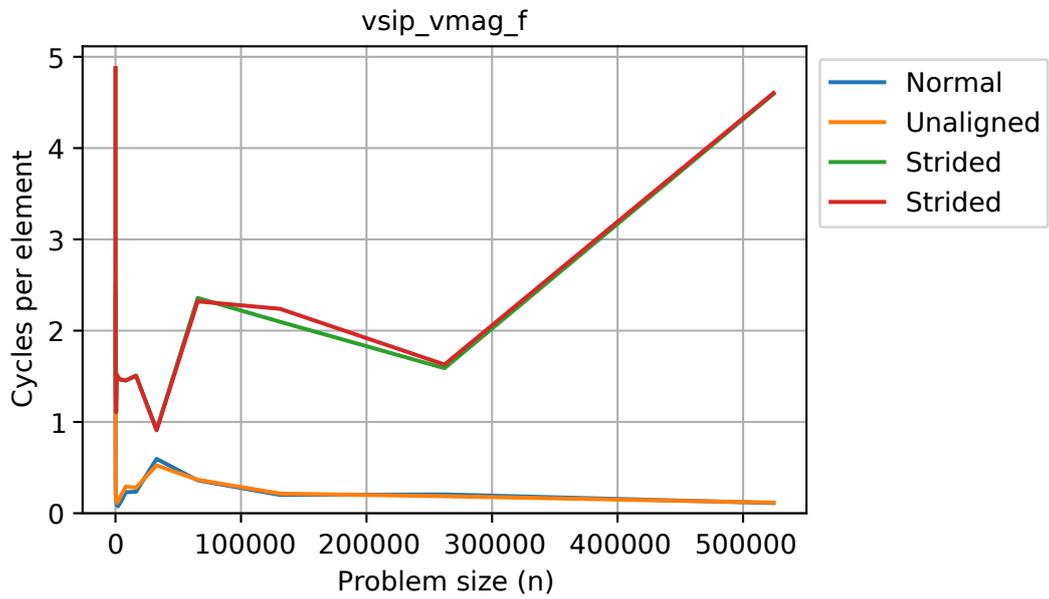


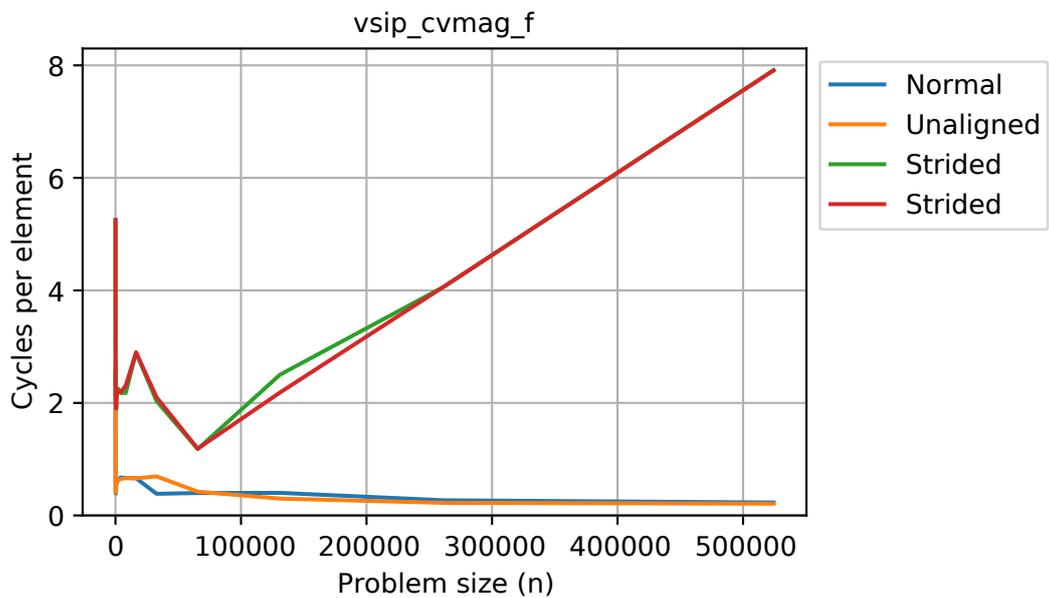
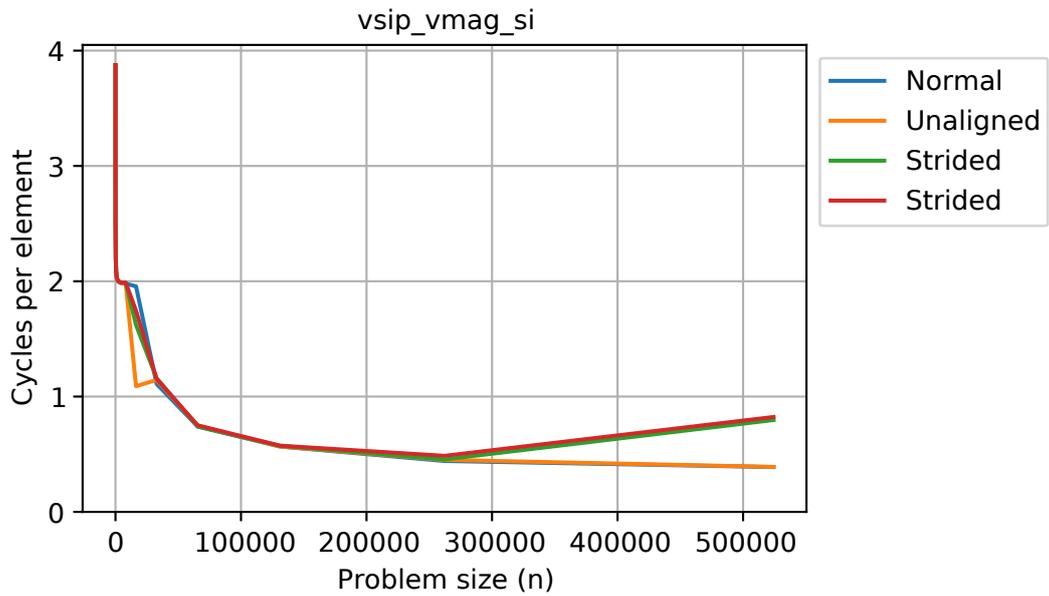
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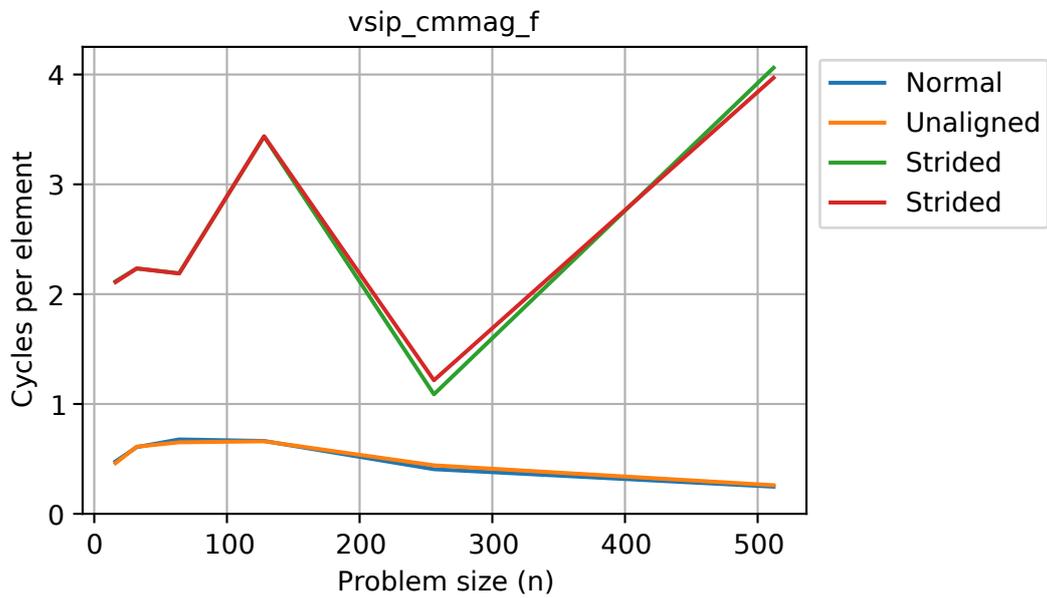
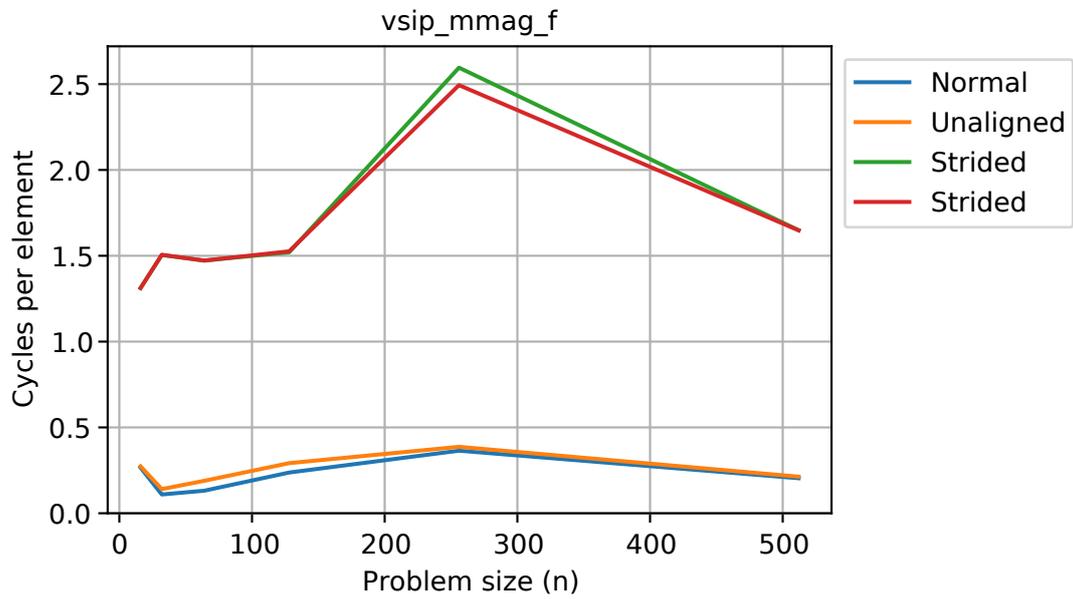


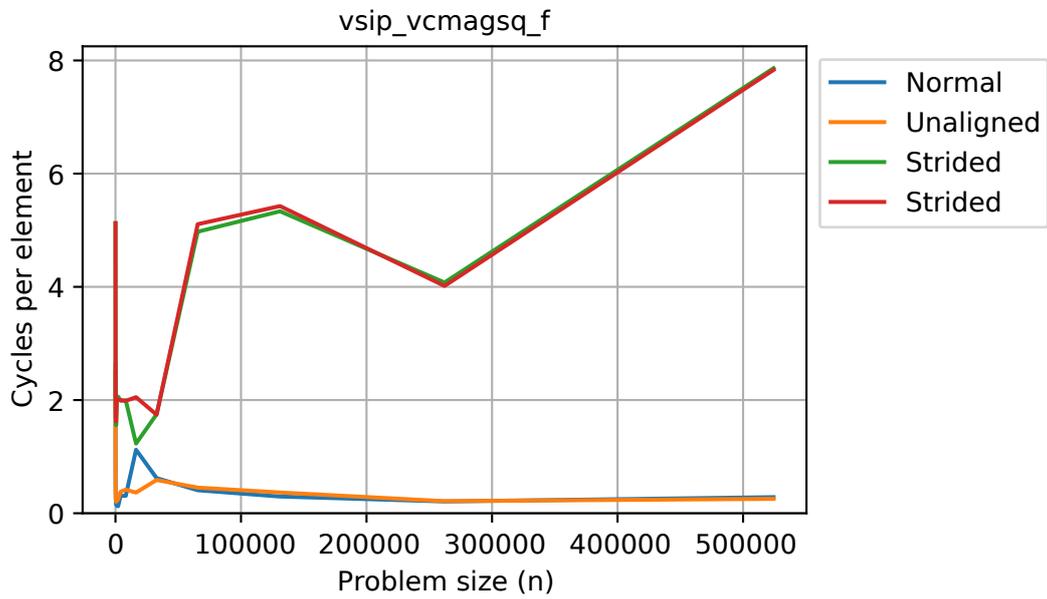
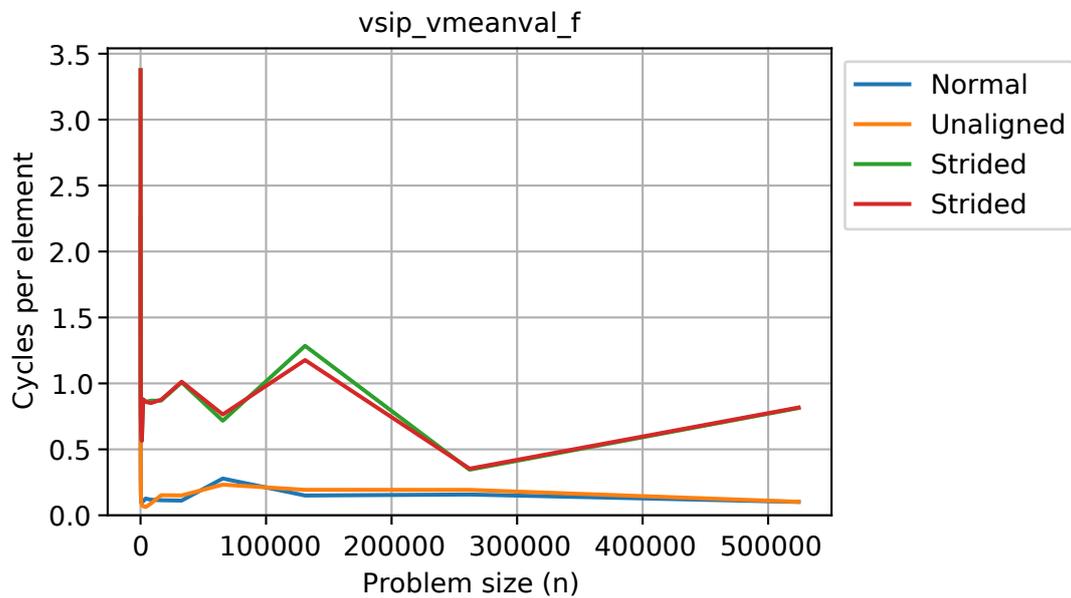
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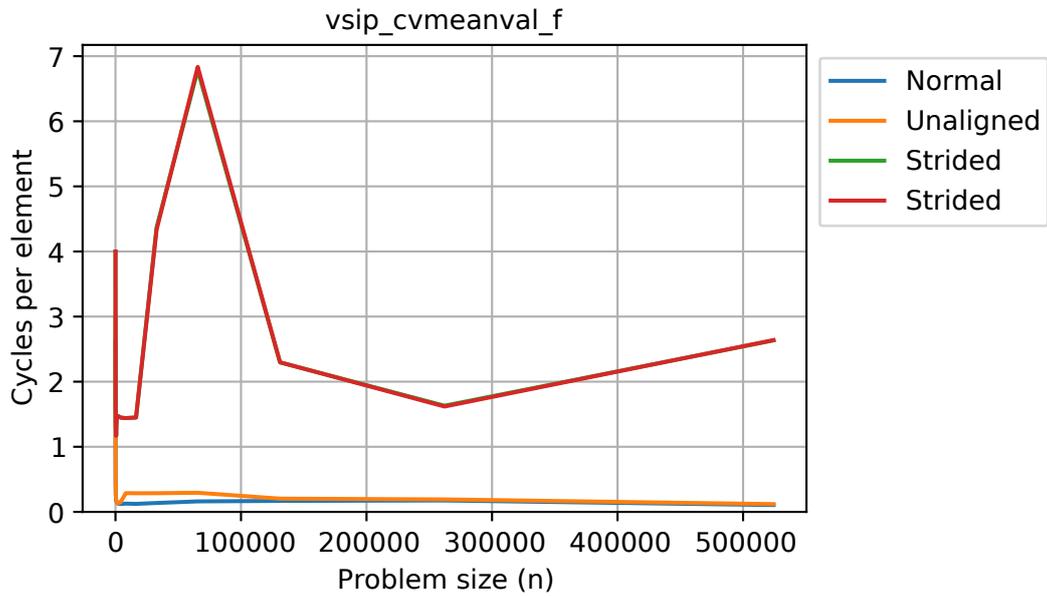
vsip_Dvmag_P



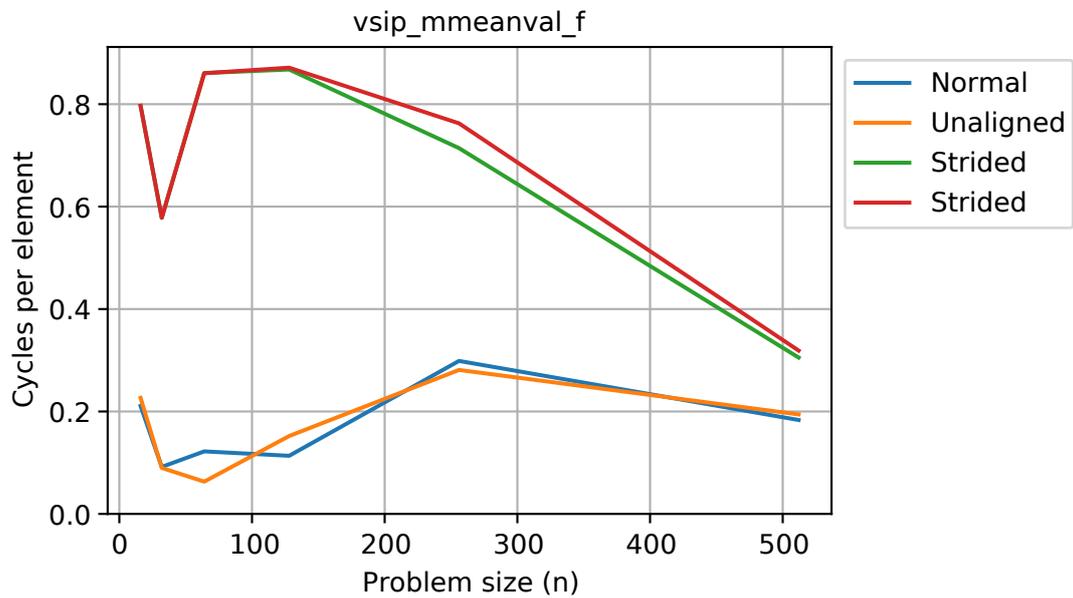


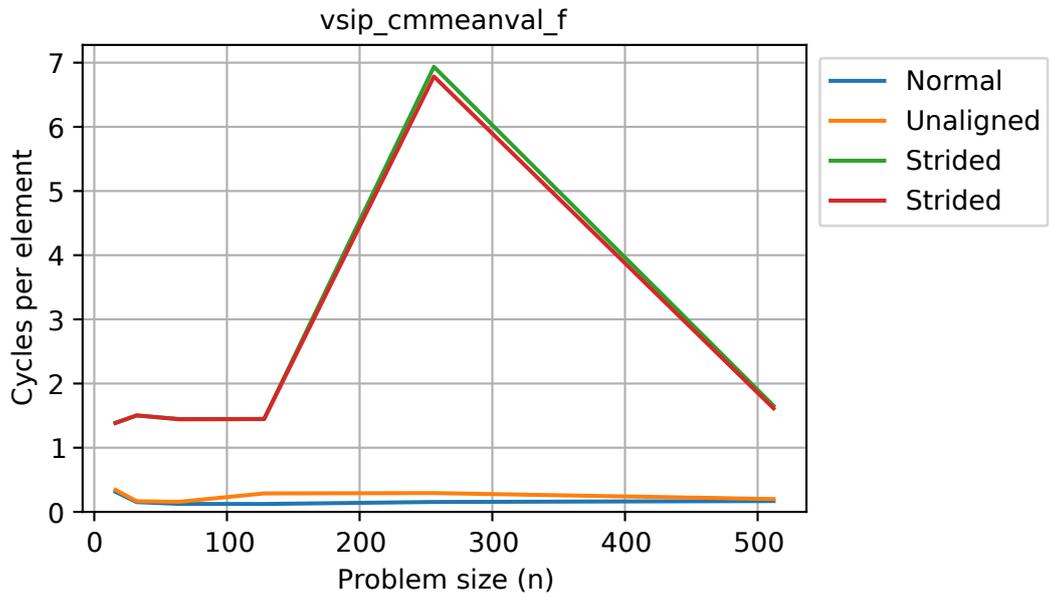
vsip_Dmmag_P

vsip_vcmagsq_f**vsip_Dvmeanval_P**

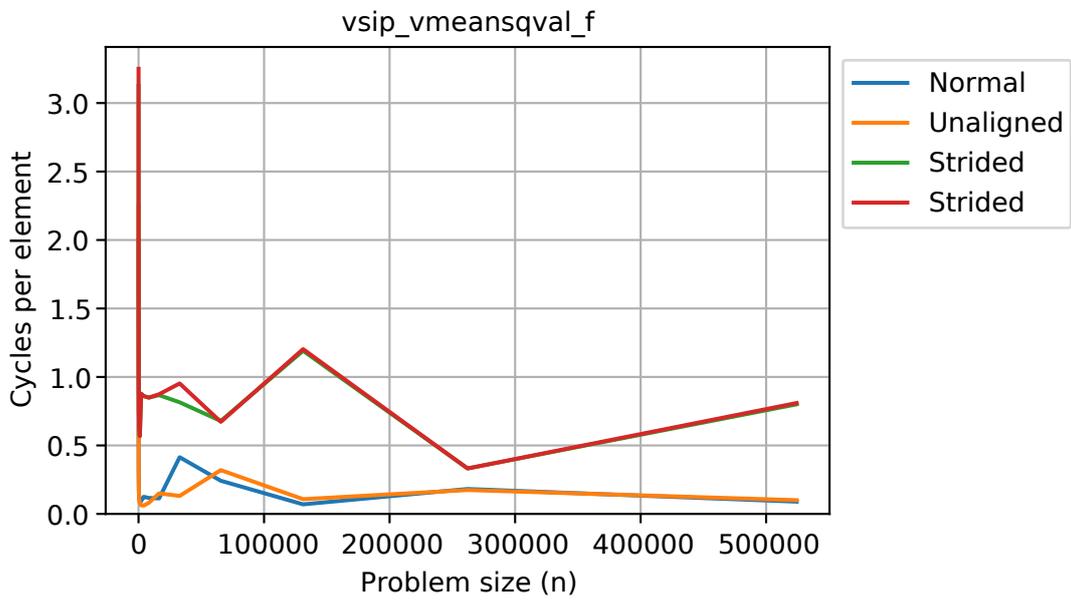


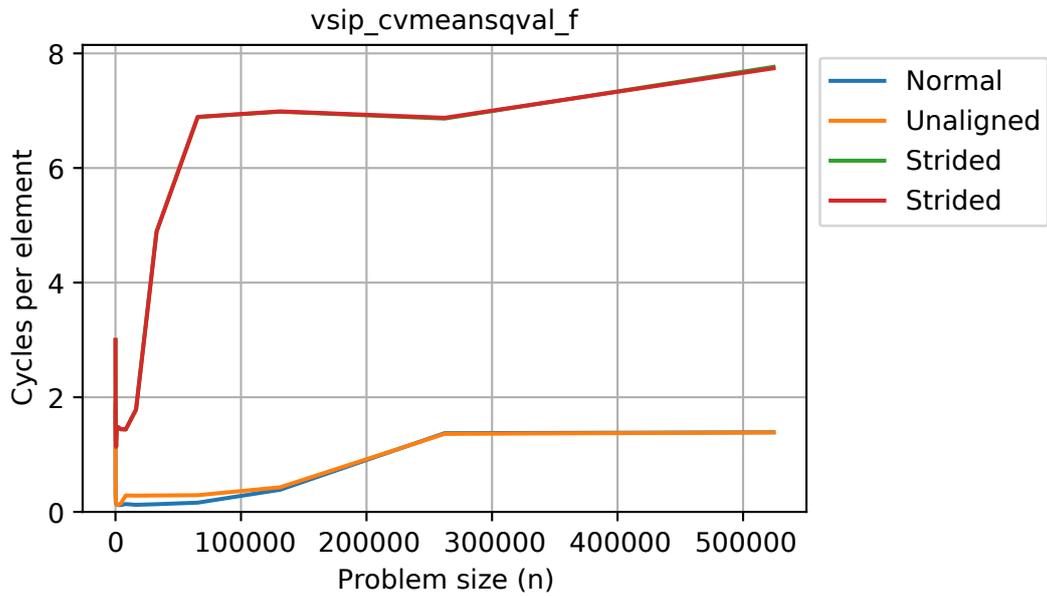
vsip_Dmmeanval_P



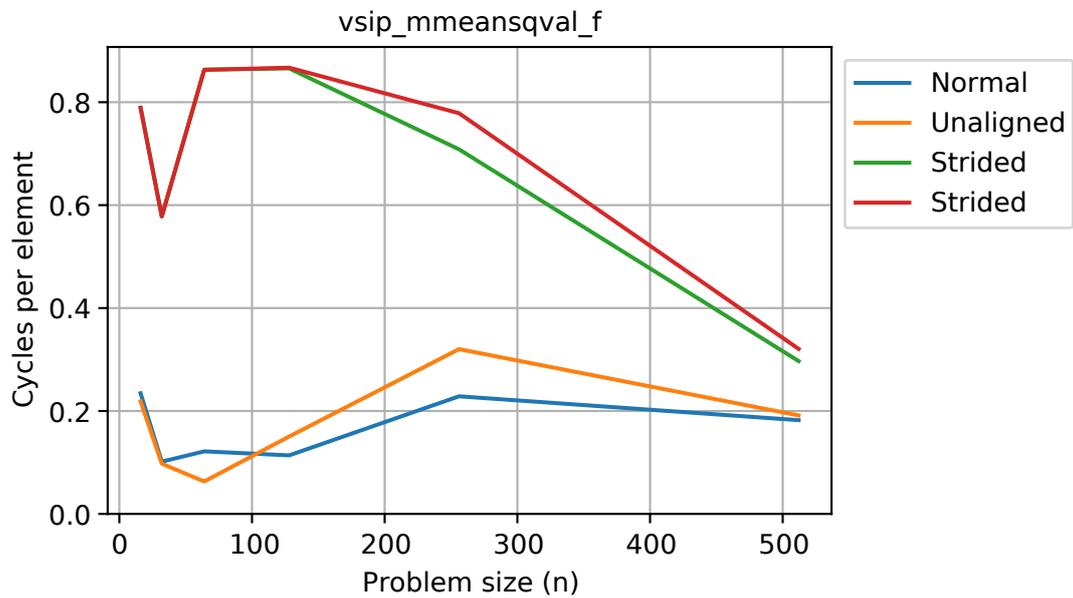


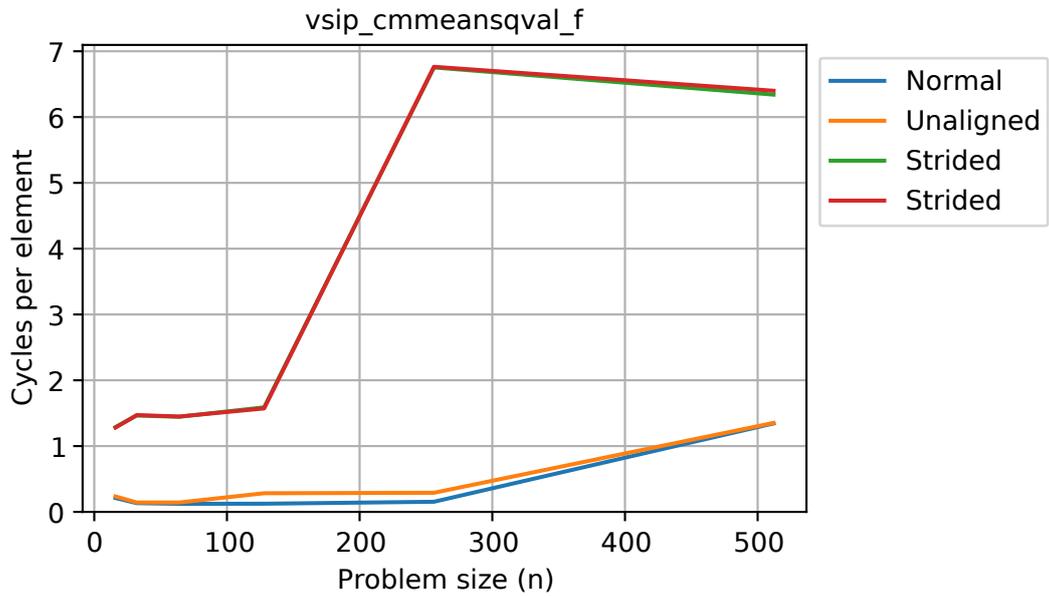
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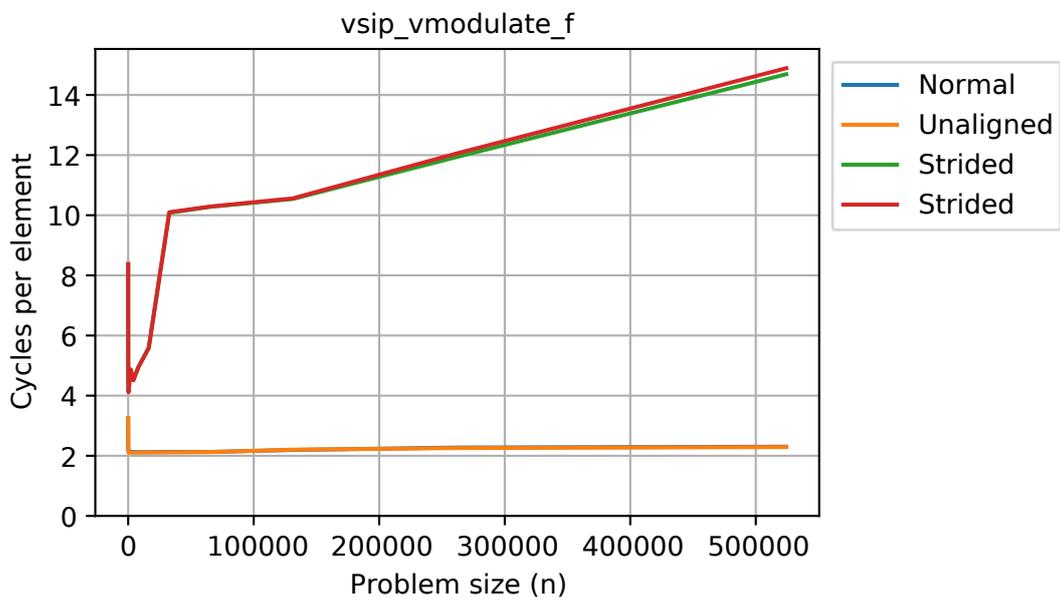


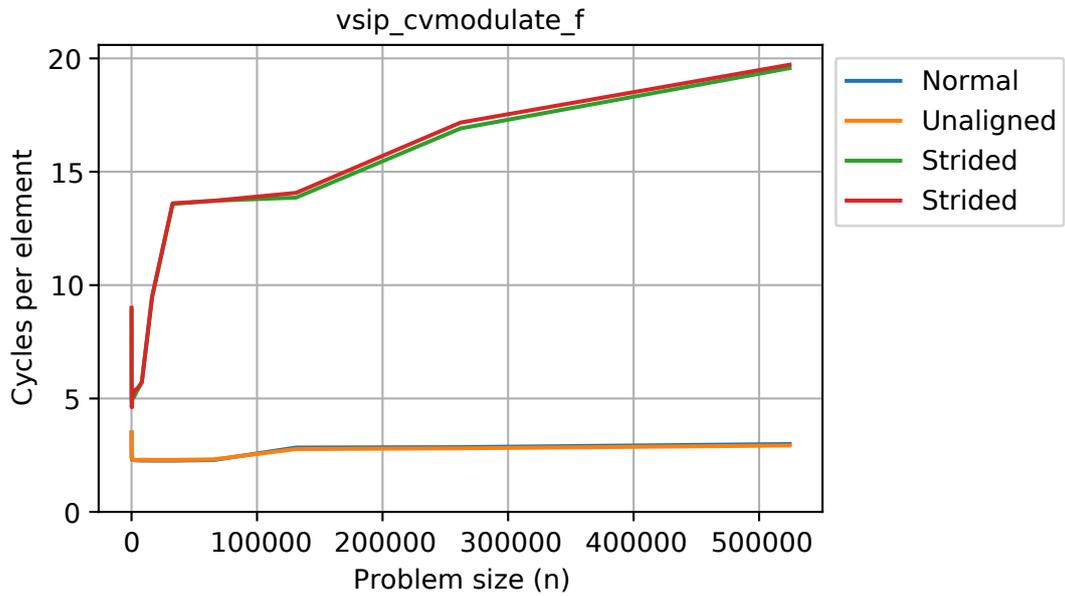
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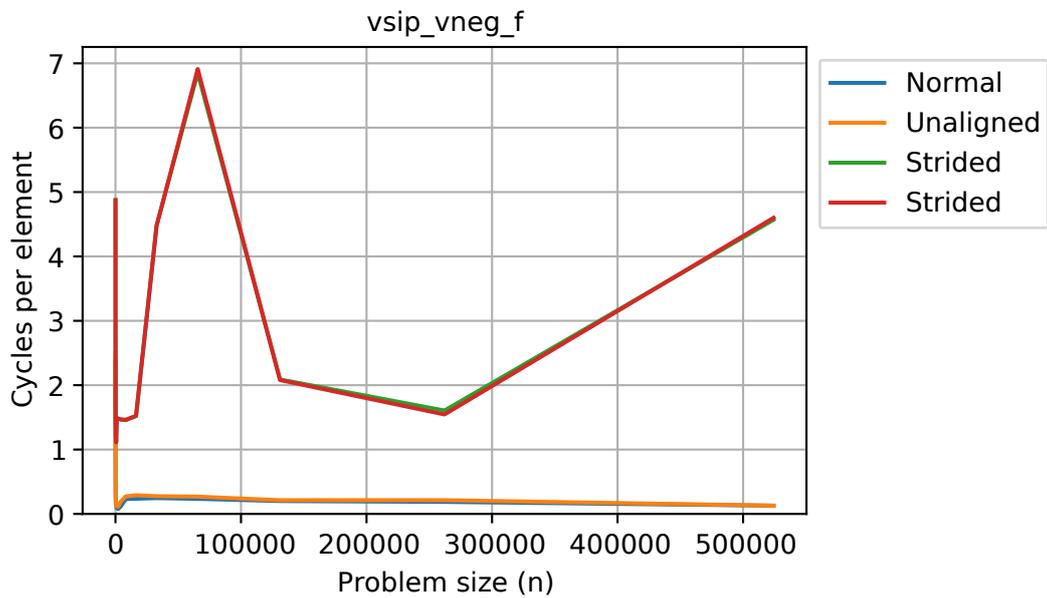


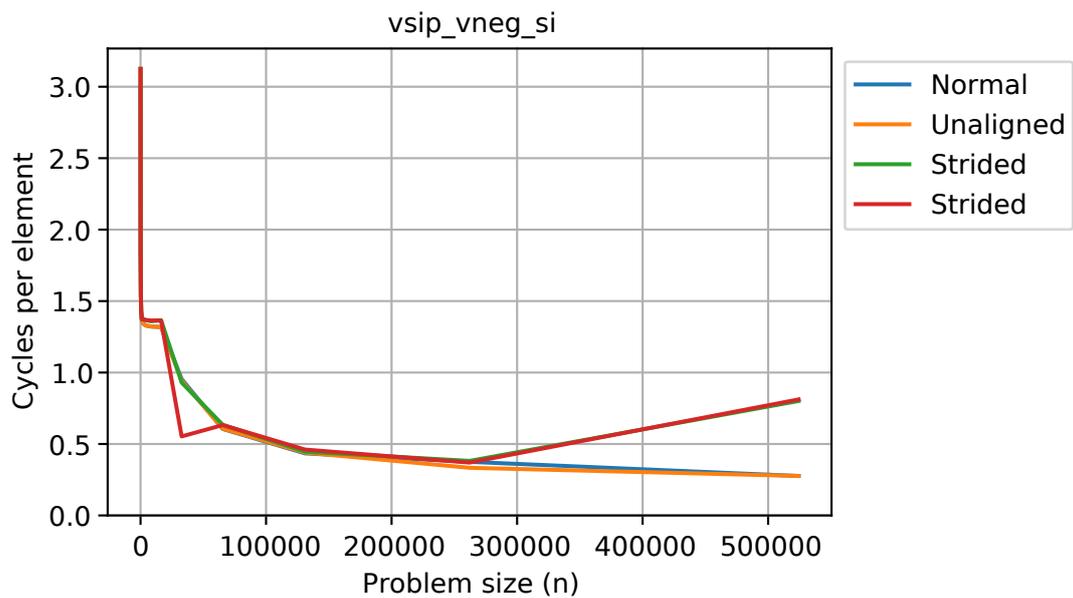
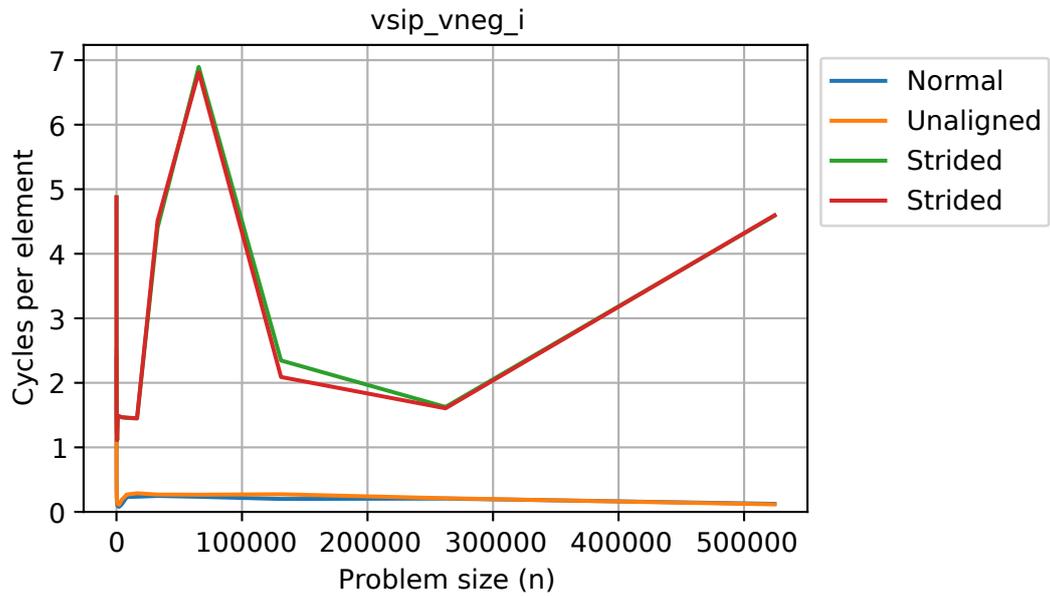
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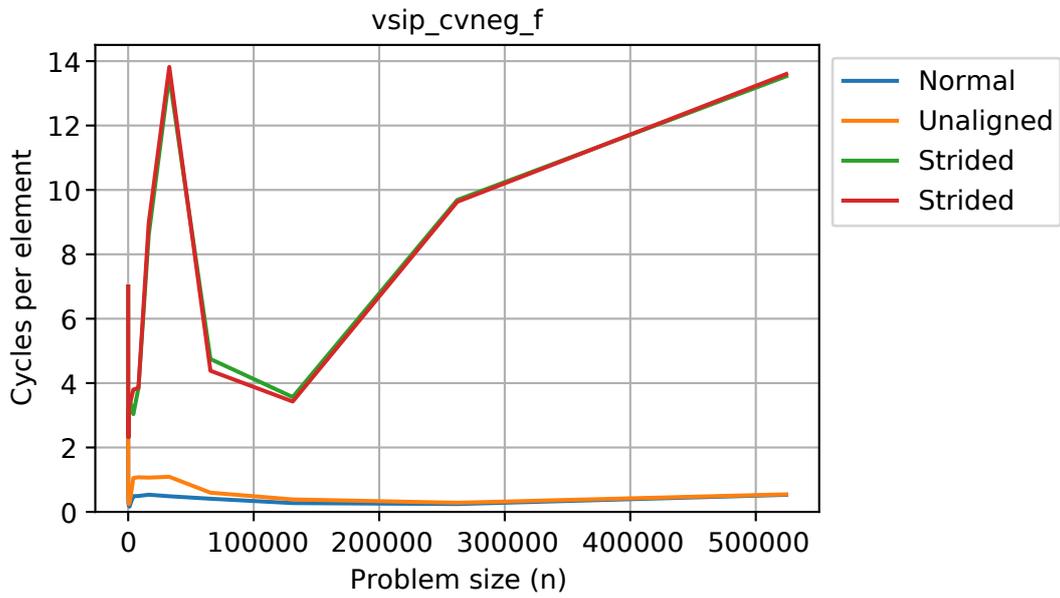




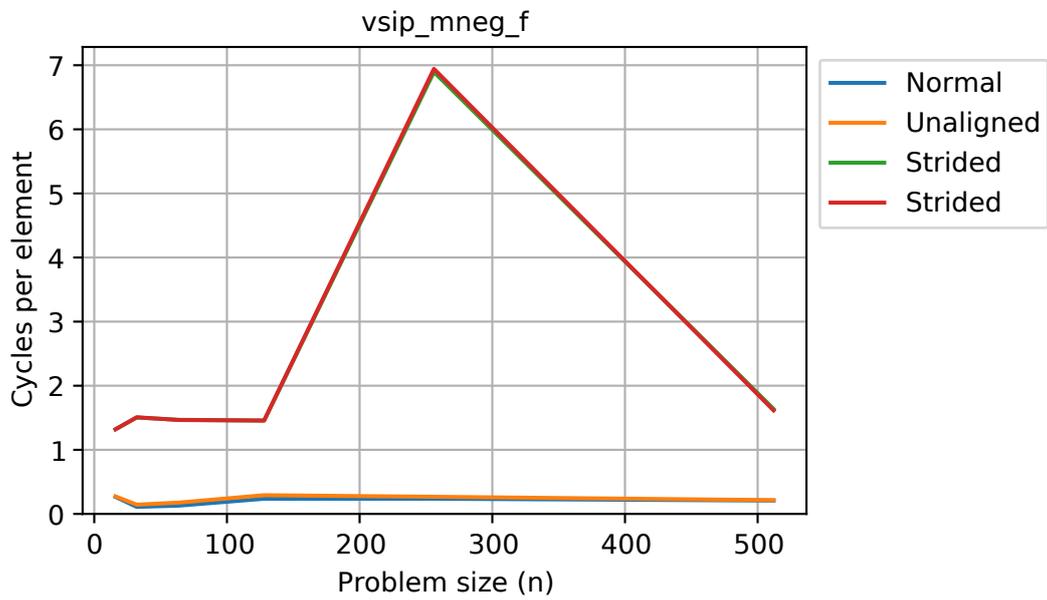
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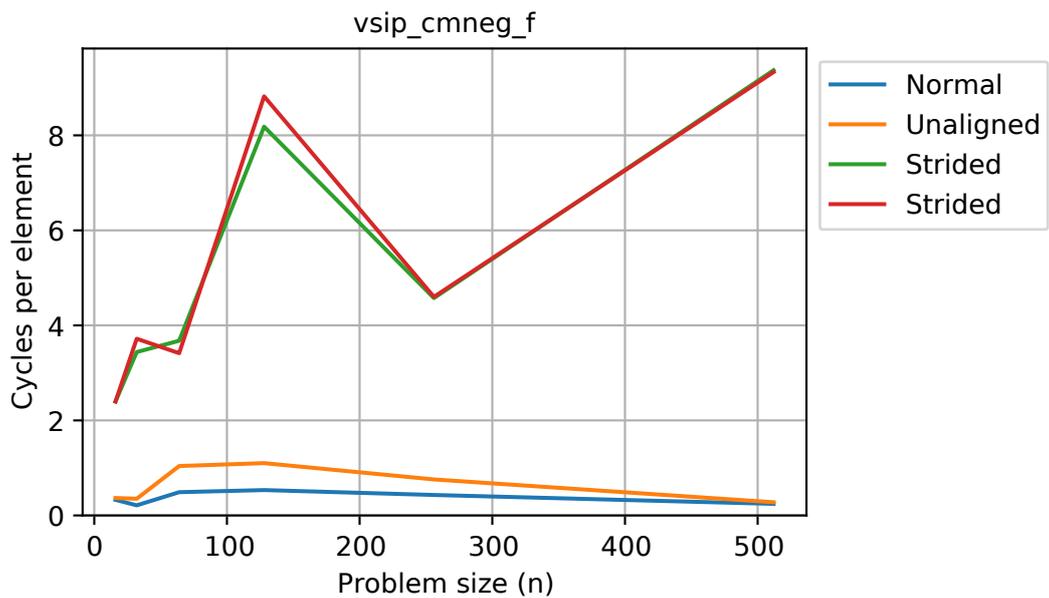
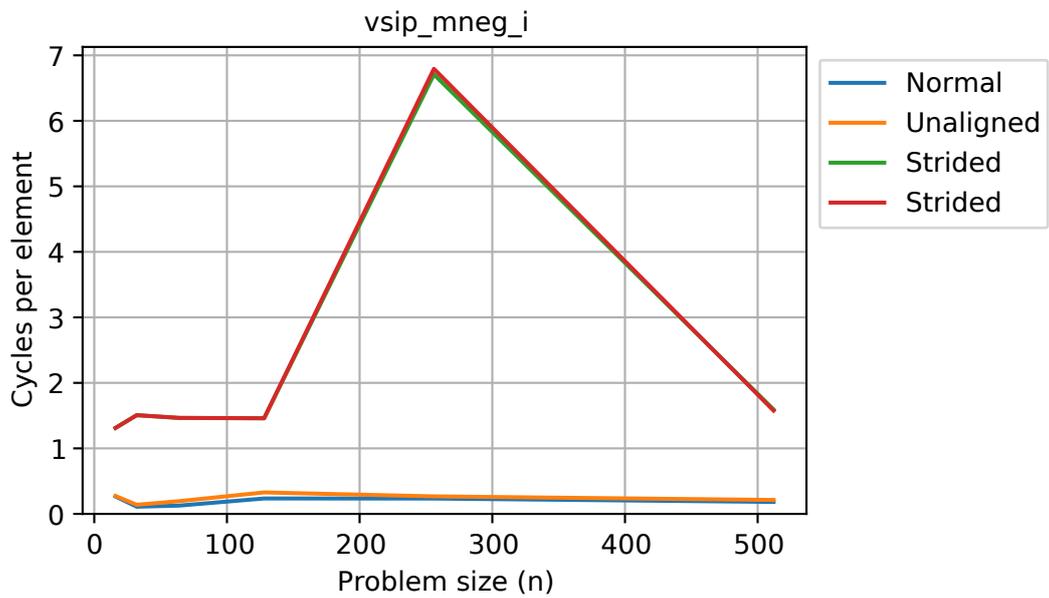




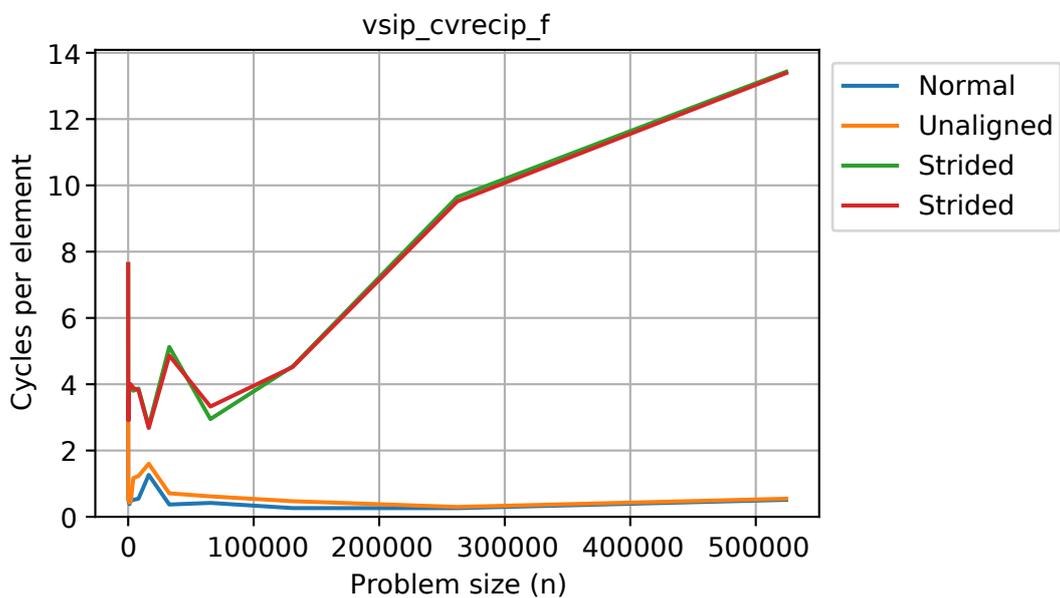
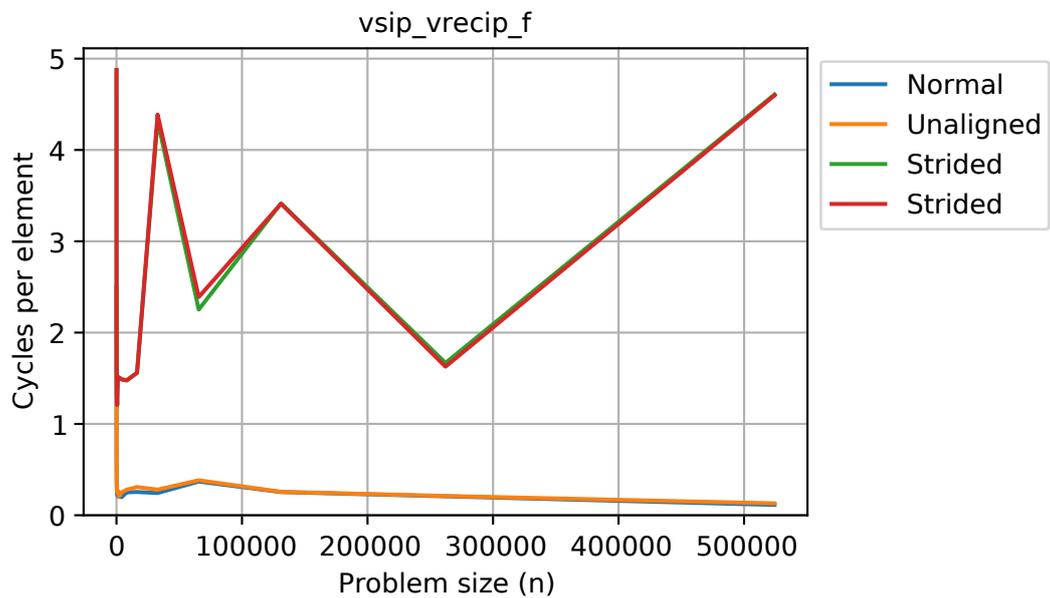


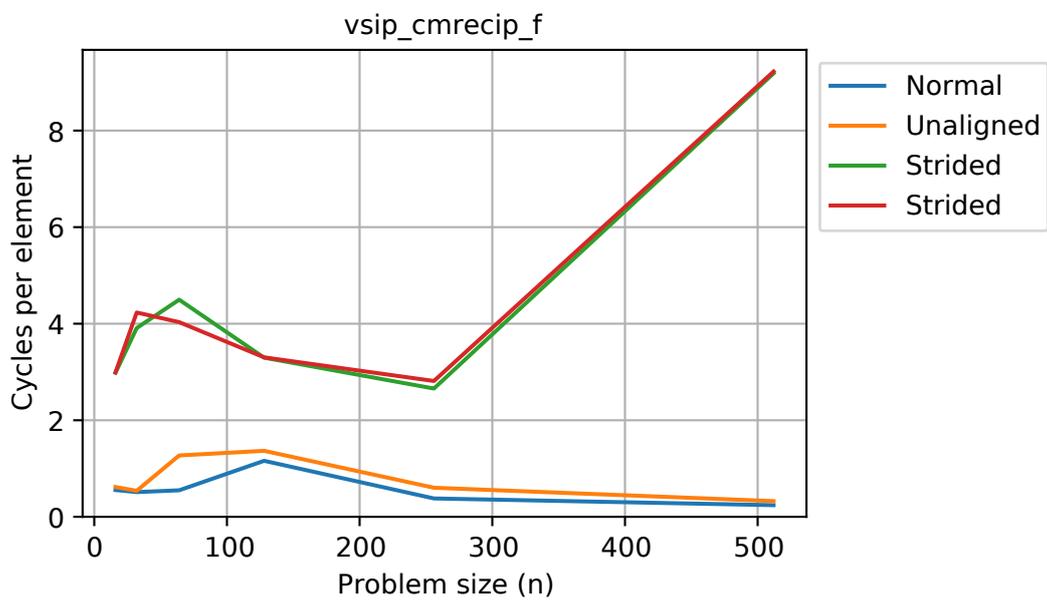
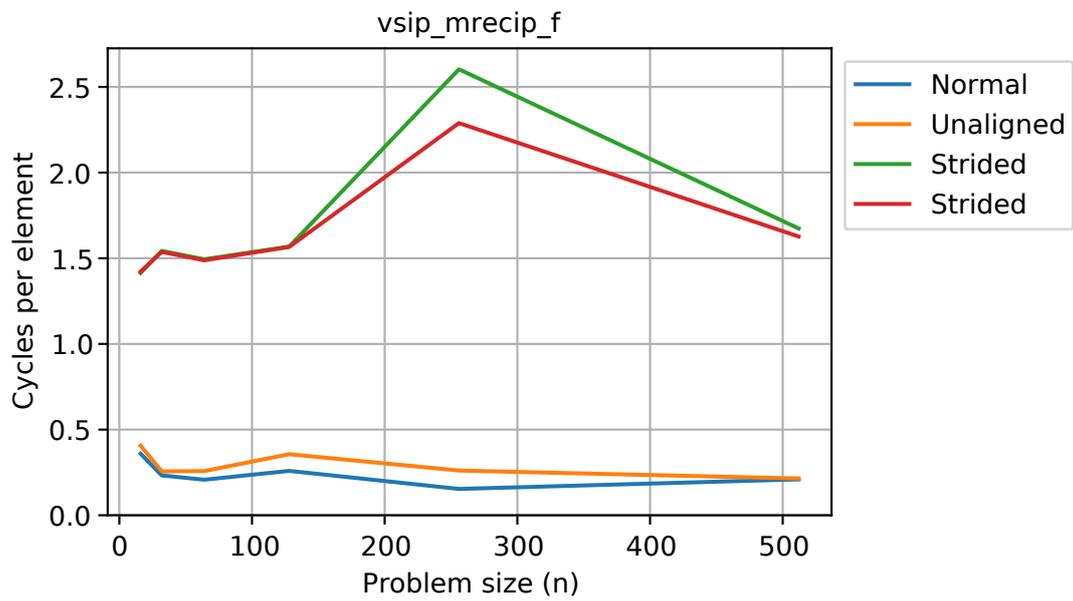
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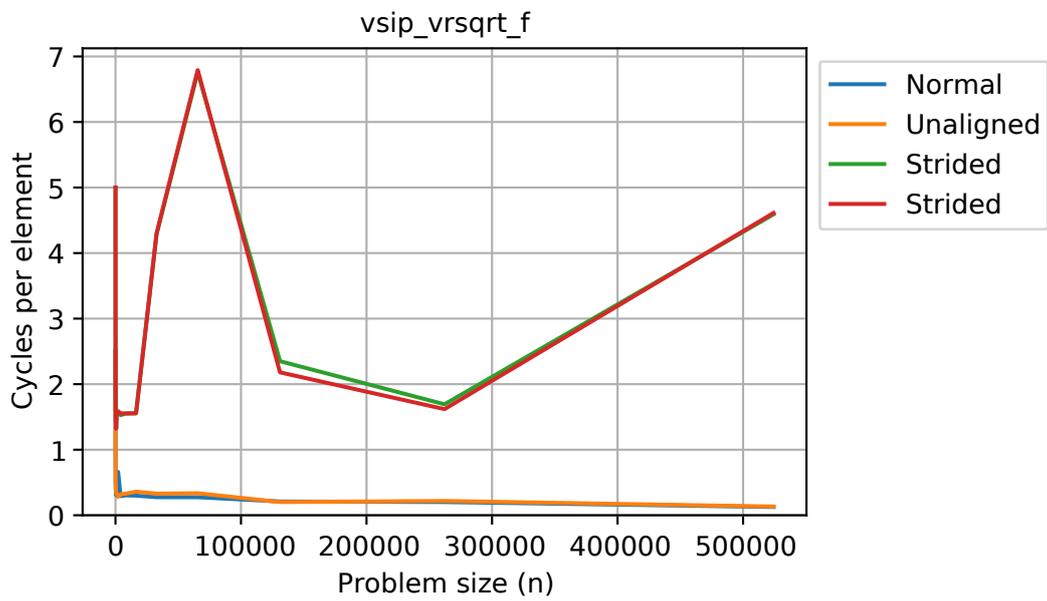
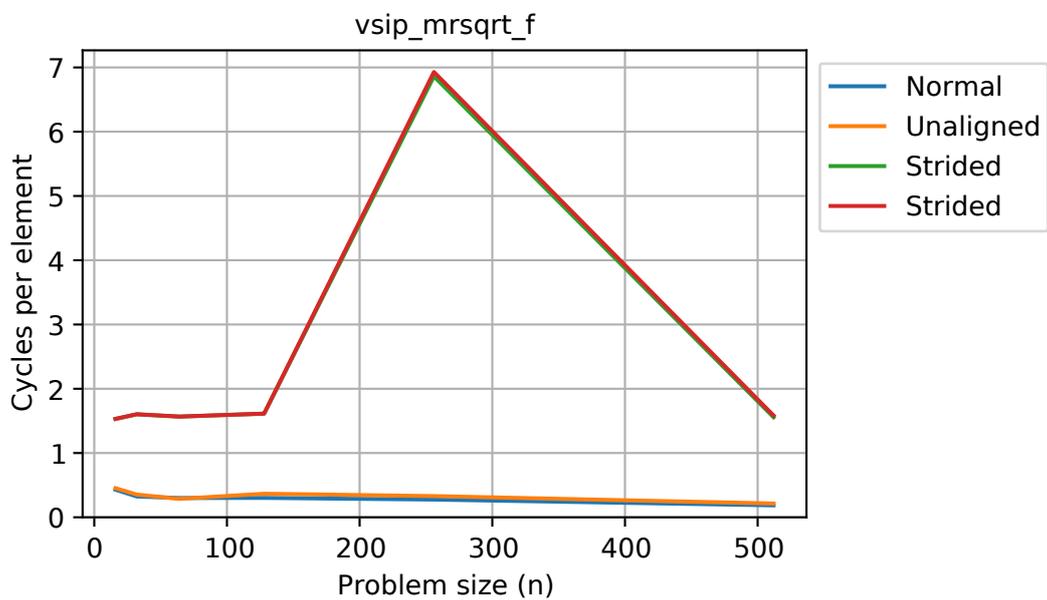


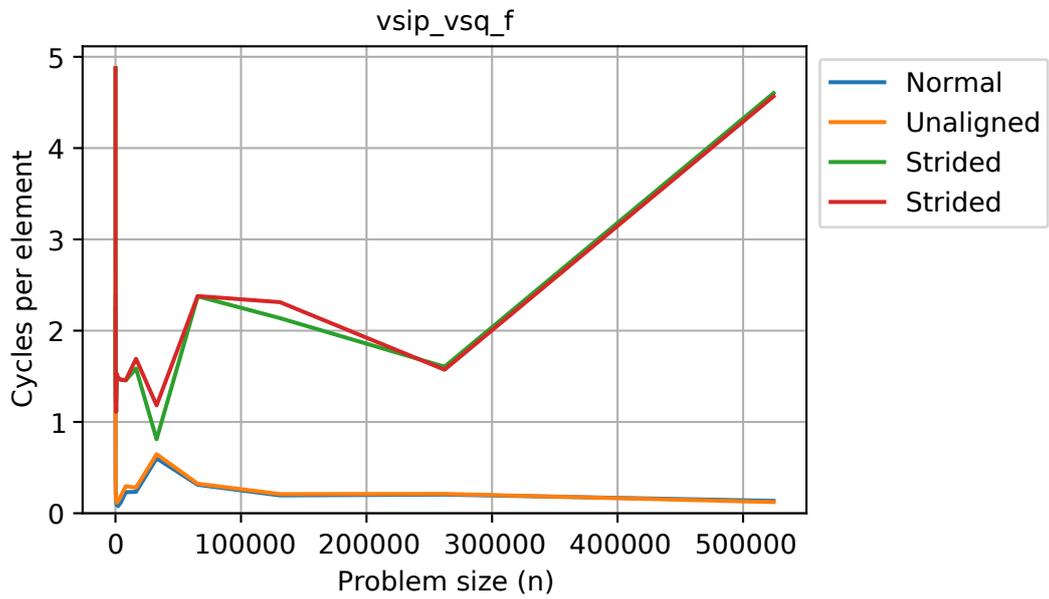
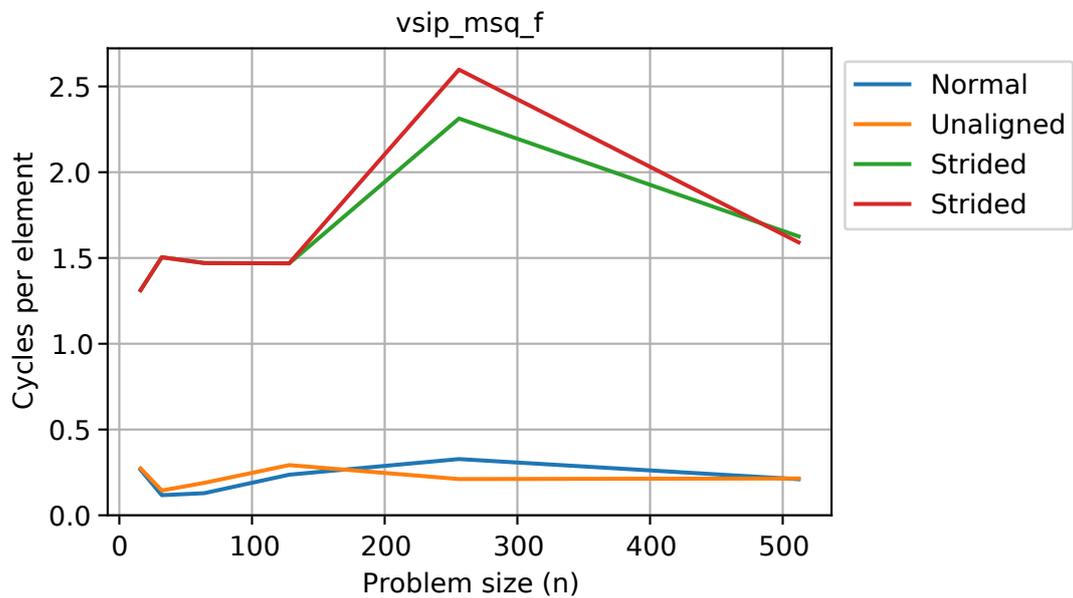


vsip_Dvrecip_P

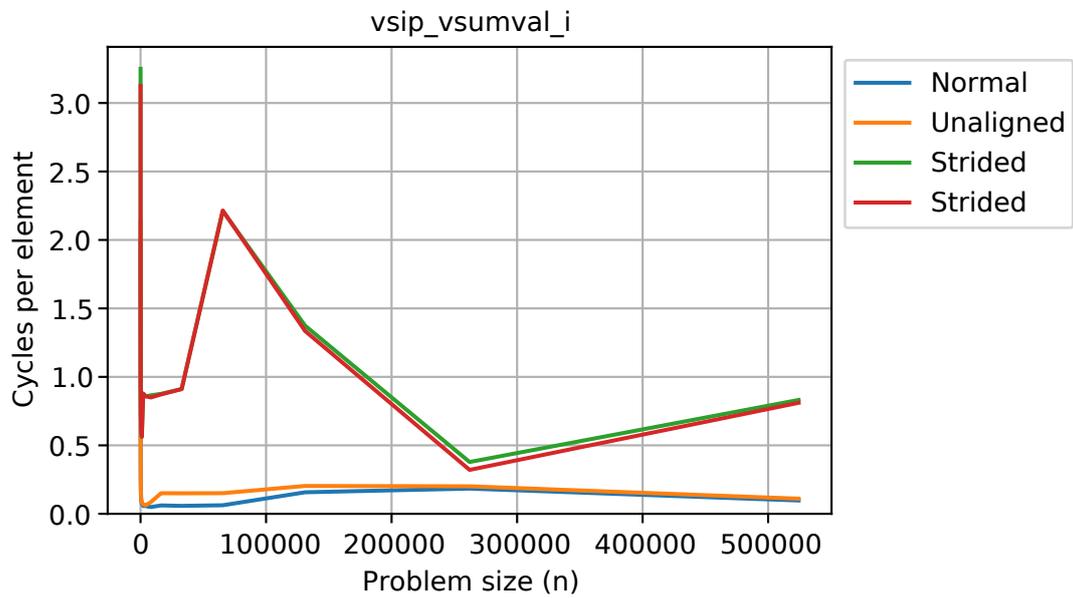
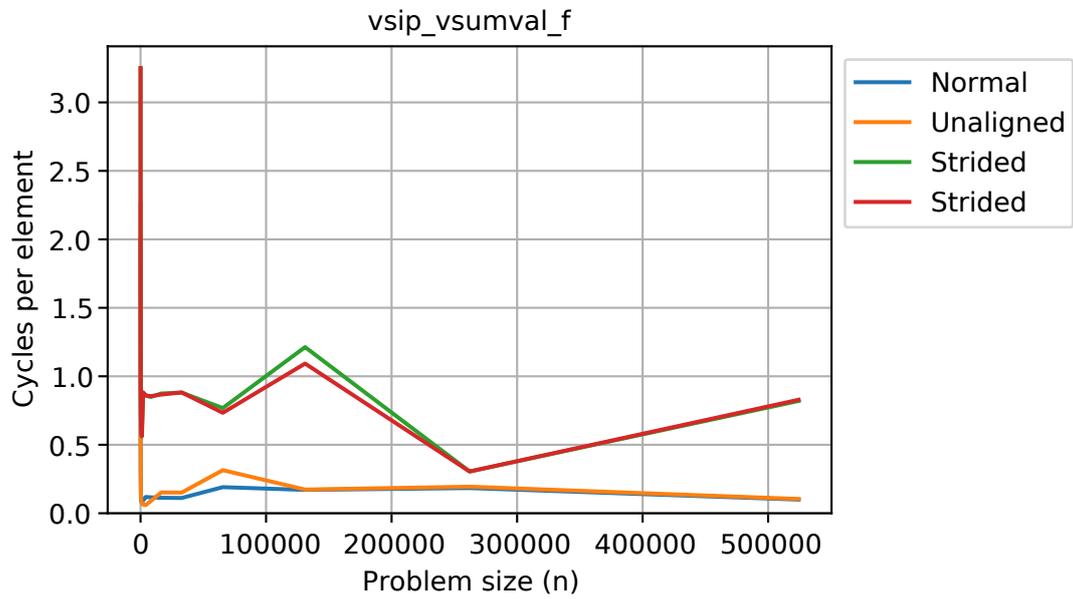


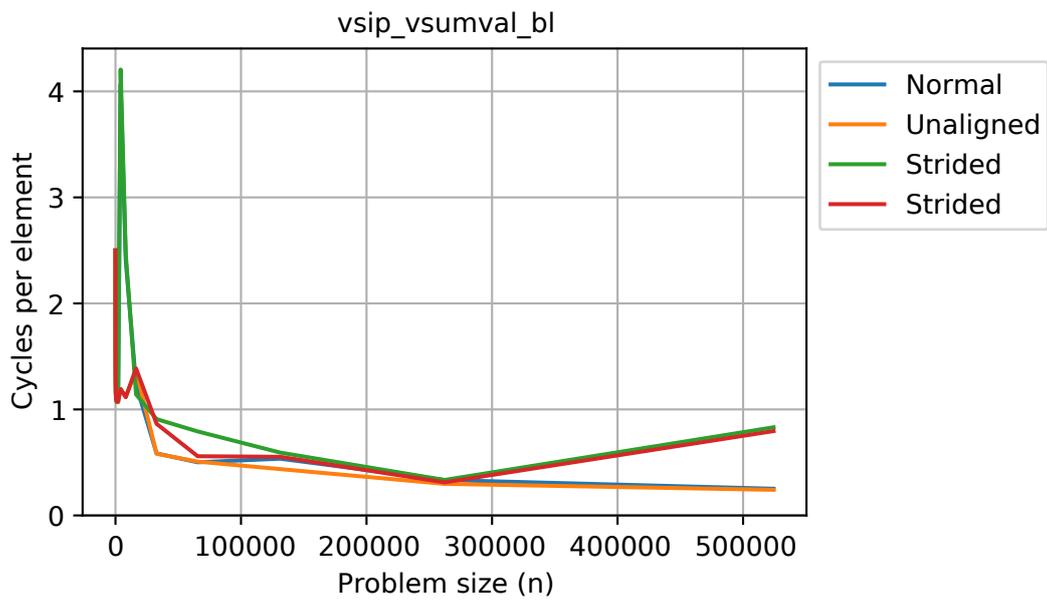
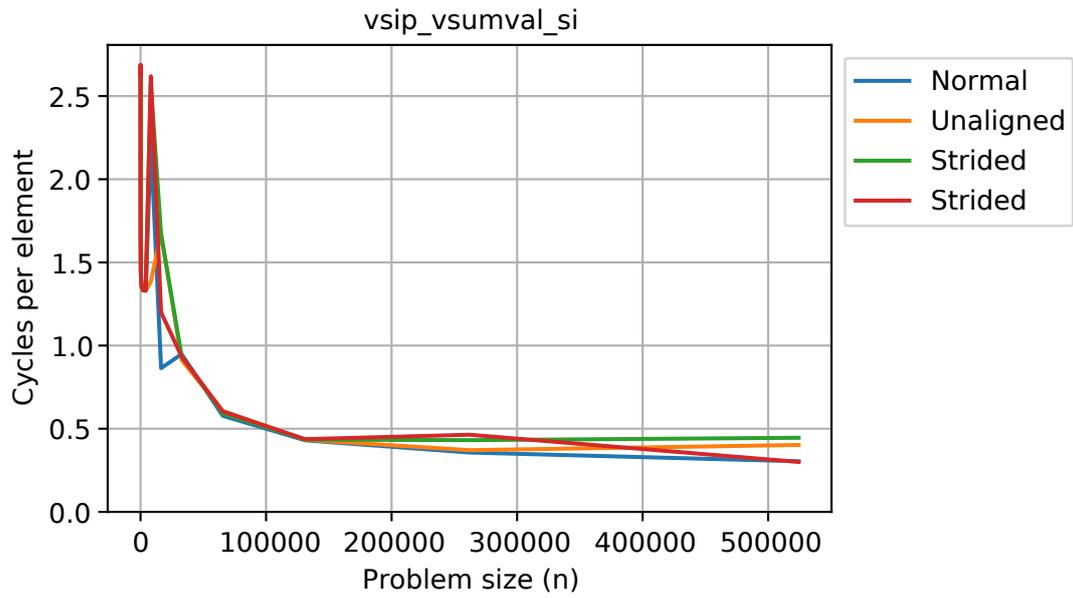
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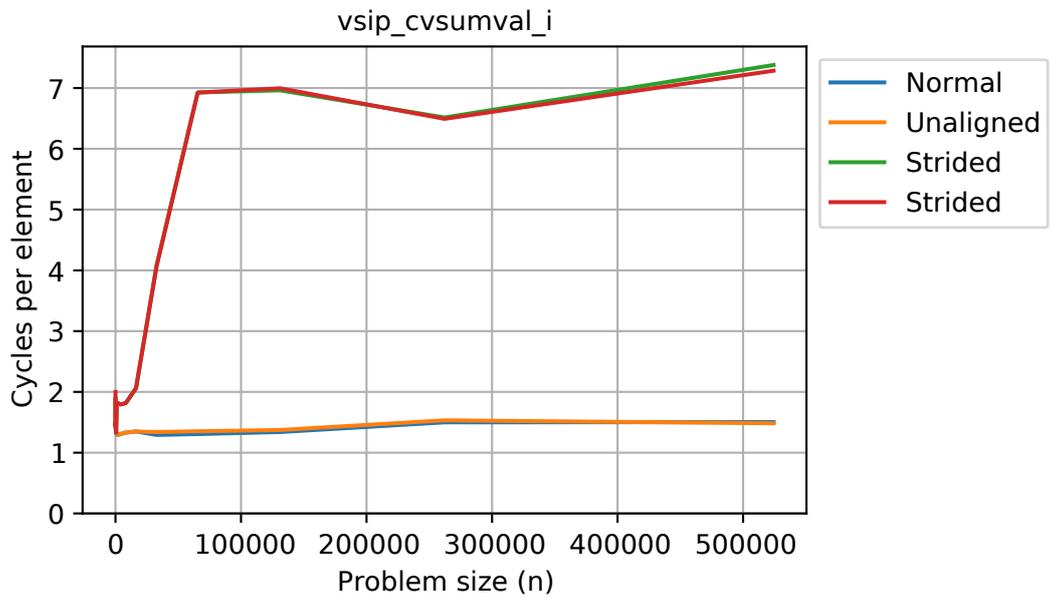
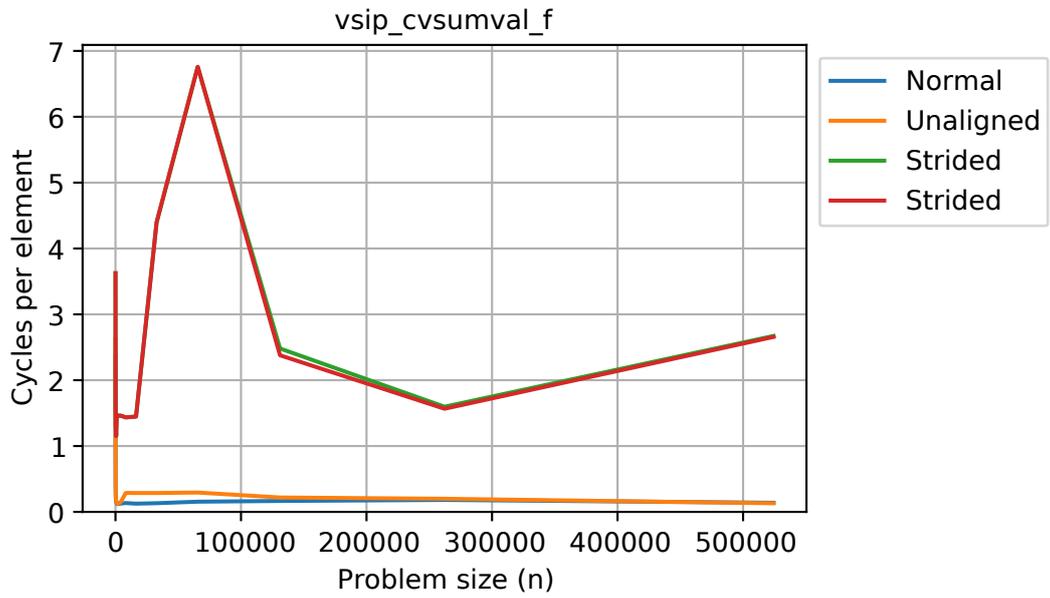
vsip_vrsqrt_f**vsip_mrsqrt_f**

vsip_vsq_f**vsip_msq_f**

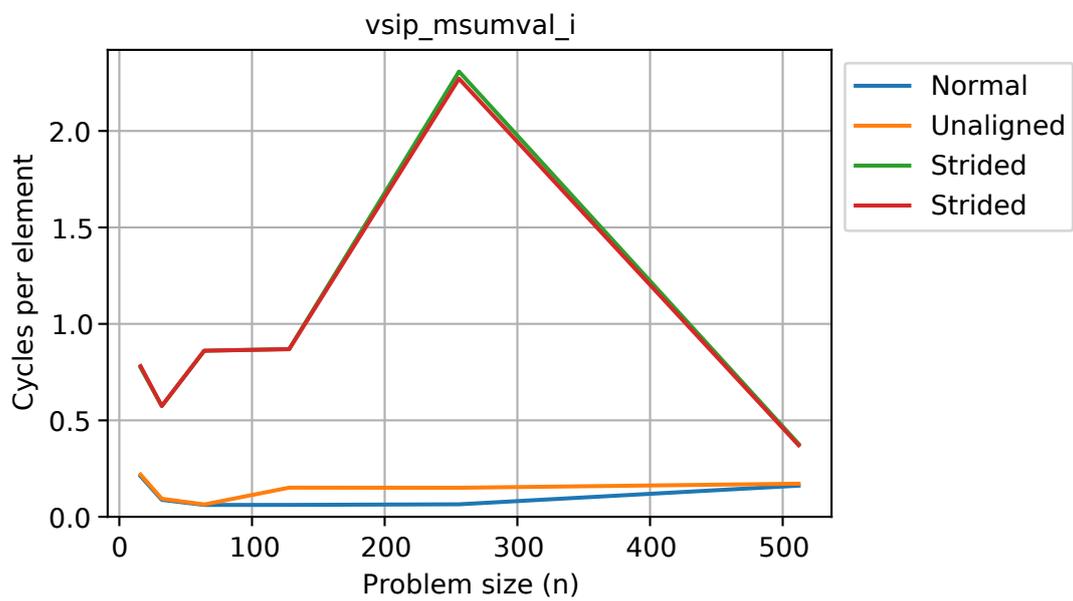
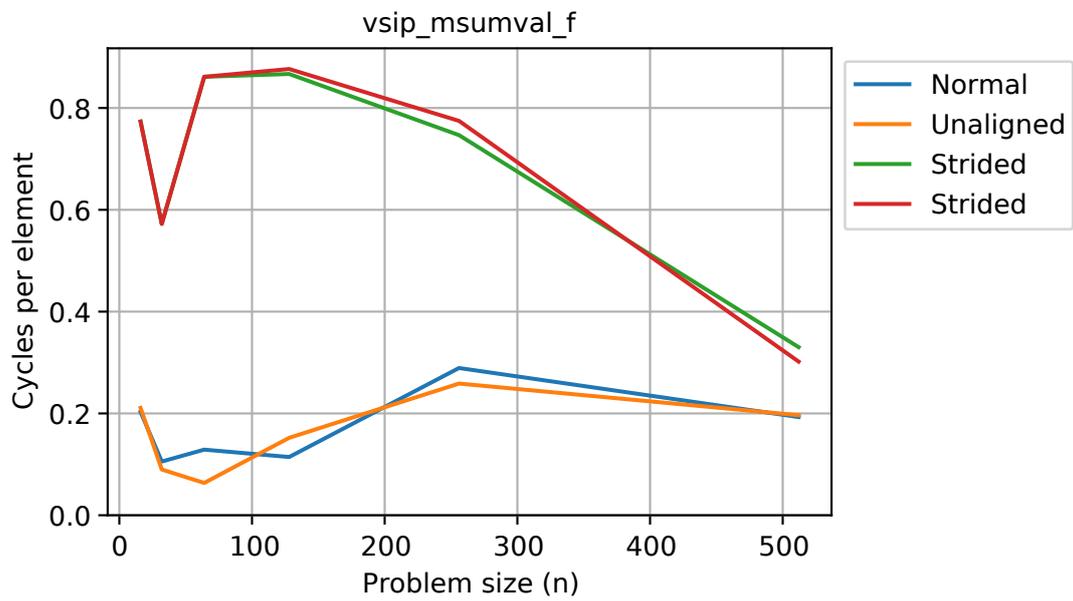
vsip_Dvsumval_P

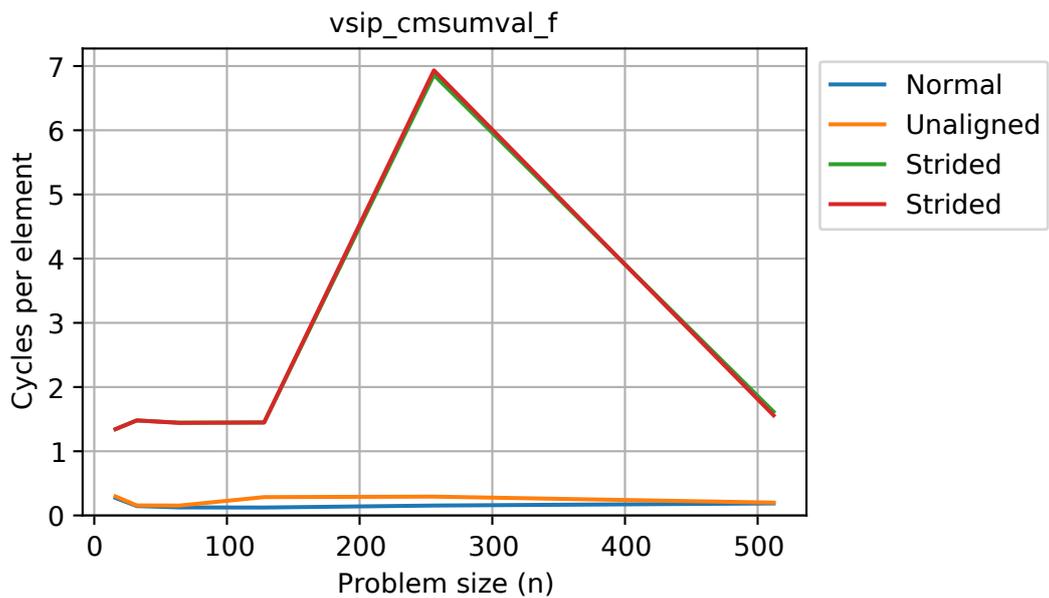
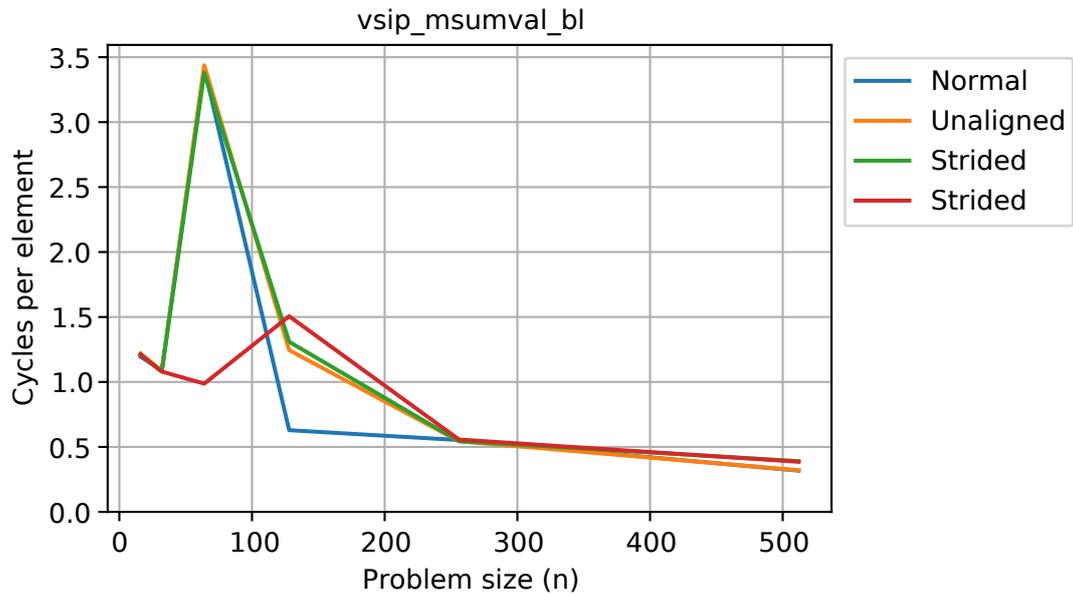


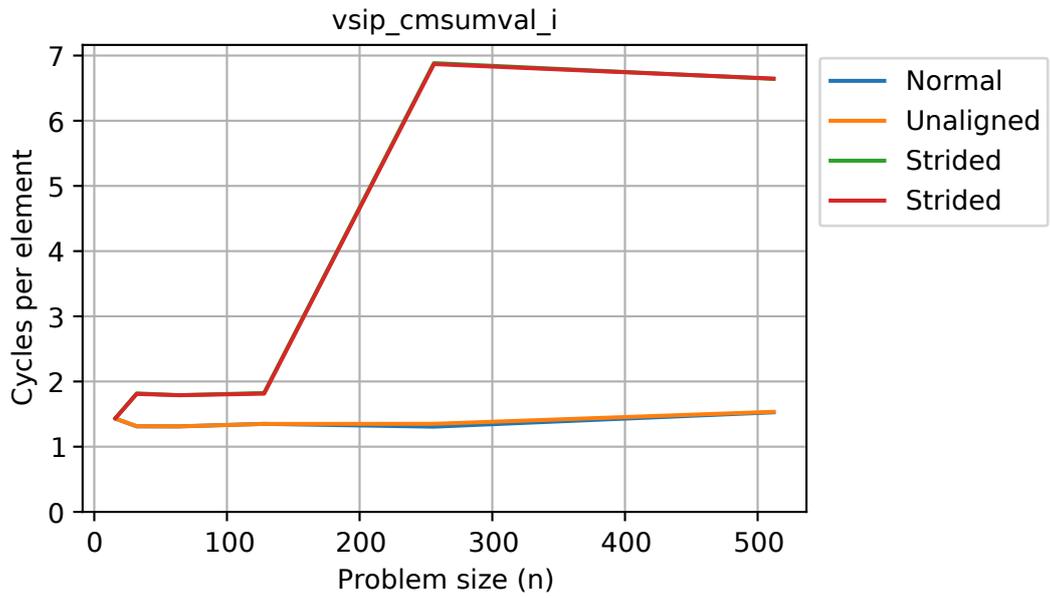




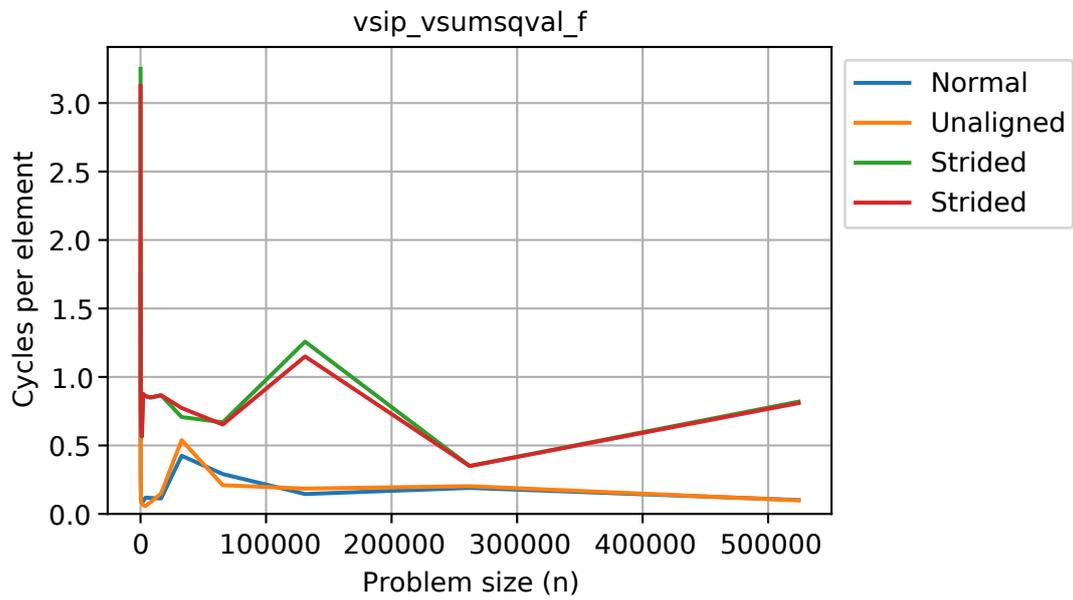
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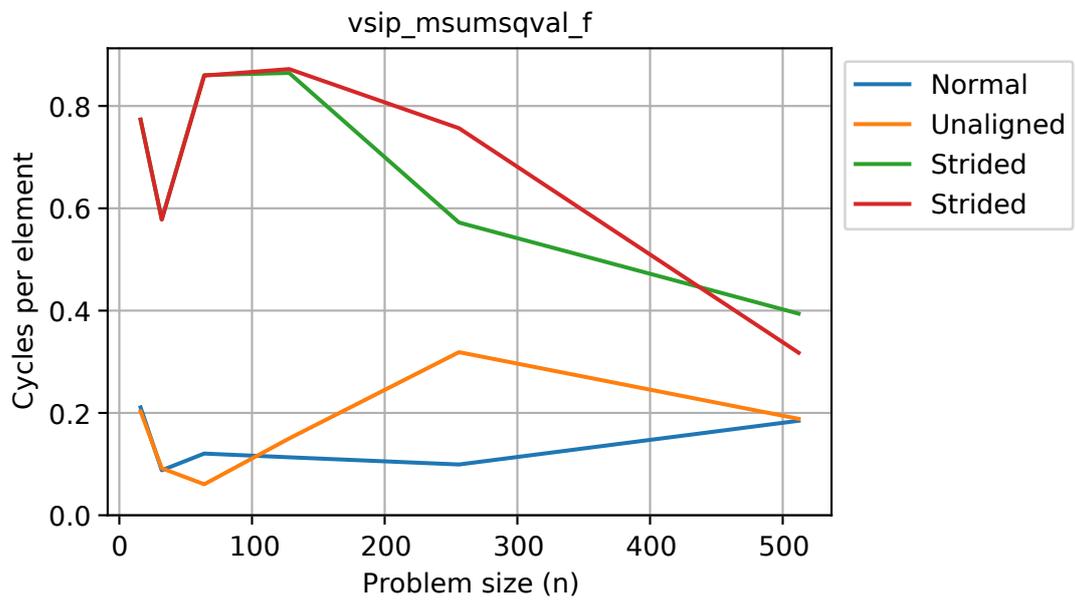






vsip_vsumsqval_f



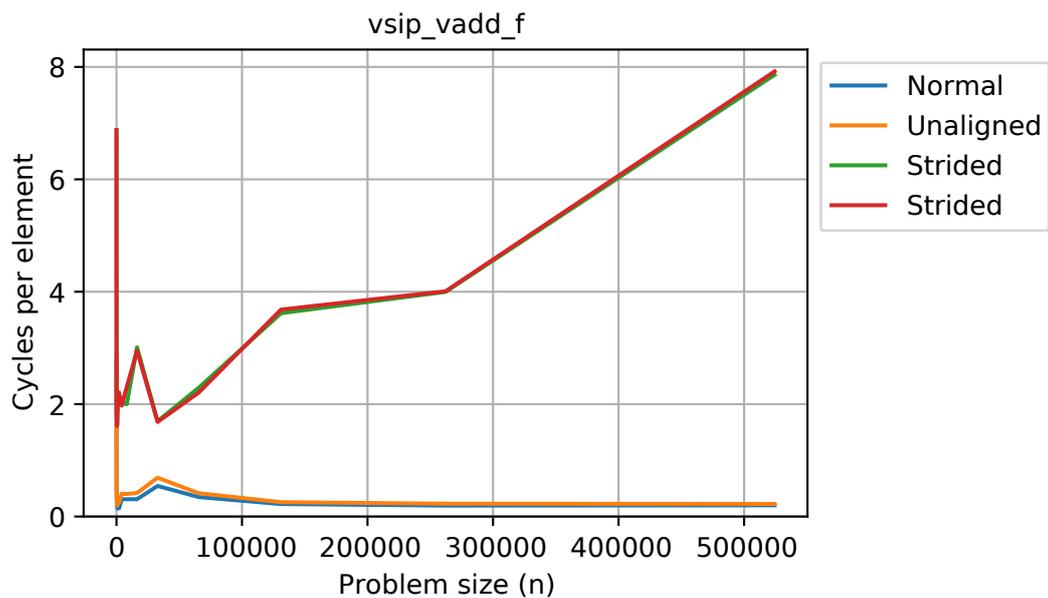
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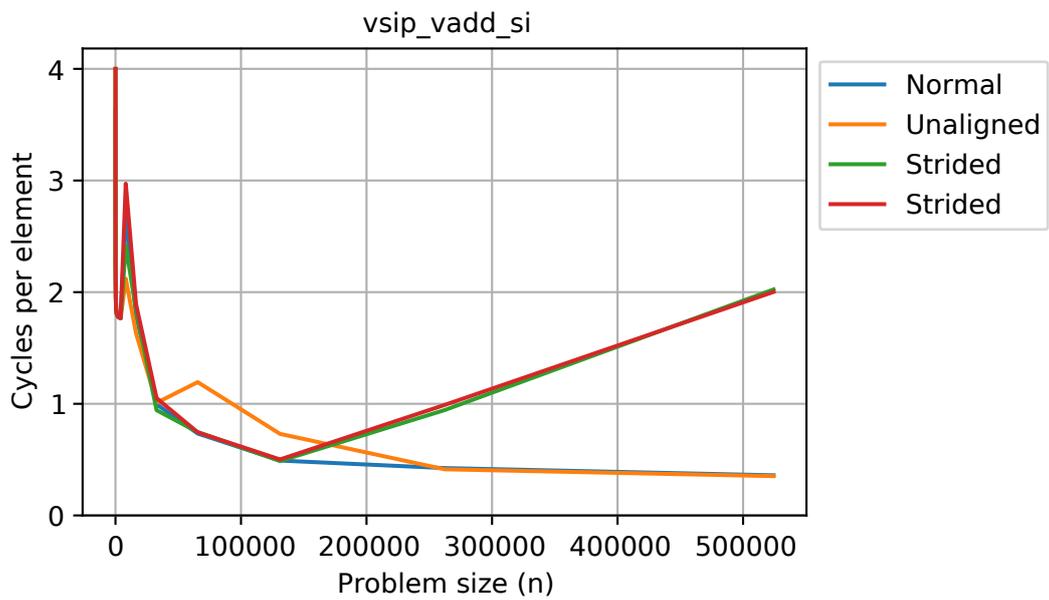
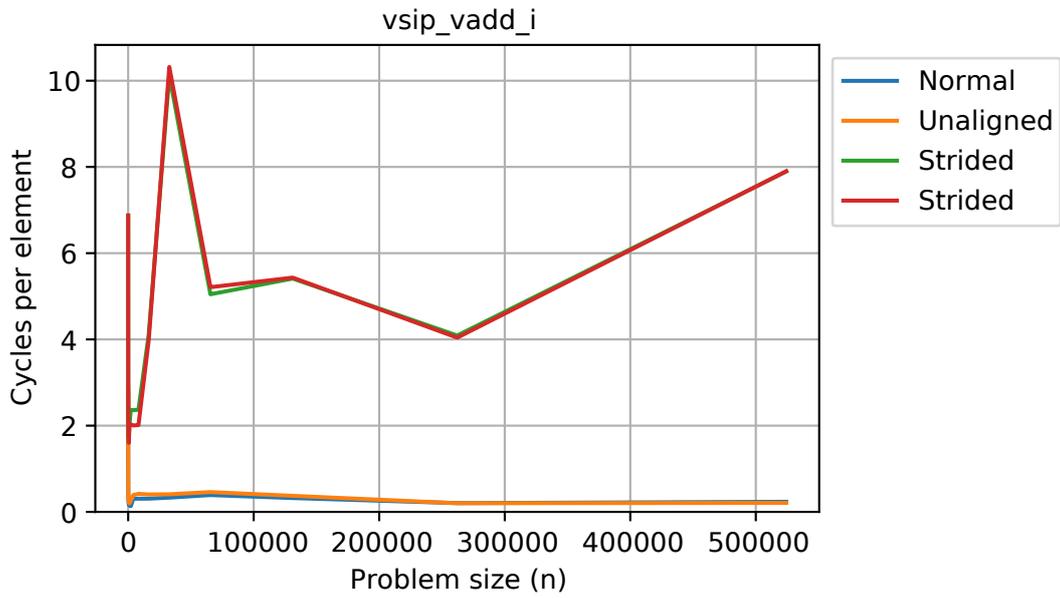
2.3 Binary Operations

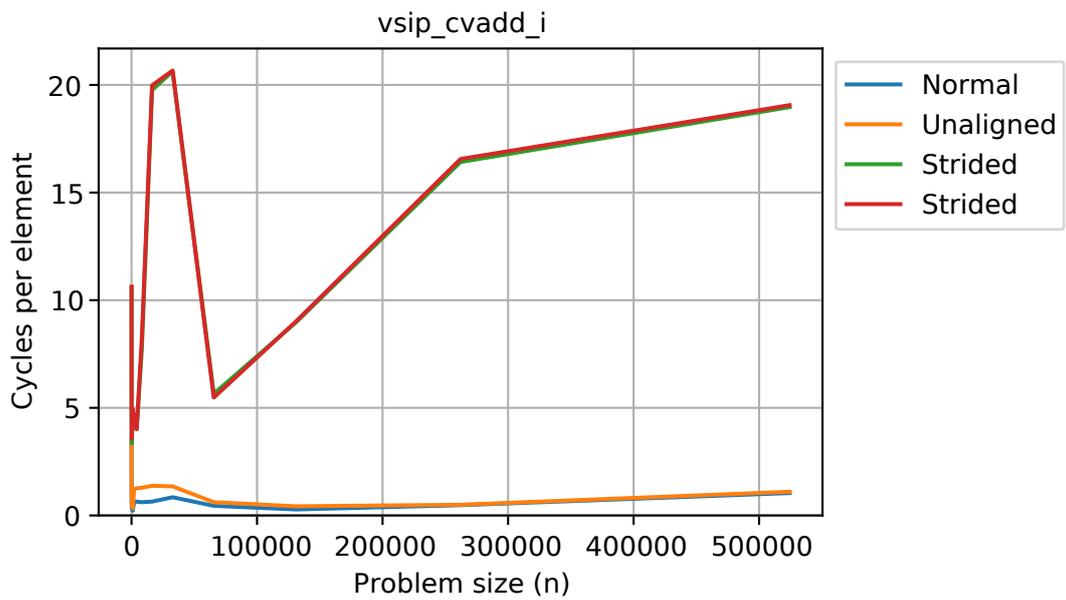
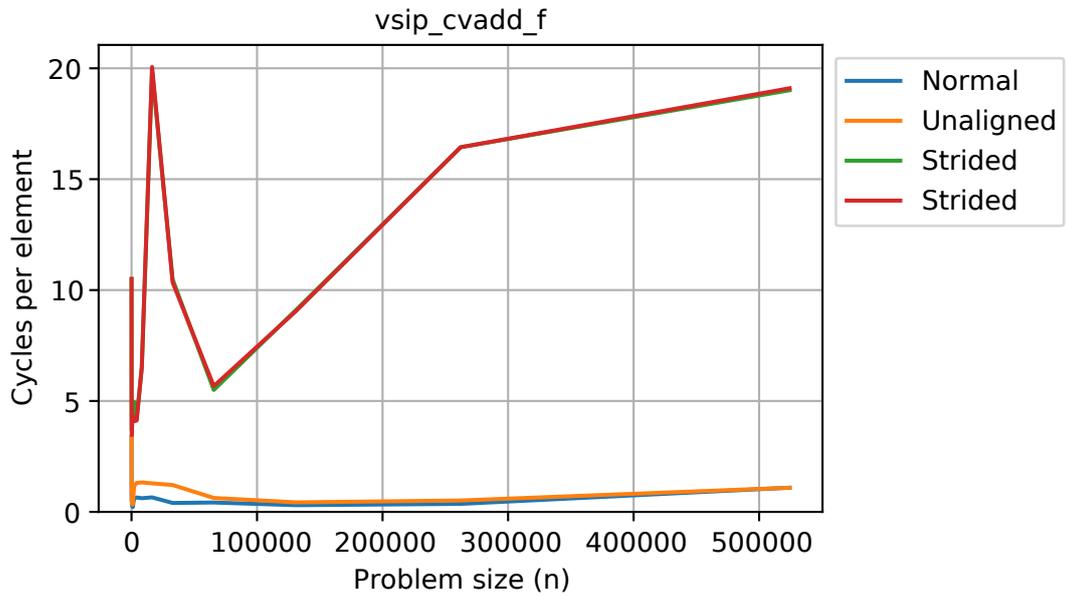
- `vsip_Dvadd_P`
- `vsip_Dmadd_P`
- `vsip_rcvadd_f`
- `vsip_rcmadd_f`
- `vsip_Dsvadd_P`
- `vsip_Dsmadd_P`
- `vsip_rscvadd_f`
- `vsip_rscmadd_f`
- `vsip_Dvdiv_P`
- `vsip_Dmdiv_P`
- `vsip_rcvdiv_f`
- `vsip_rcmdiv_f`
- `vsip_crvdiv_f`
- `vsip_crmdiv_f`
- `vsip_Dsvdiv_P`
- `vsip_Dsmdiv_P`
- `vsip_rscvdiv_f`
- `vsip_rscvsub_f`
- `vsip_rscmdiv_f`
- `vsip_rscmsub_f`
- `vsip_Dvsdiv_P`
- `vsip_Dmsdiv_P`
- `vsip_Dvexpoavg_P`
- `vsip_Dmexpoavg_P`
- `vsip_vhypot_f`
- `vsip_mhypot_f`
- `vsip_cvjmul_f`
- `vsip_cmjmul_f`
- `vsip_Dvmul_P`
- `vsip_Dmmul_P`
- `vsip_rcvmul_f`
- `vsip_rcmmul_f`
- `vsip_Dsvmul_P`

- `vsip_Dsmmul_P`
- `vsip_rscvmul_f`
- `vsip_rscmmul_f`
- `vsip_DvDmmul_P`
- `vsip_rvcmmul_f`
- `vsip_Dvsub_P`
- `vsip_Dmsub_P`
- `vsip_crsvsub_f`
- `vsip_crmsub_f`
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- `vsip_rcmsub_f`
- `vsip_Dsvsub_P`
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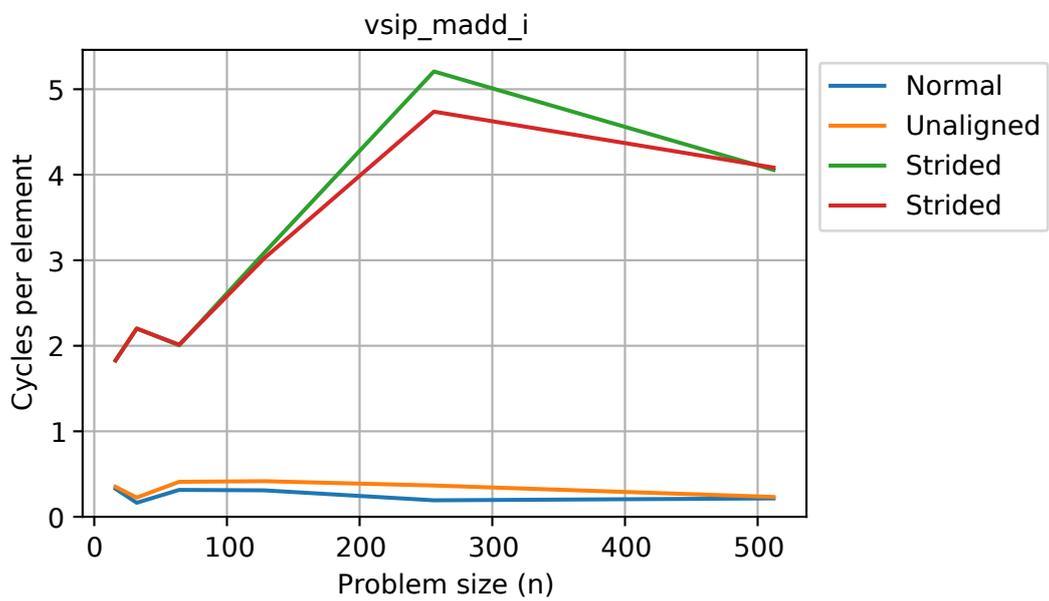
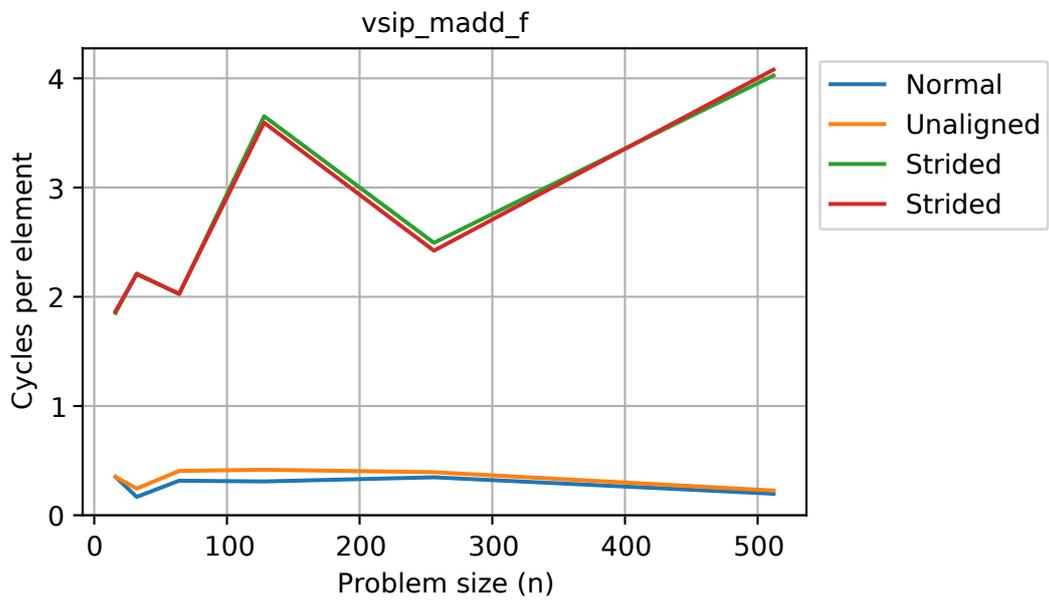
`vsip_Dvadd_P`

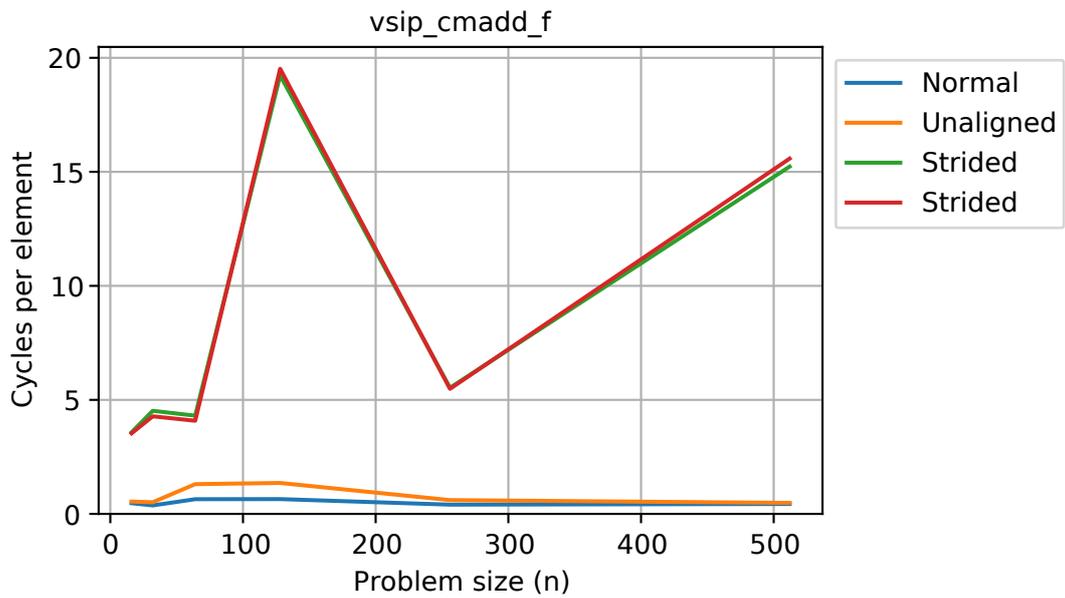




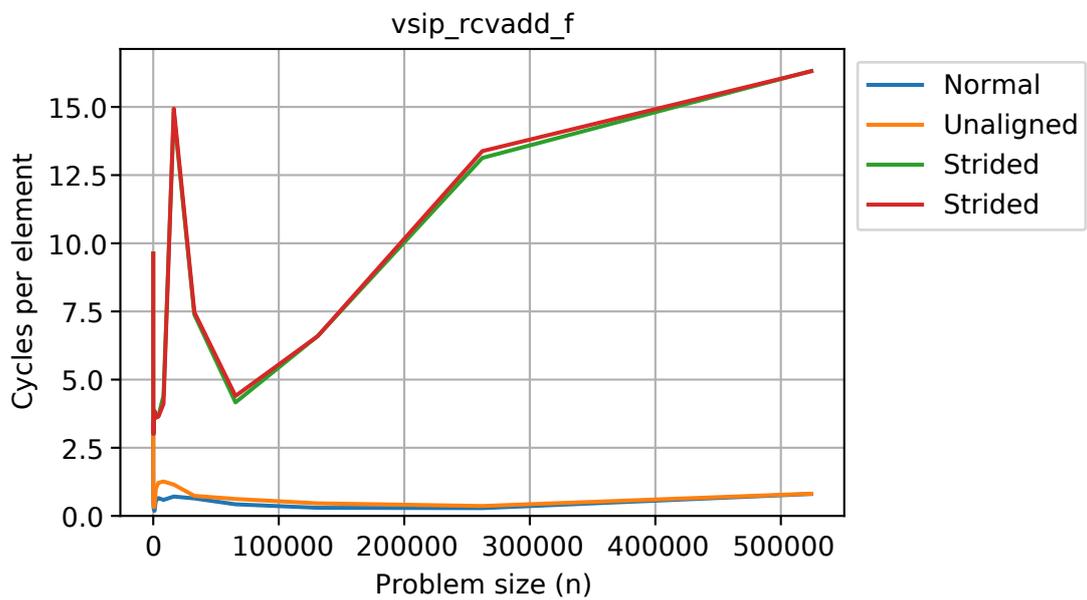


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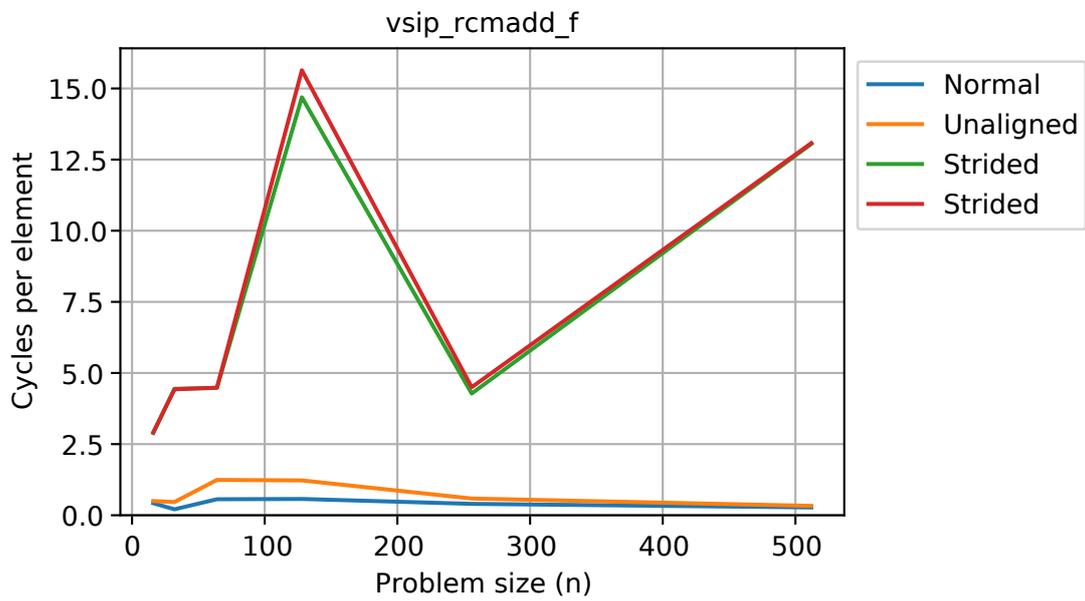




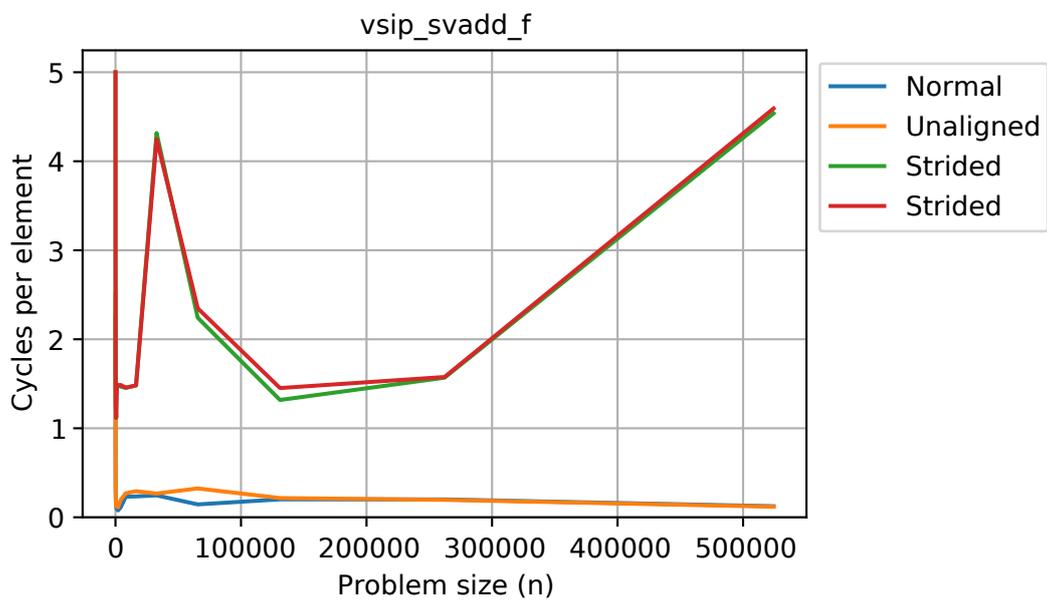
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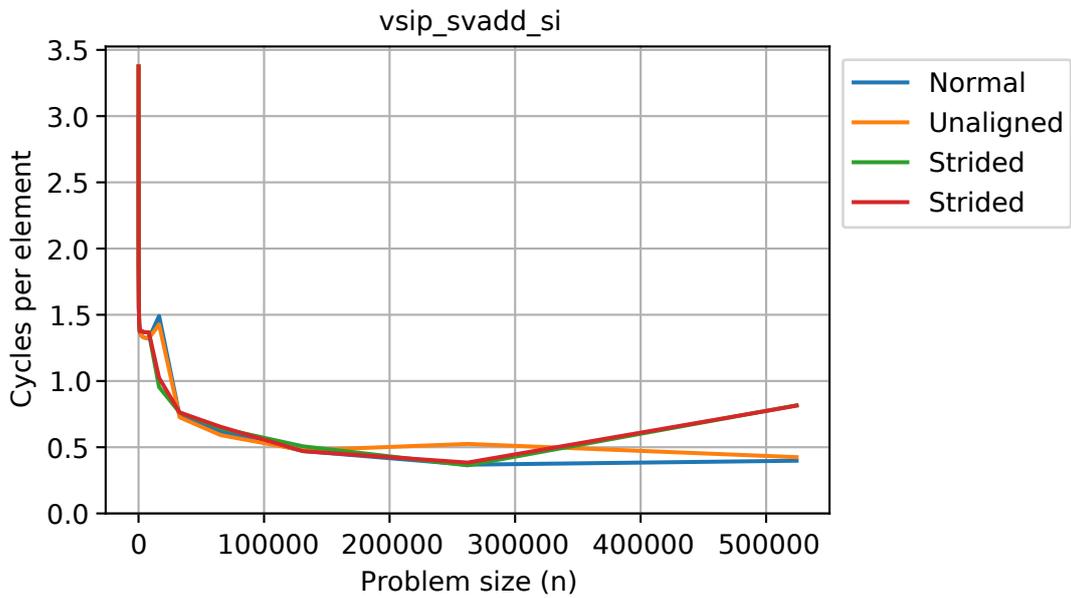
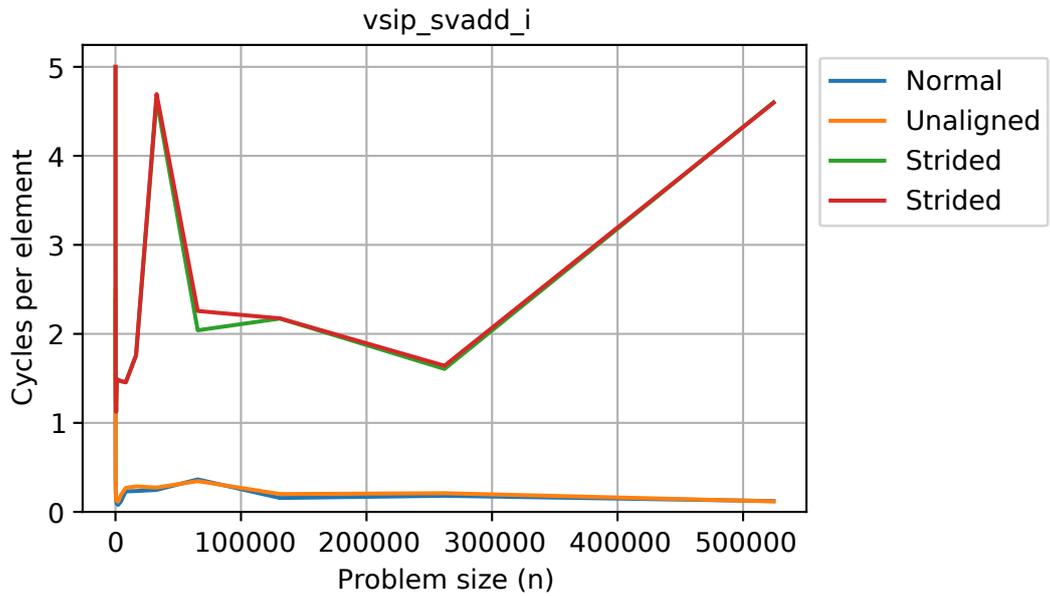


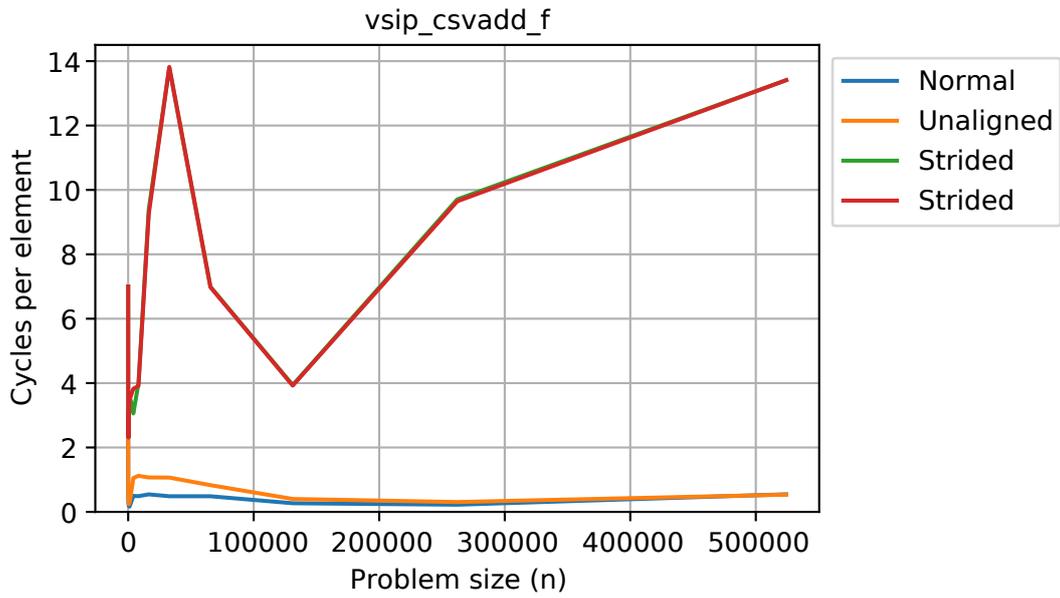
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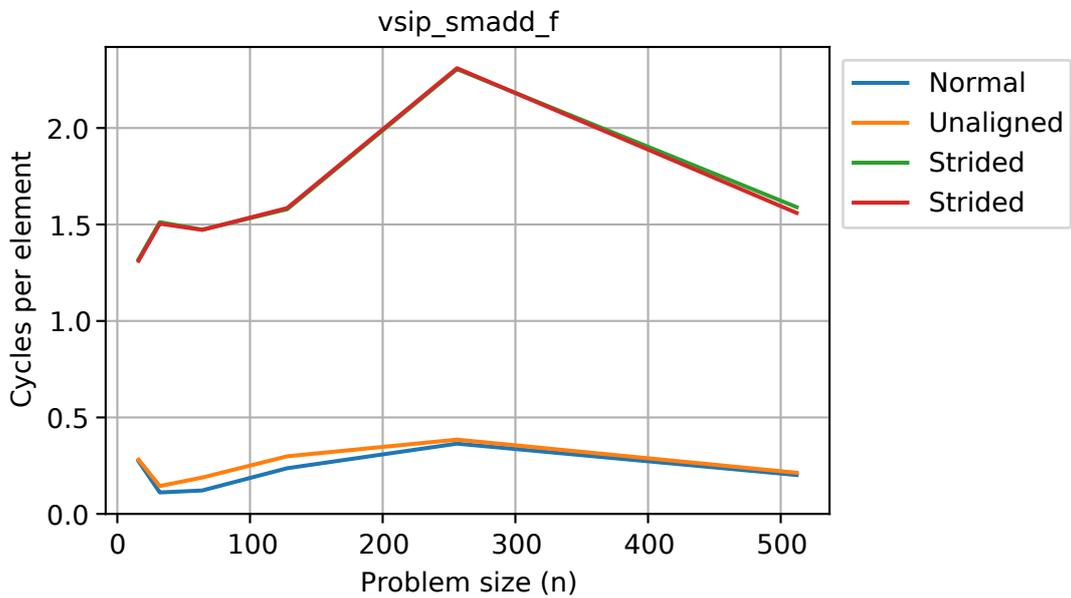
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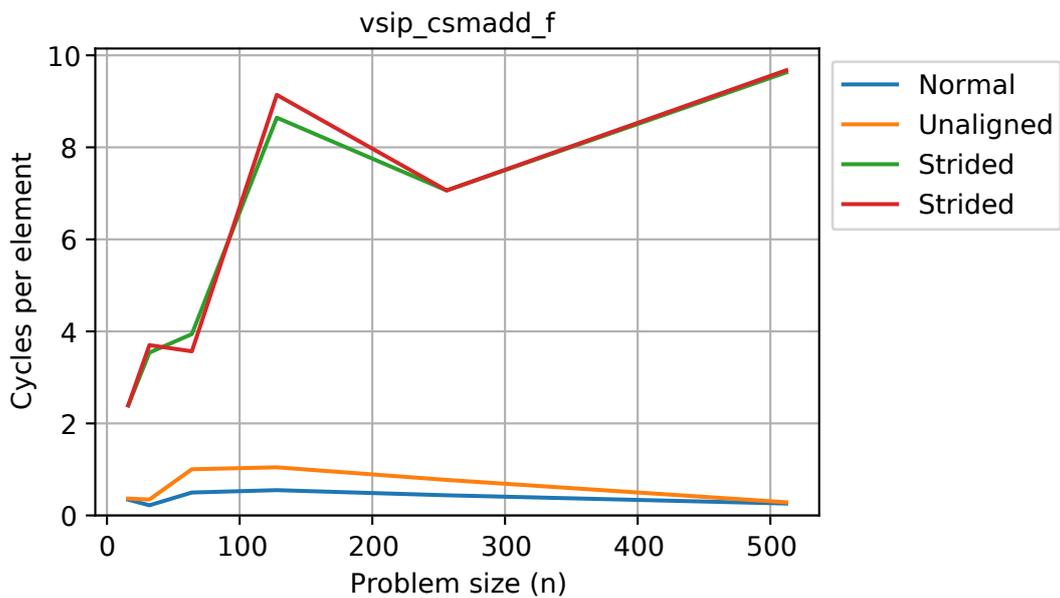
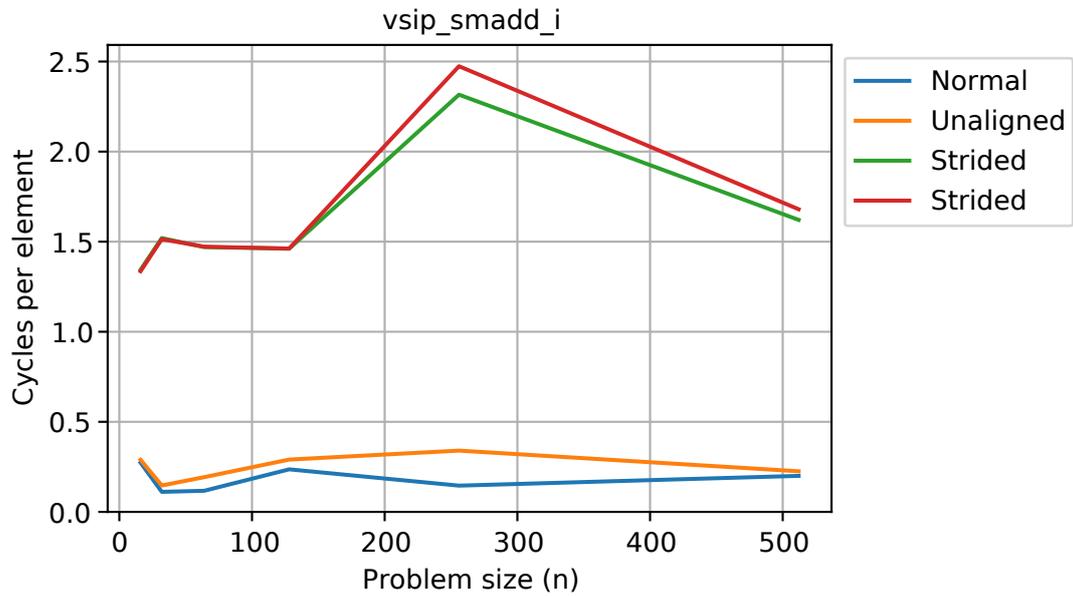


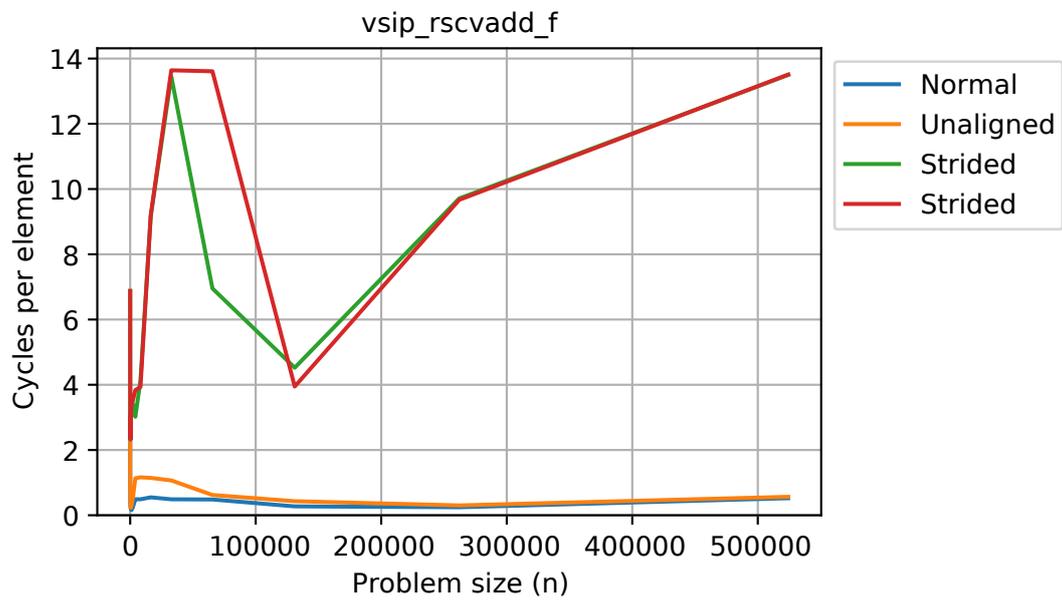
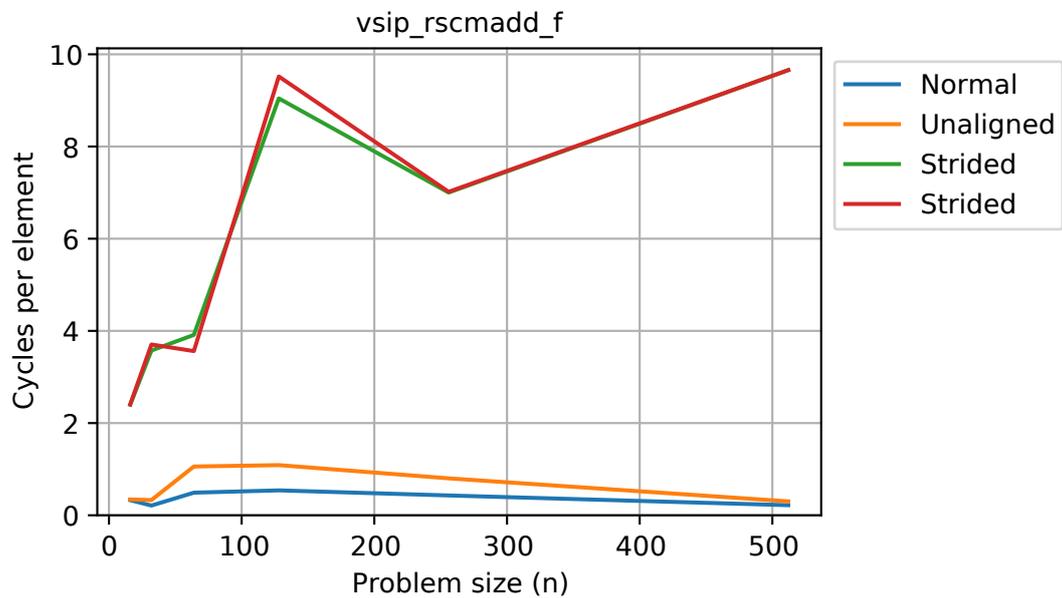




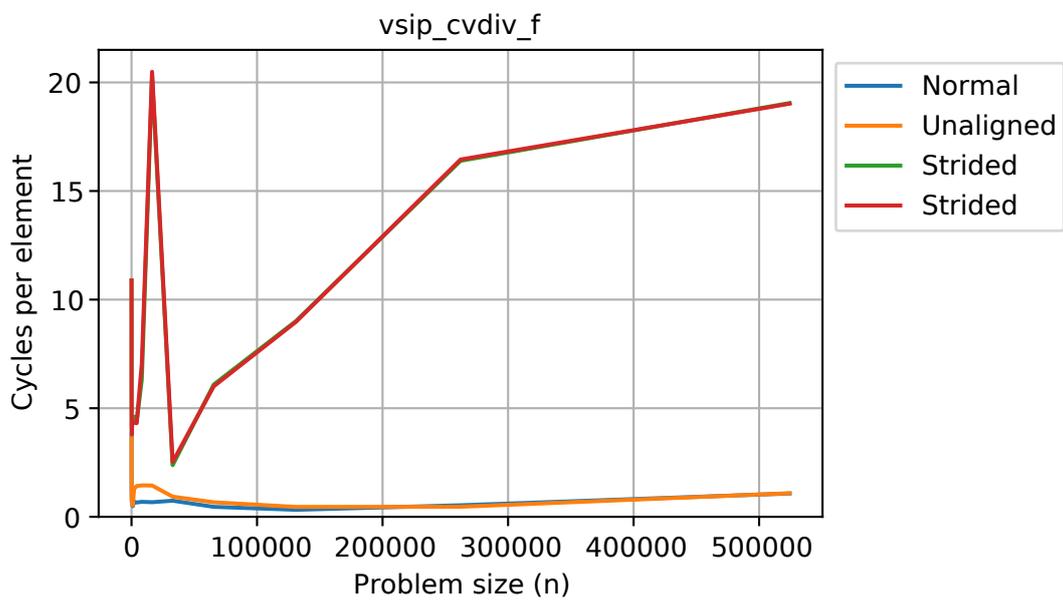
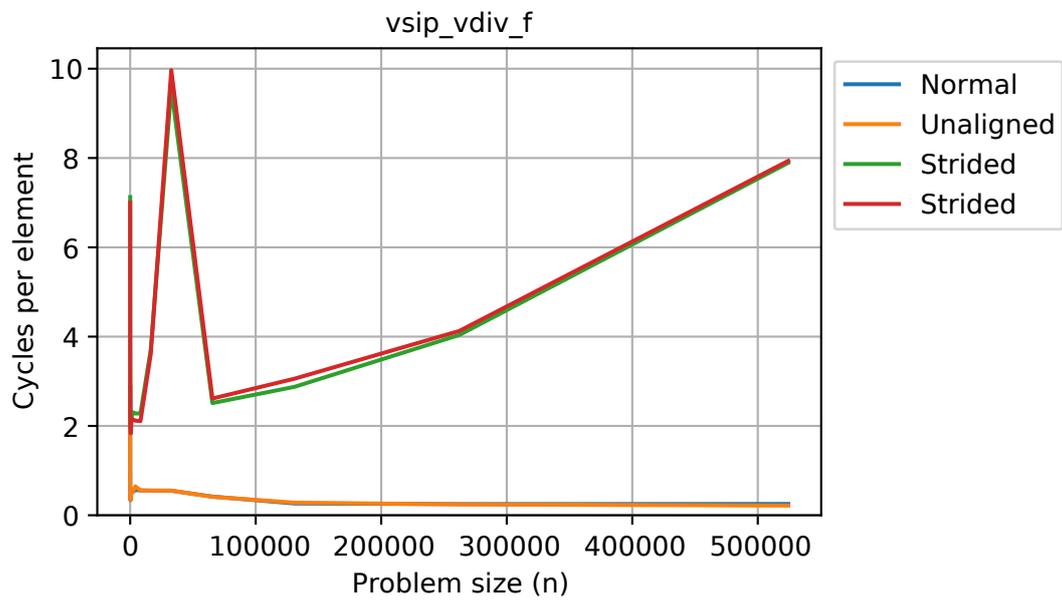
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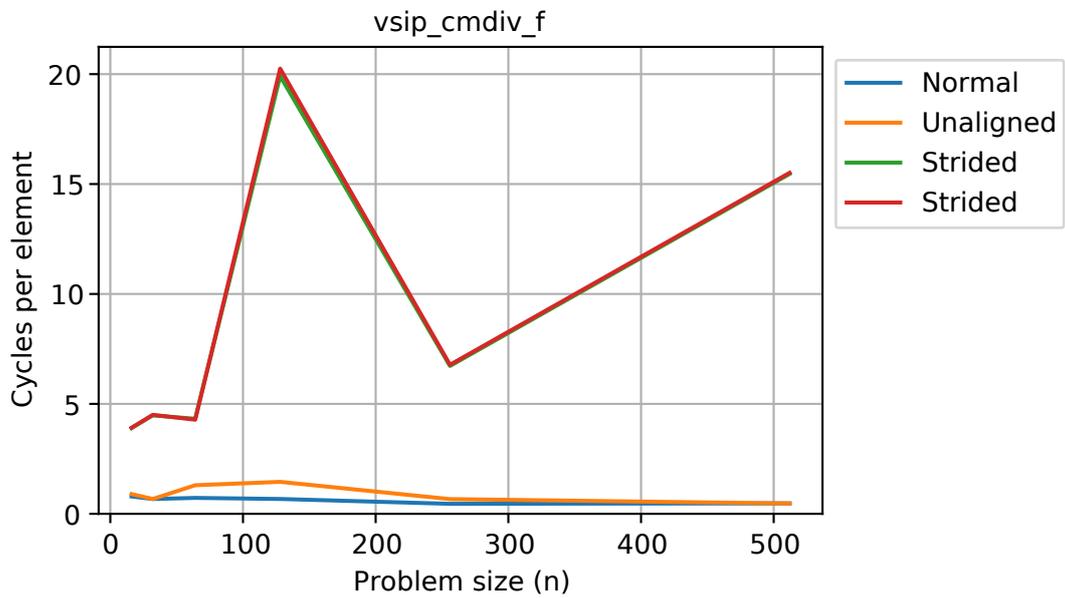
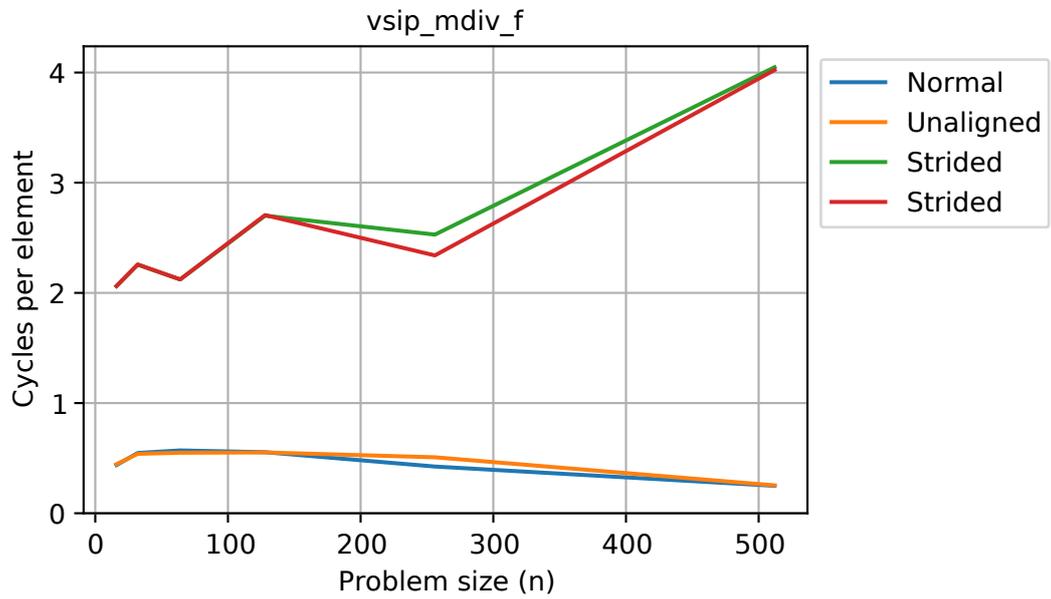


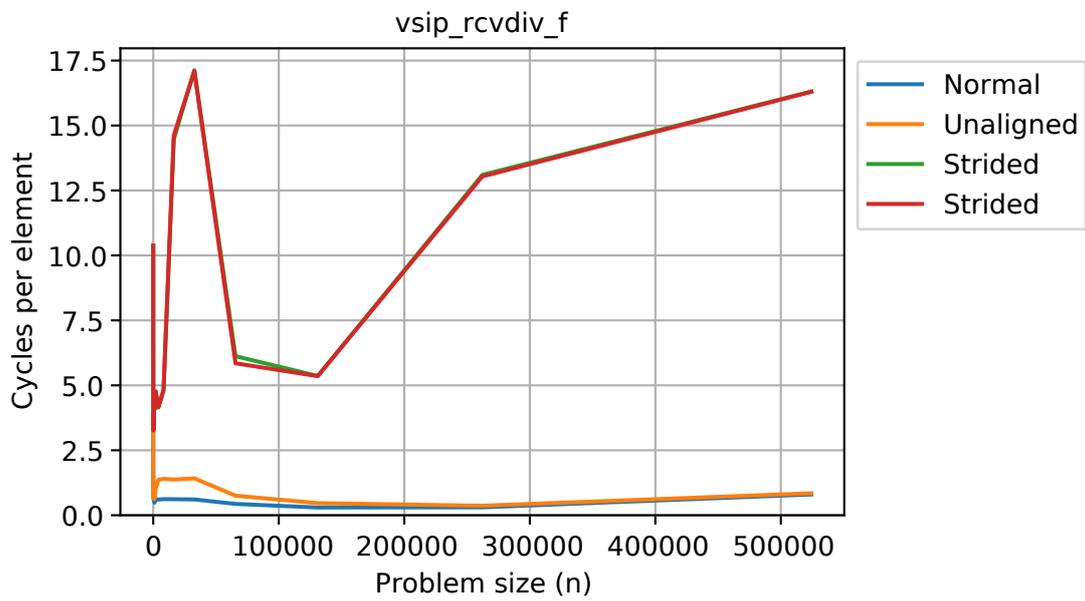
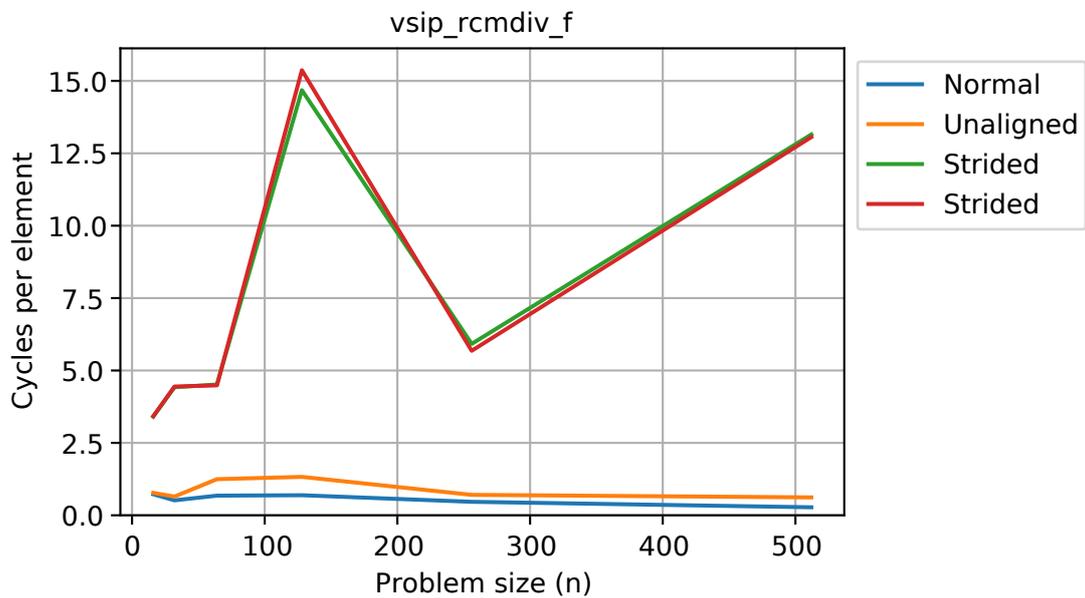
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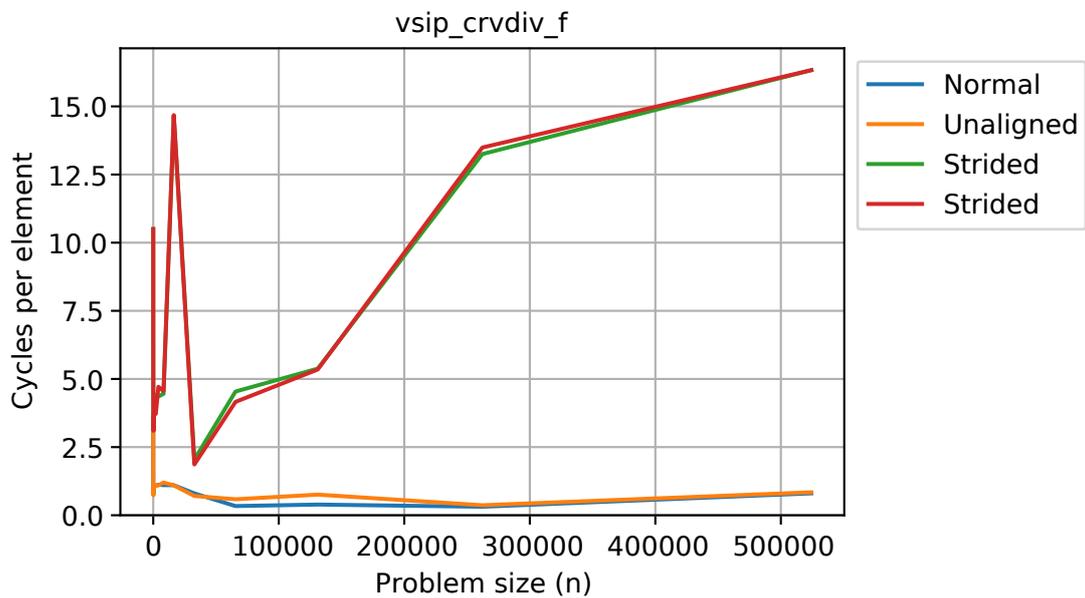
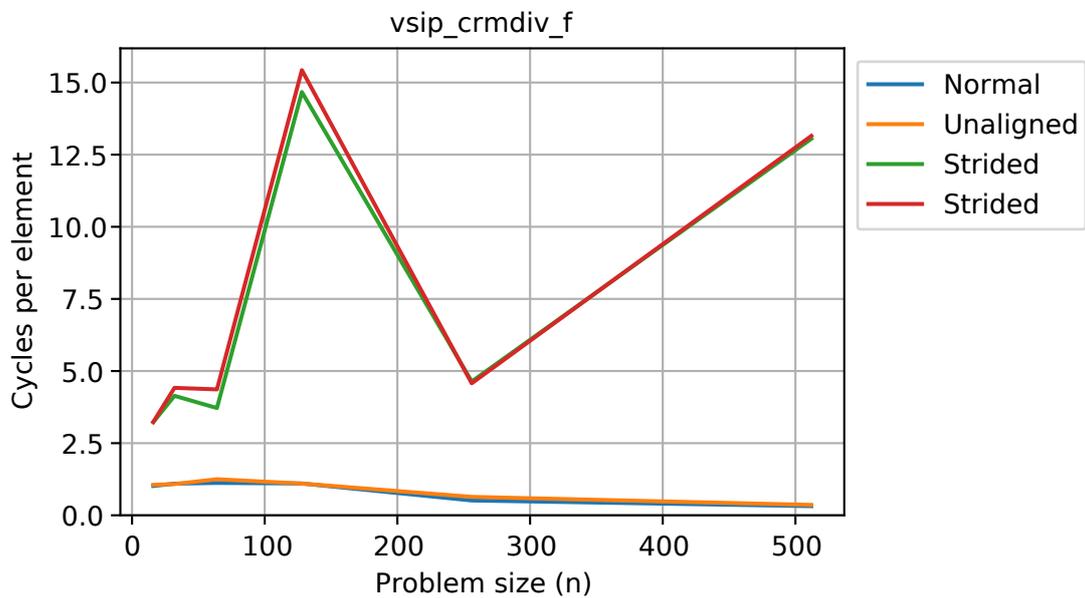
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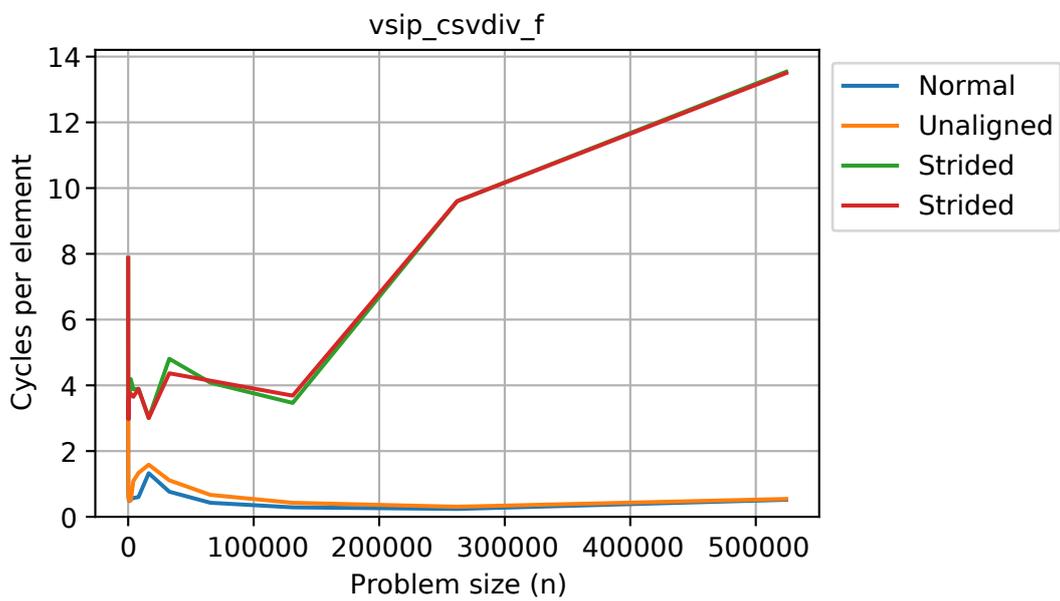
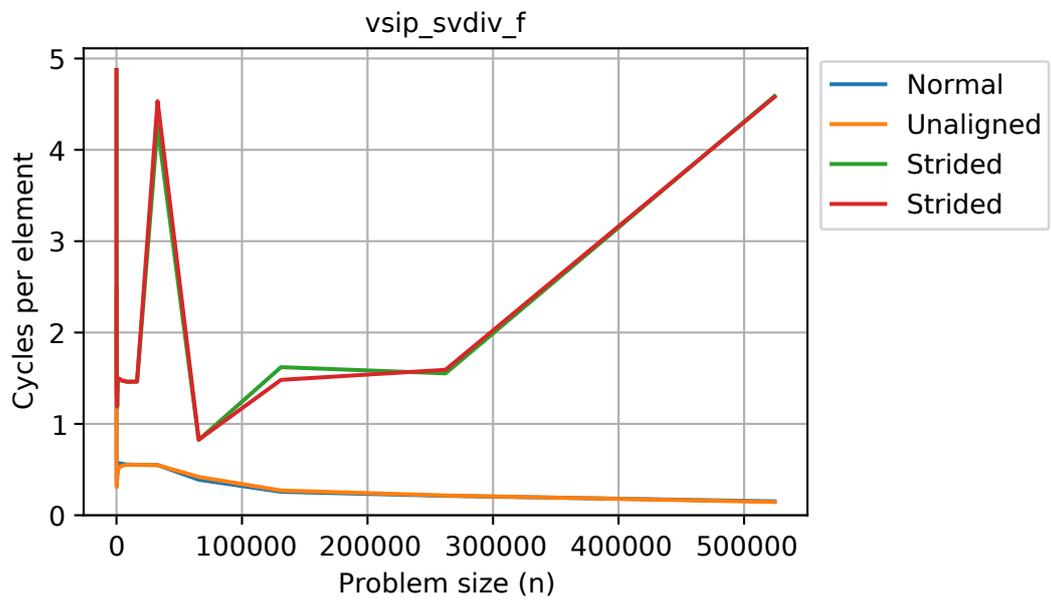
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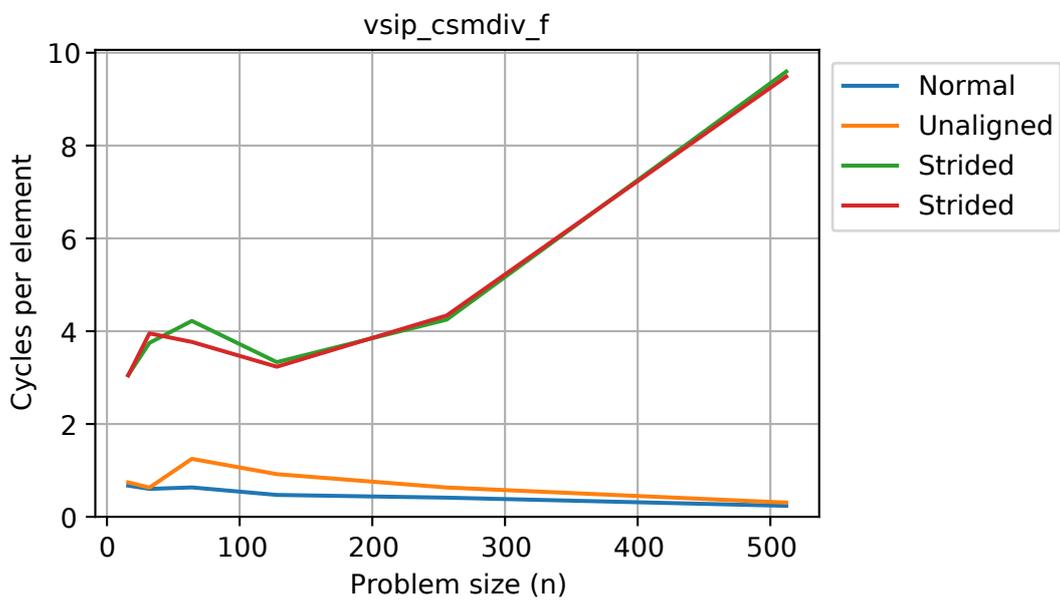
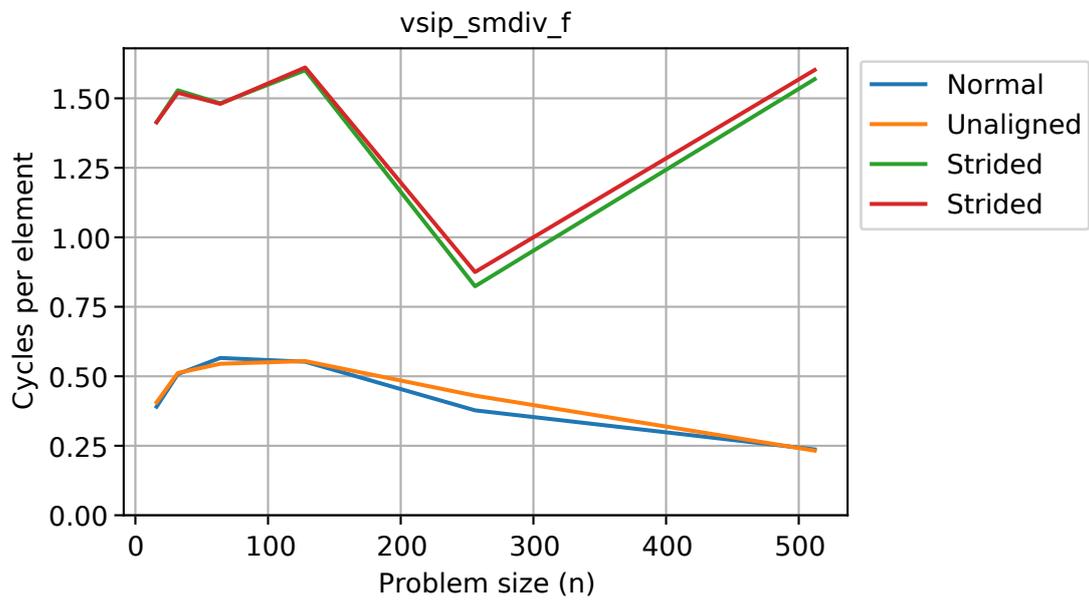
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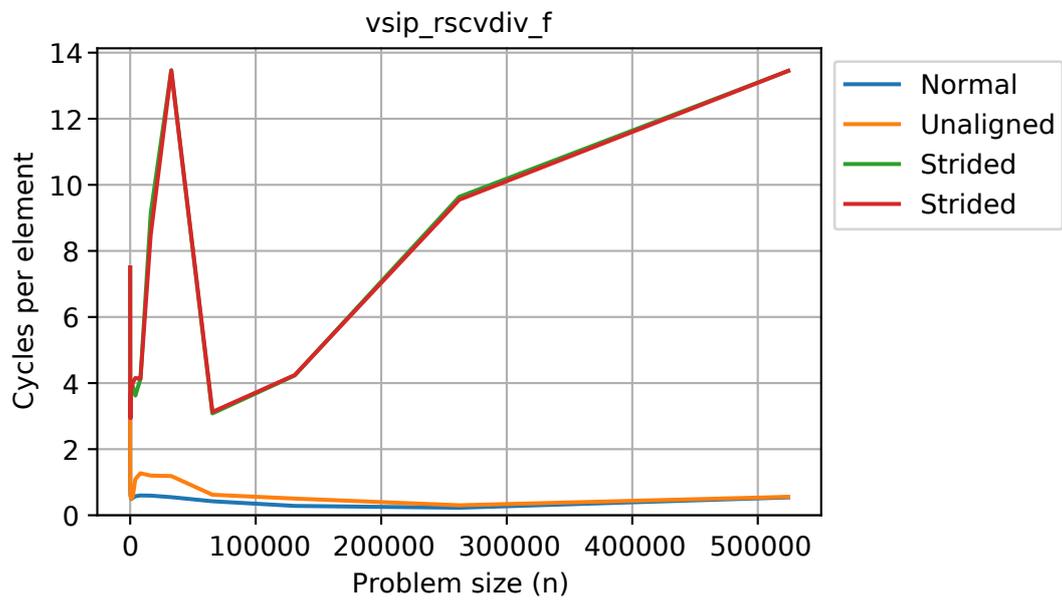
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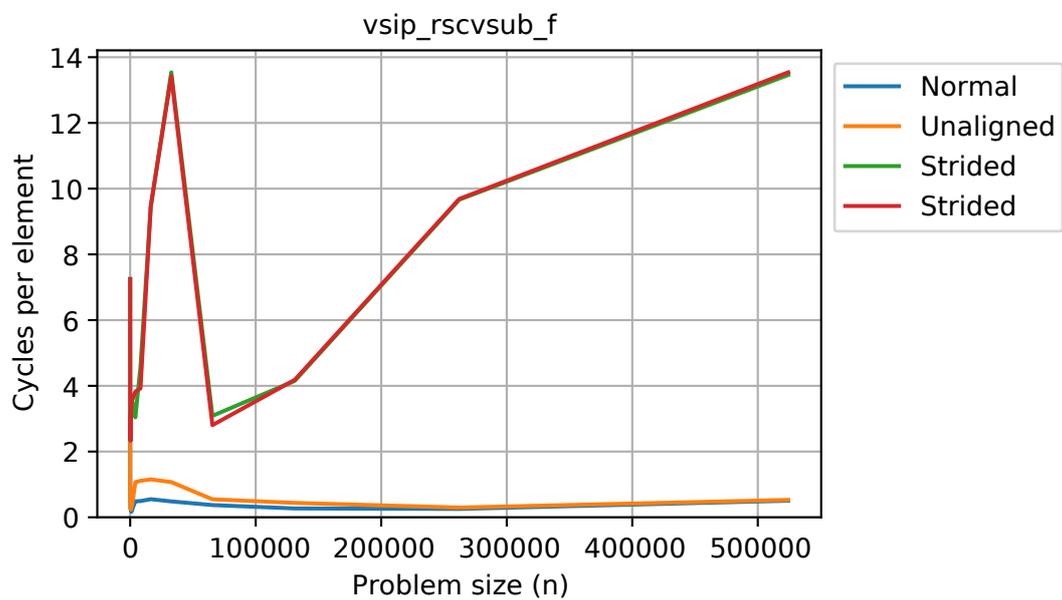
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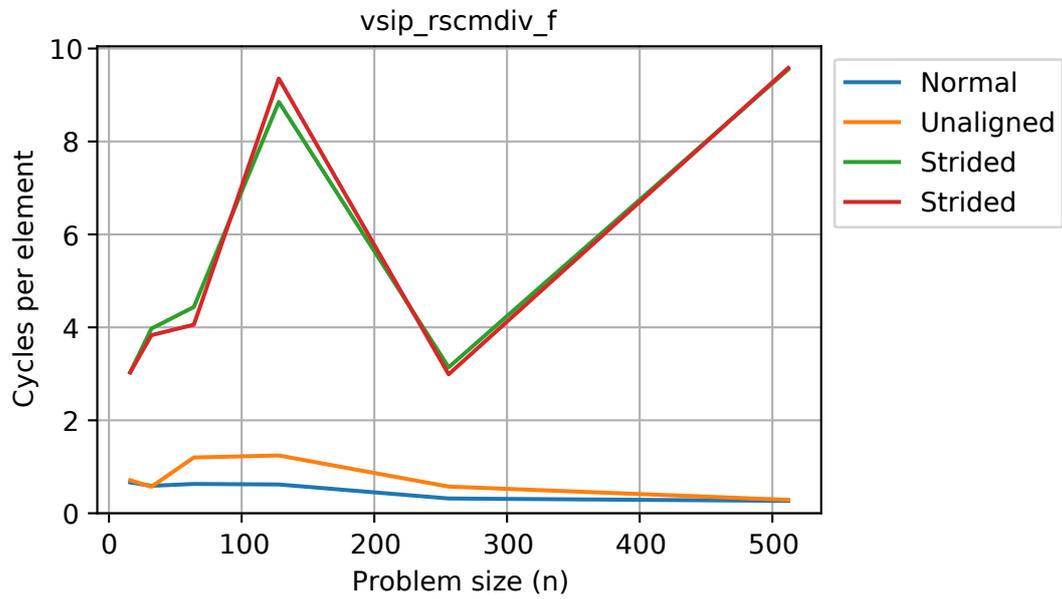
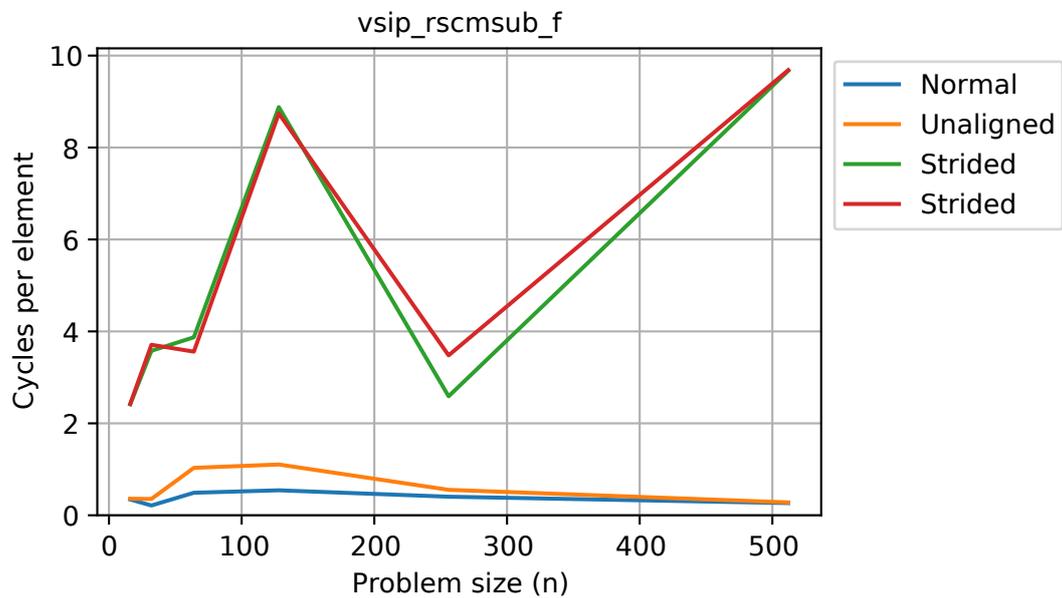


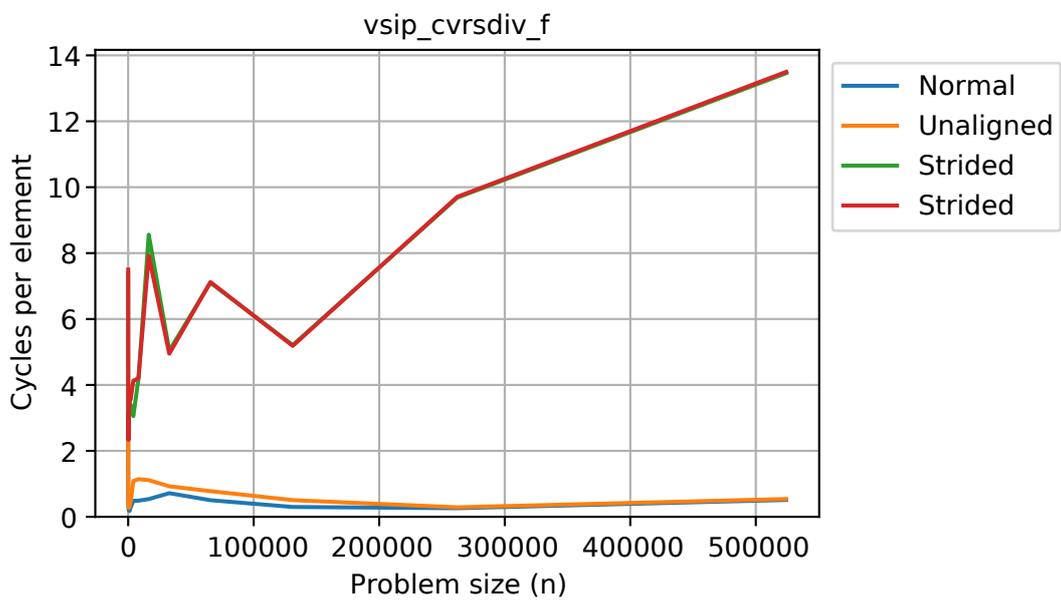
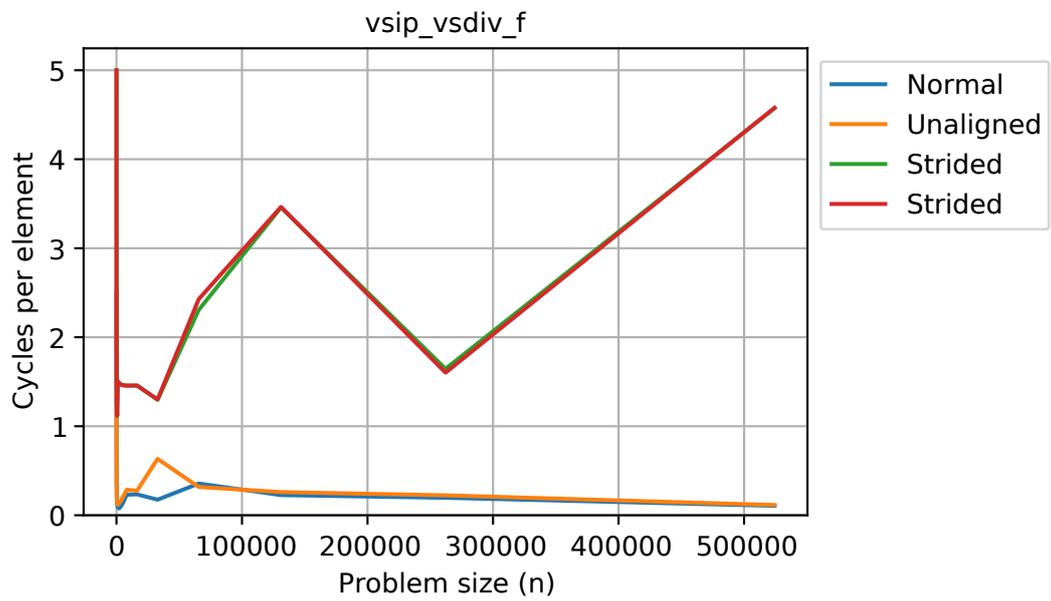
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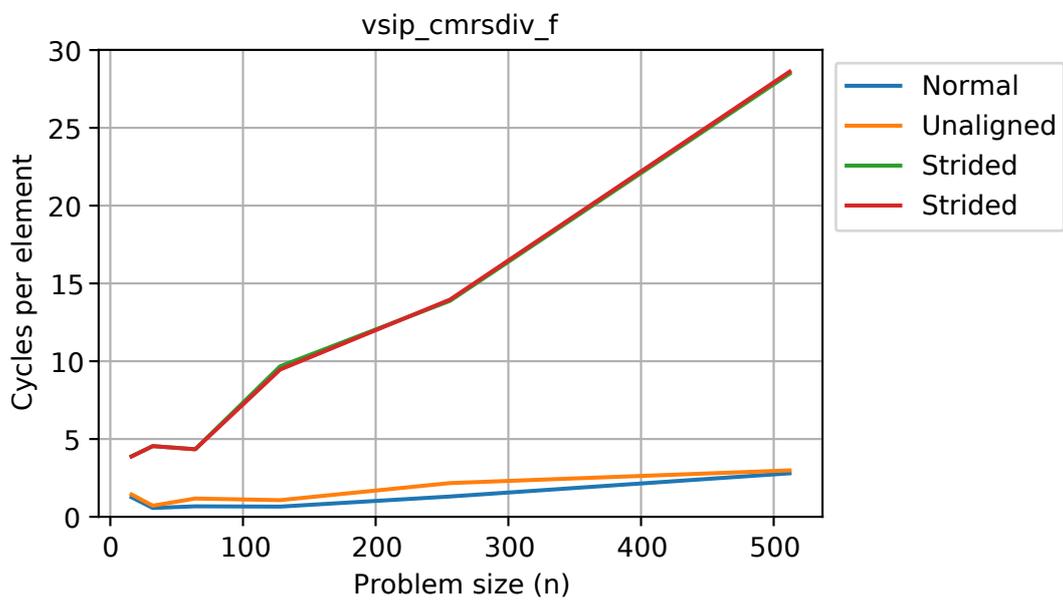
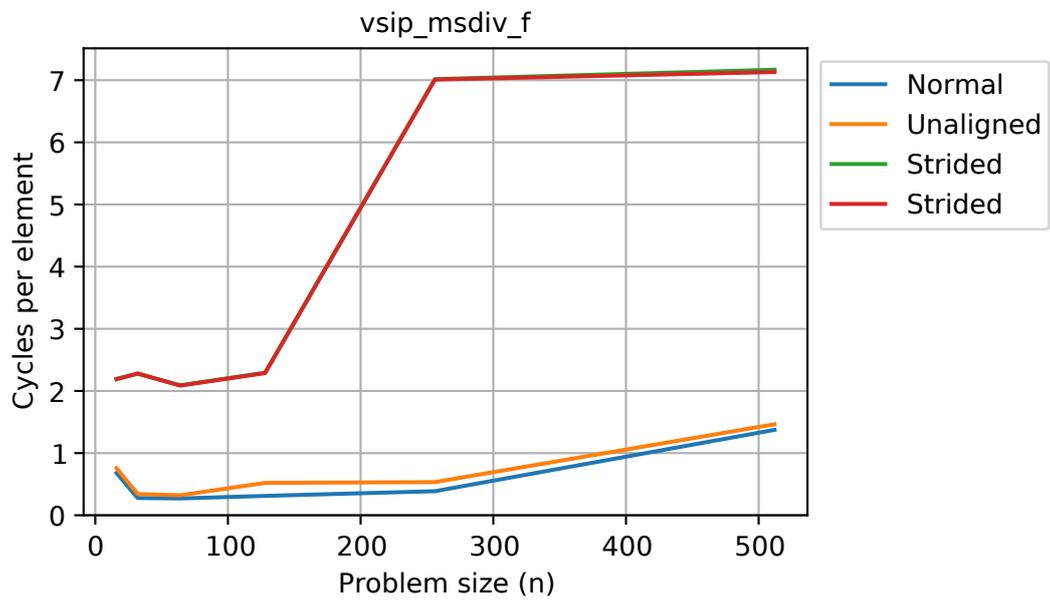


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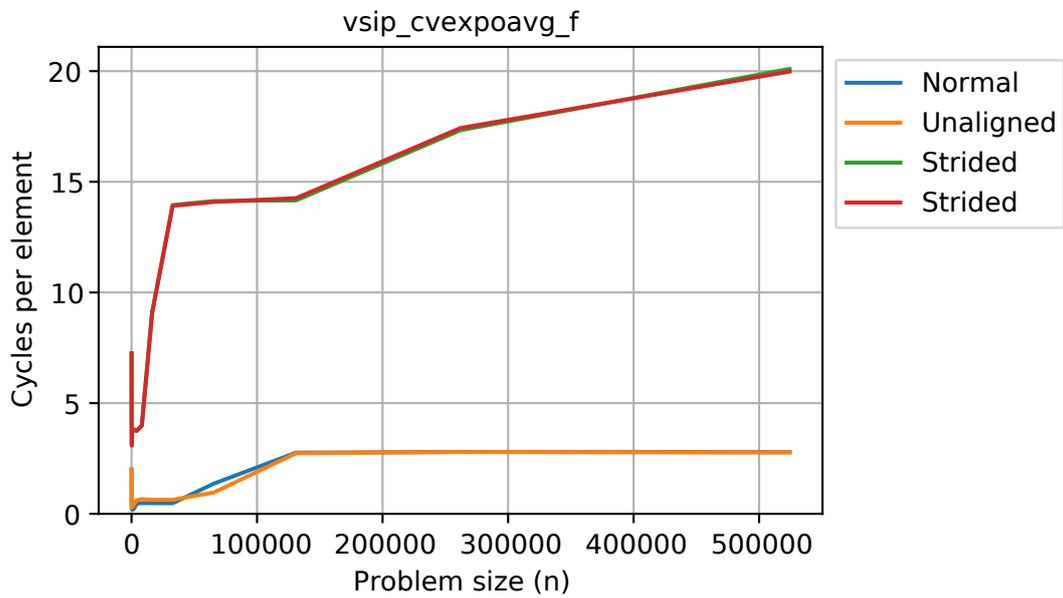
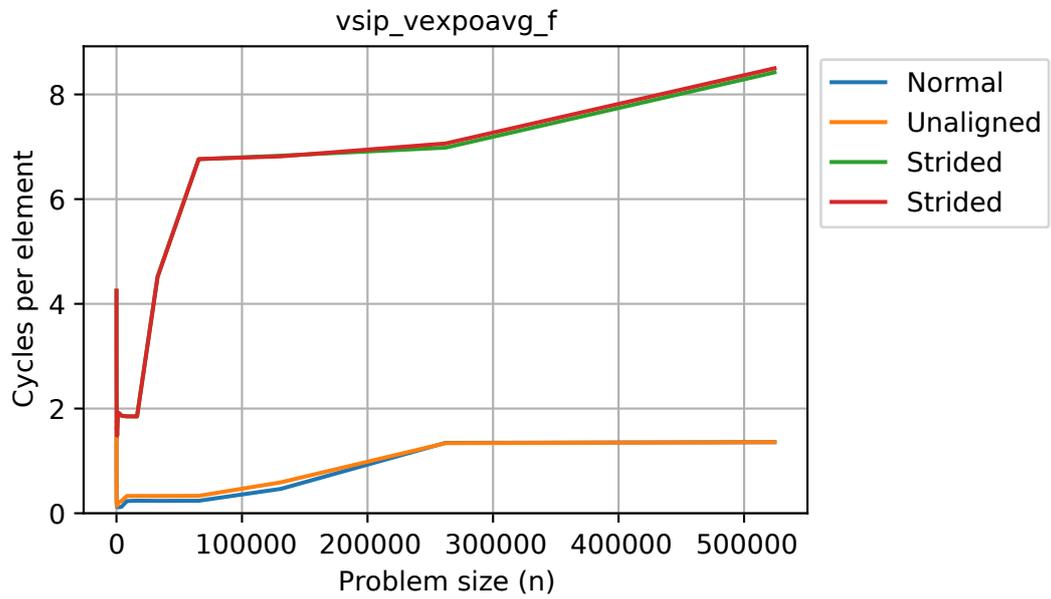


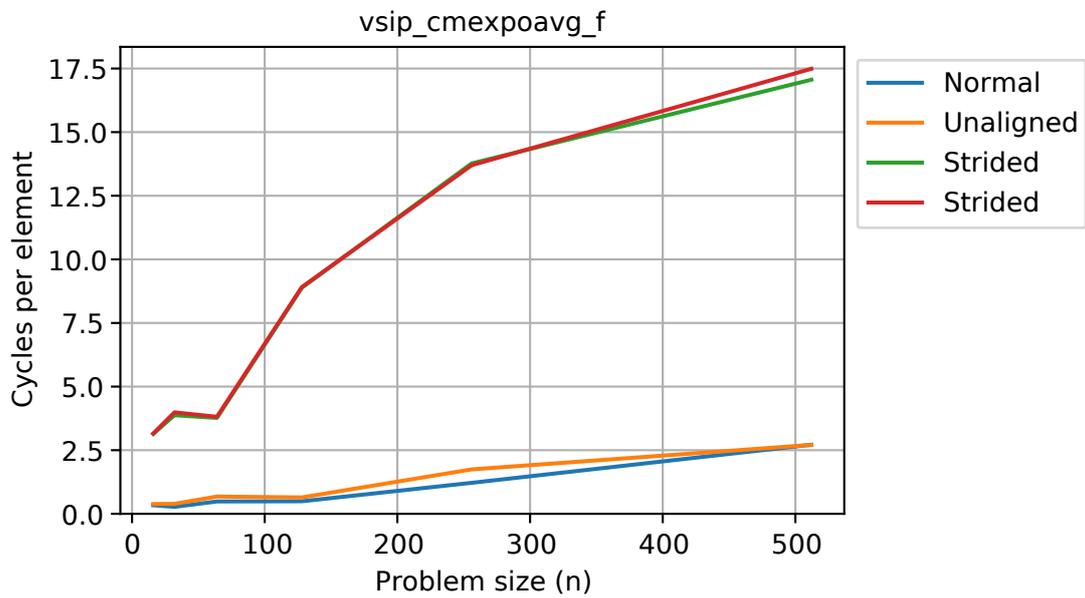
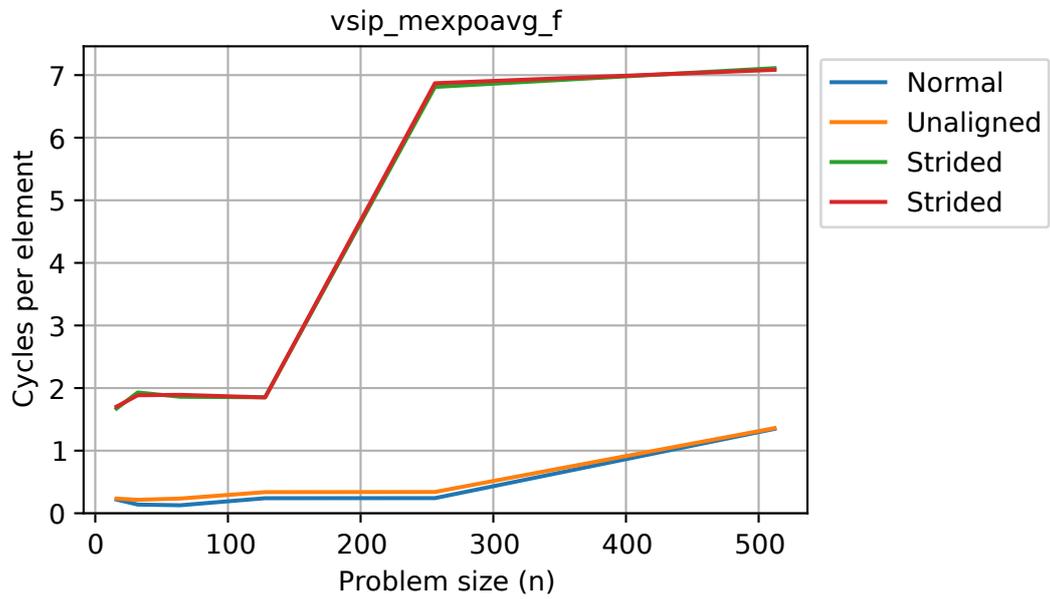
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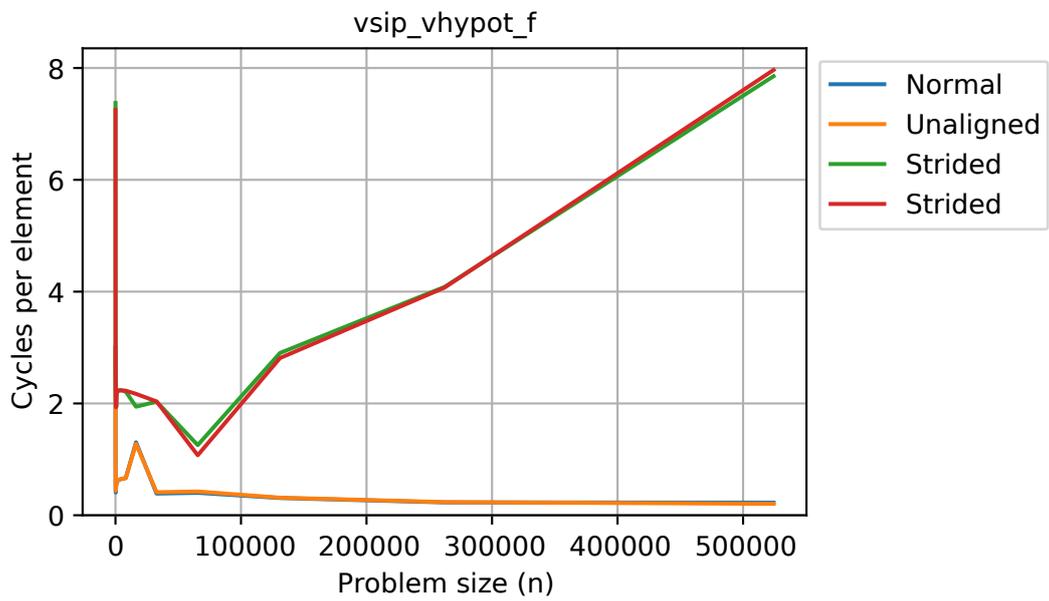
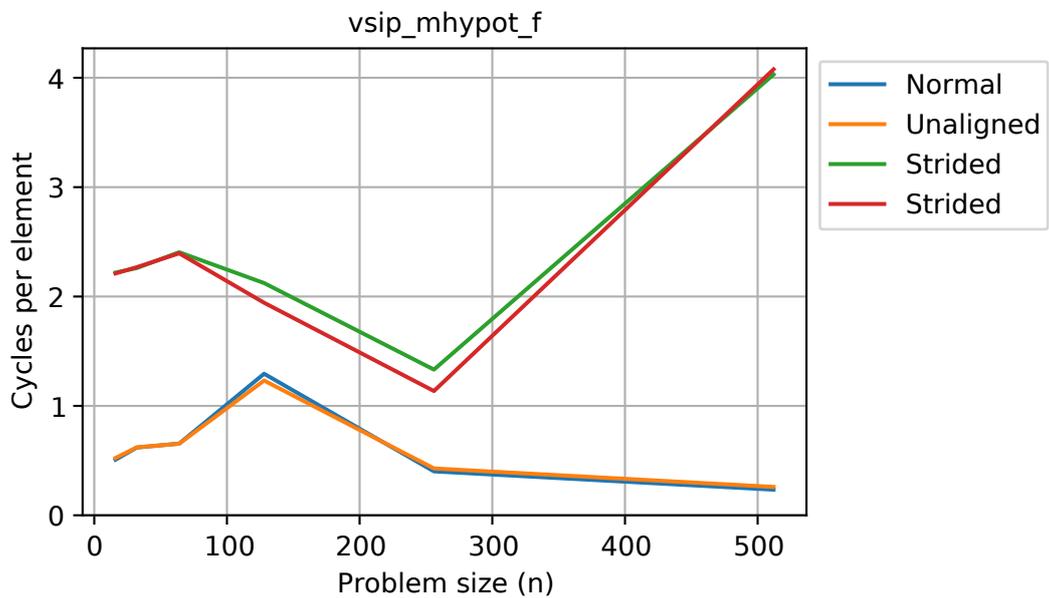
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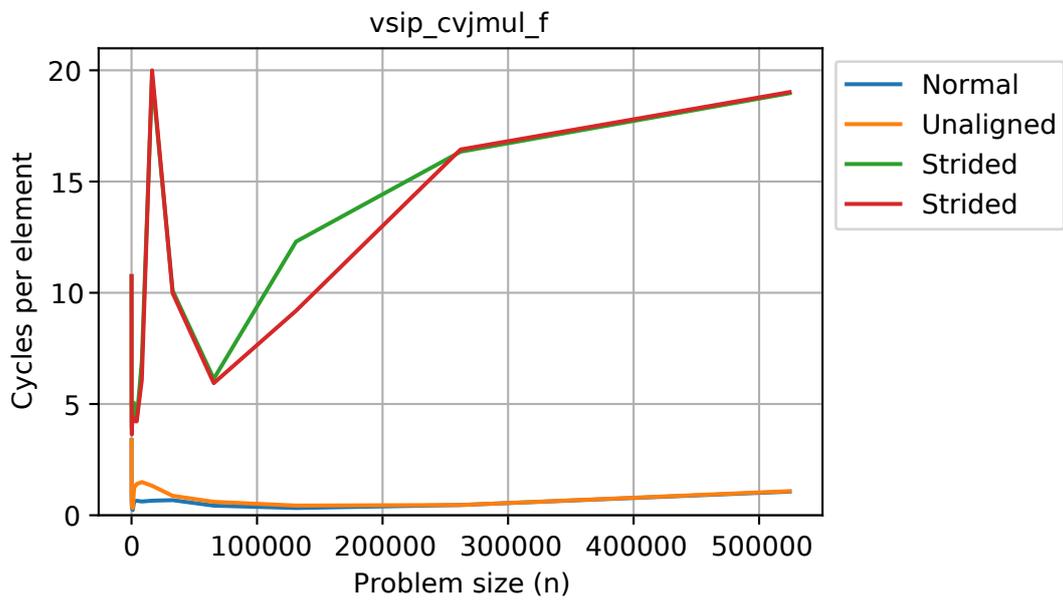
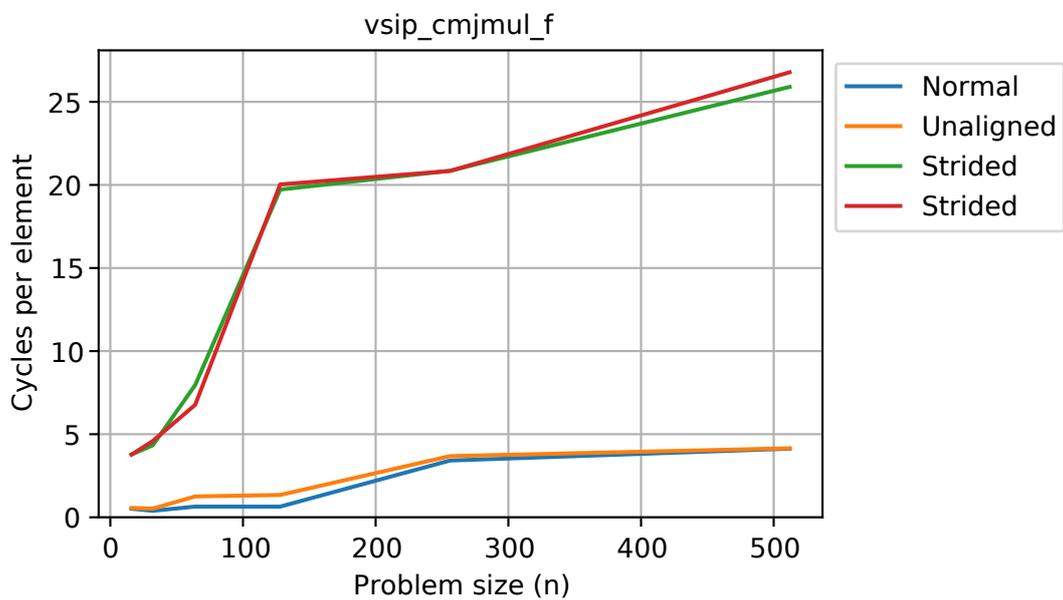
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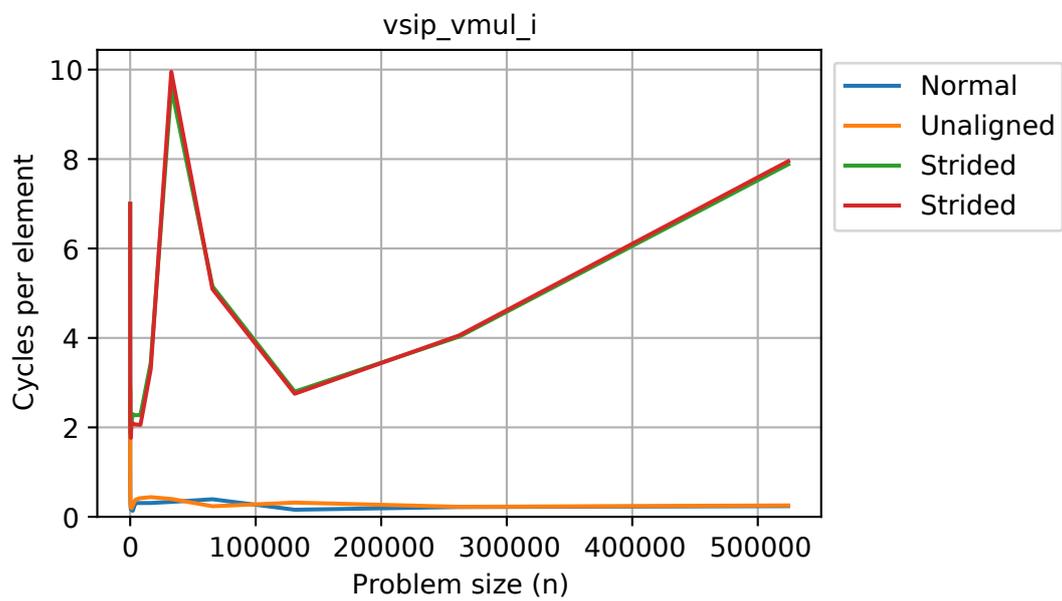
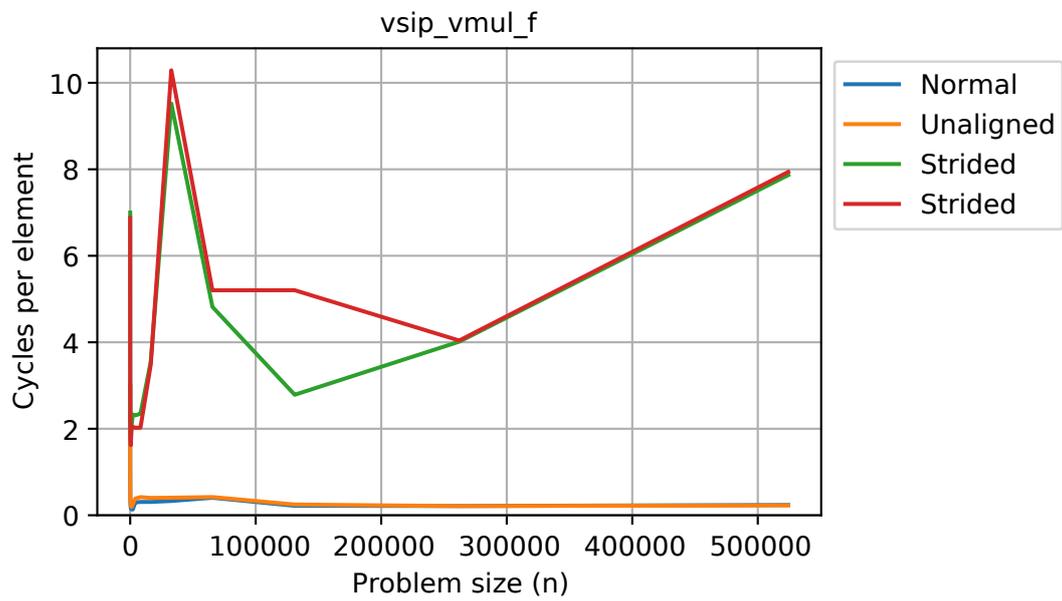
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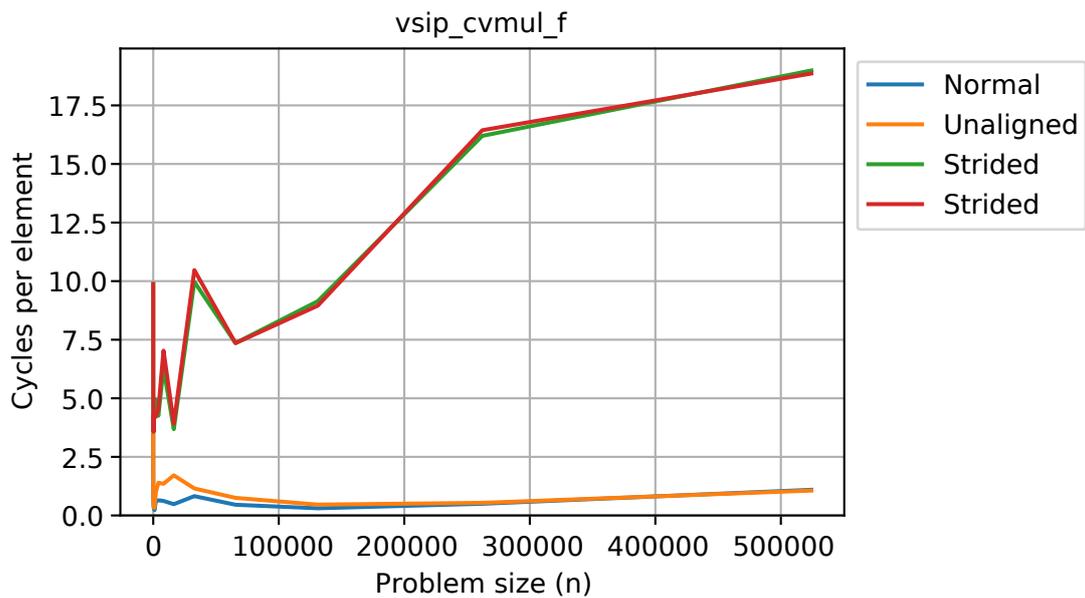
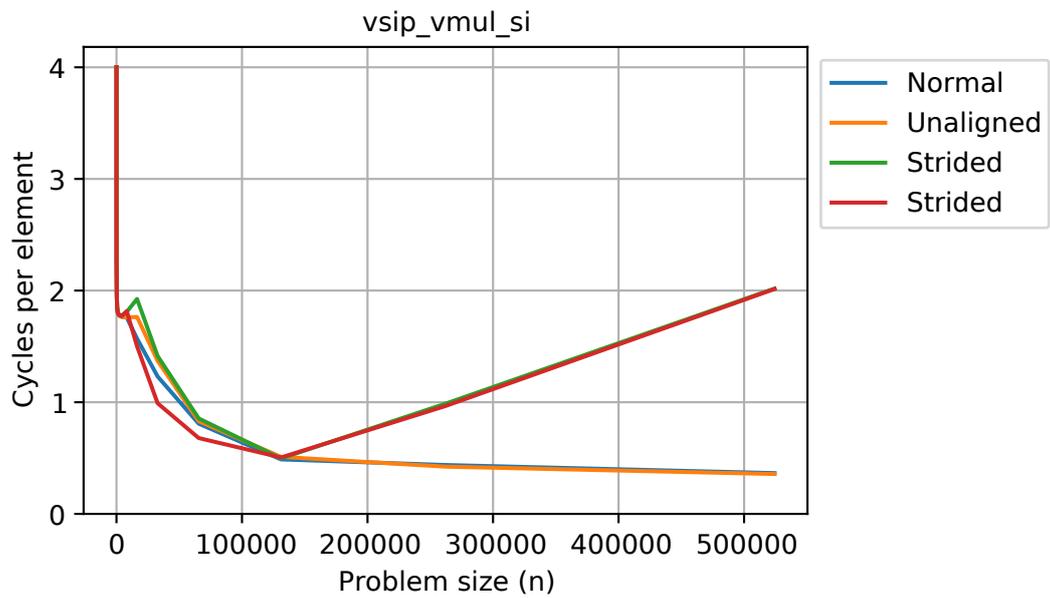


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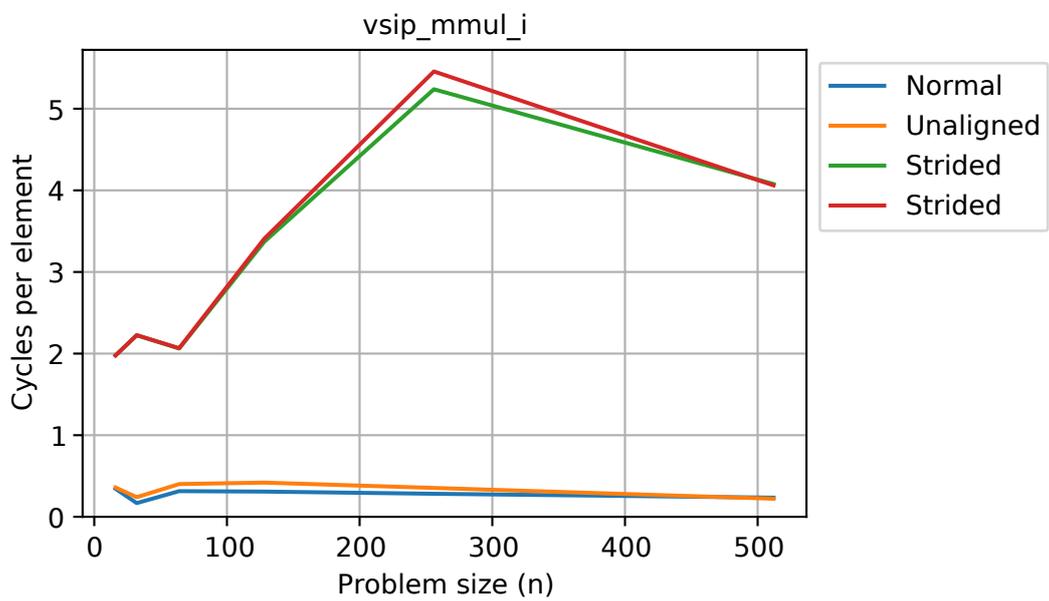
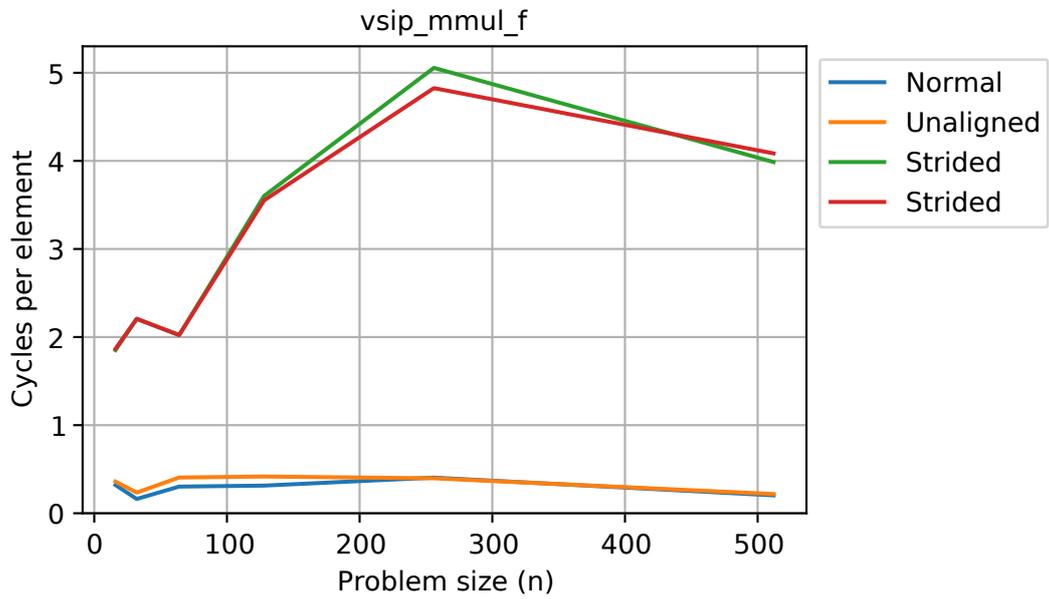
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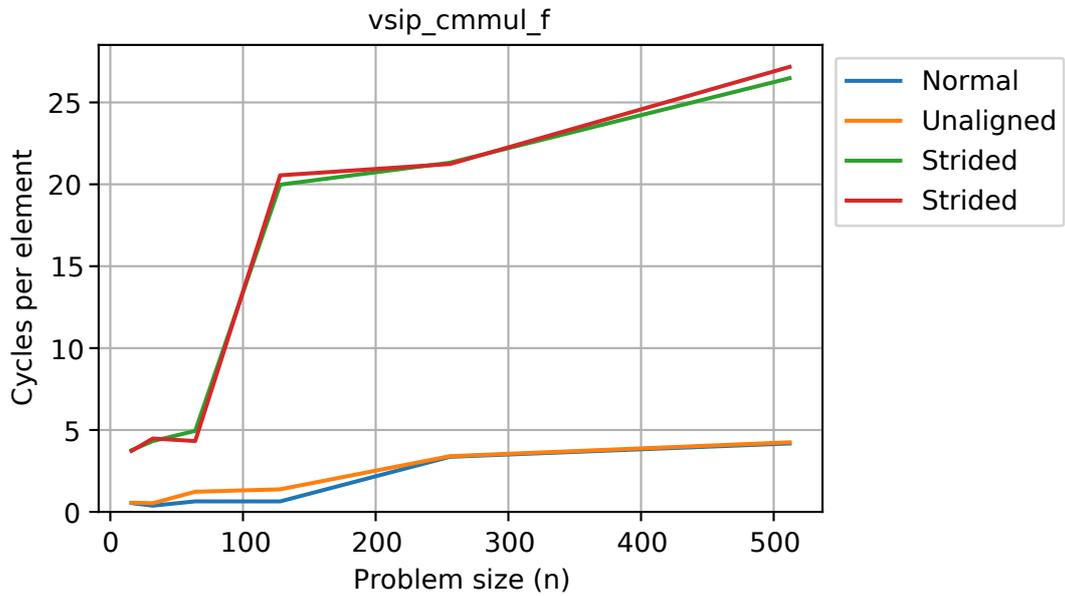
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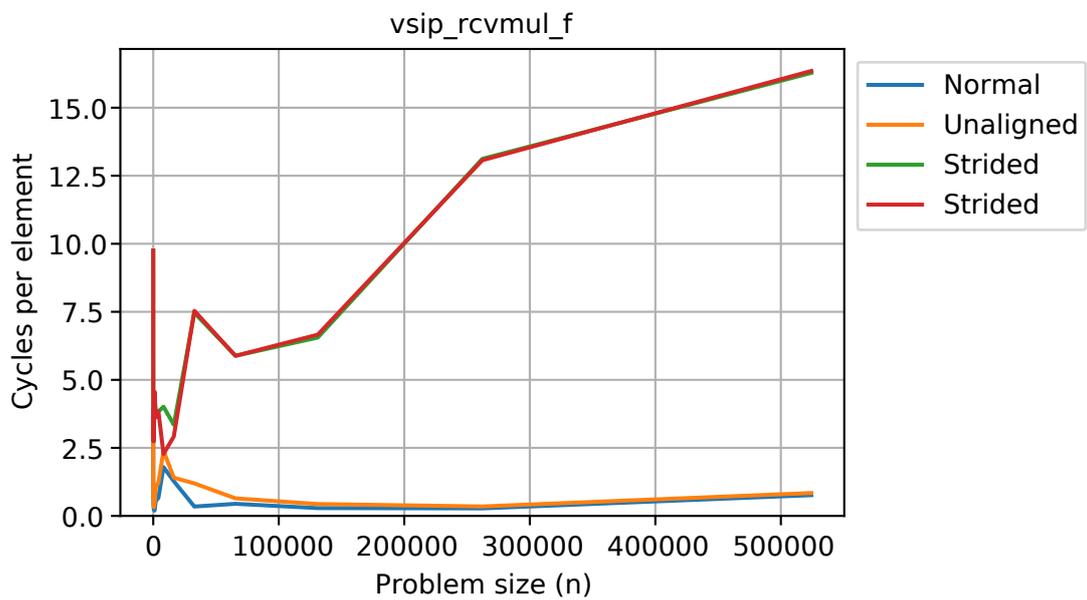


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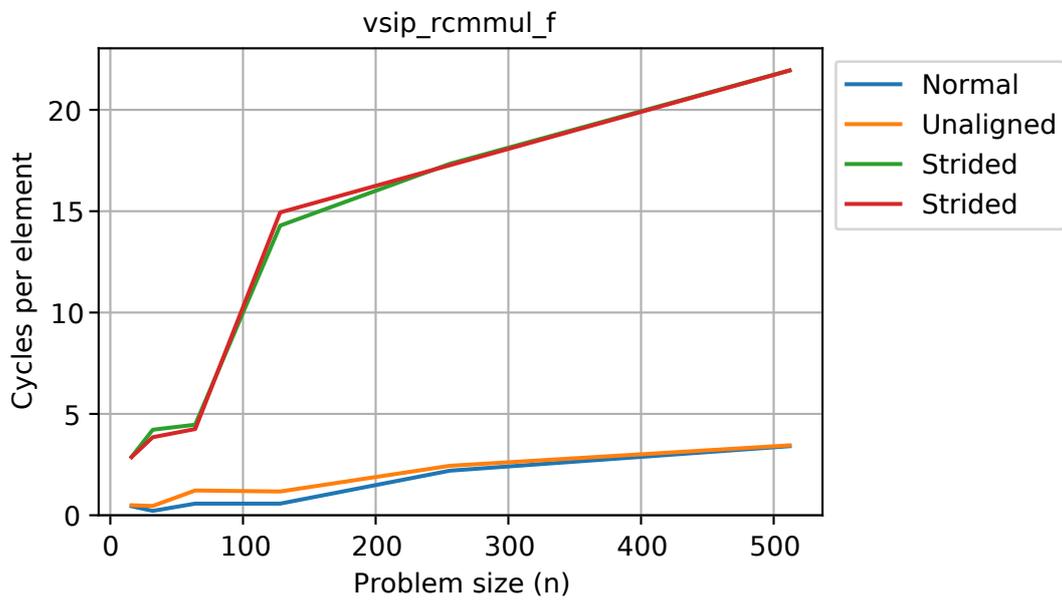




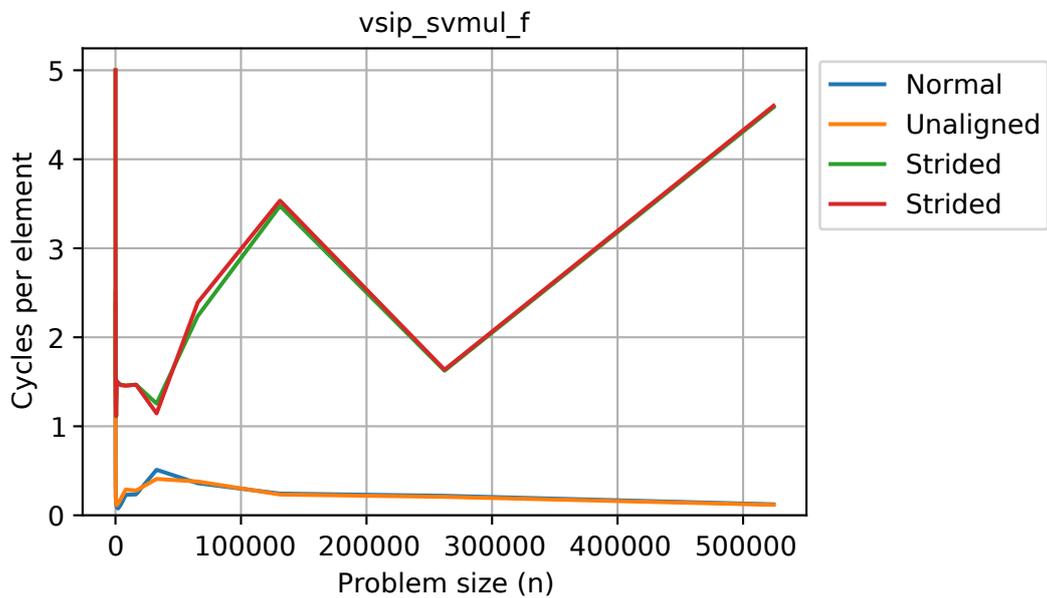
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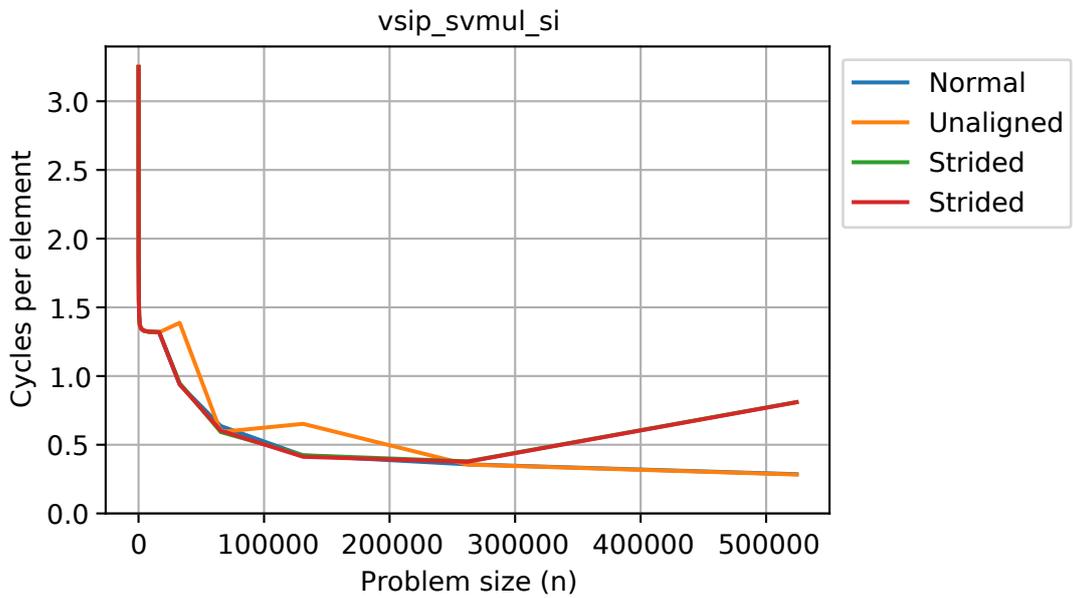
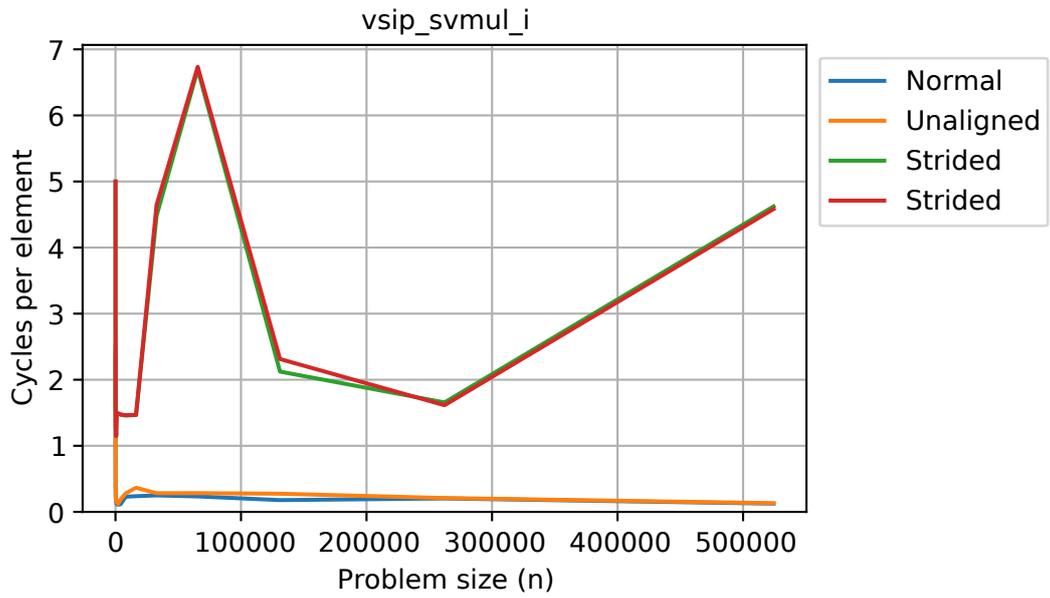


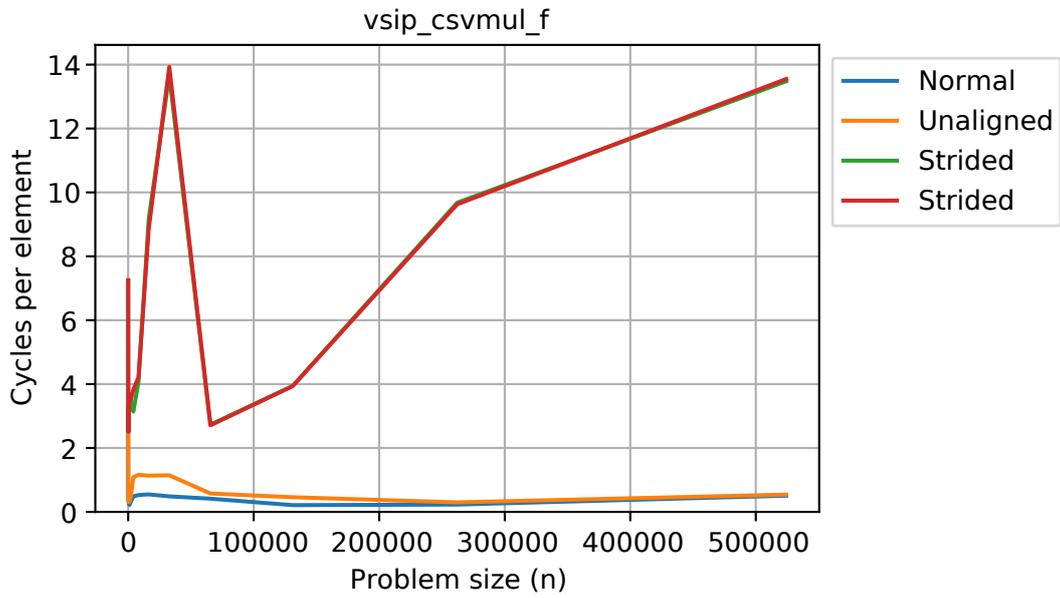
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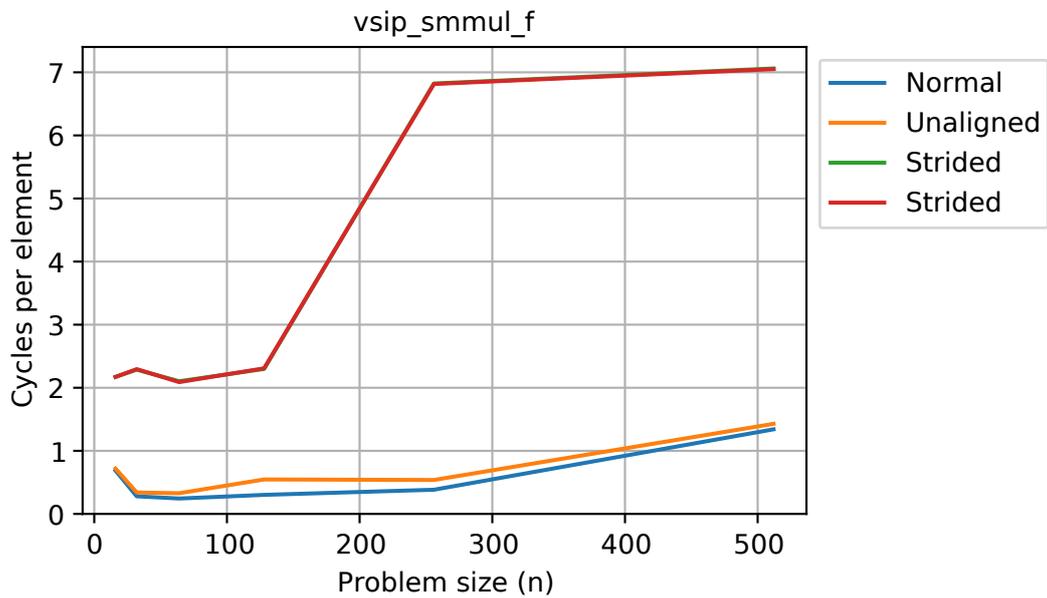
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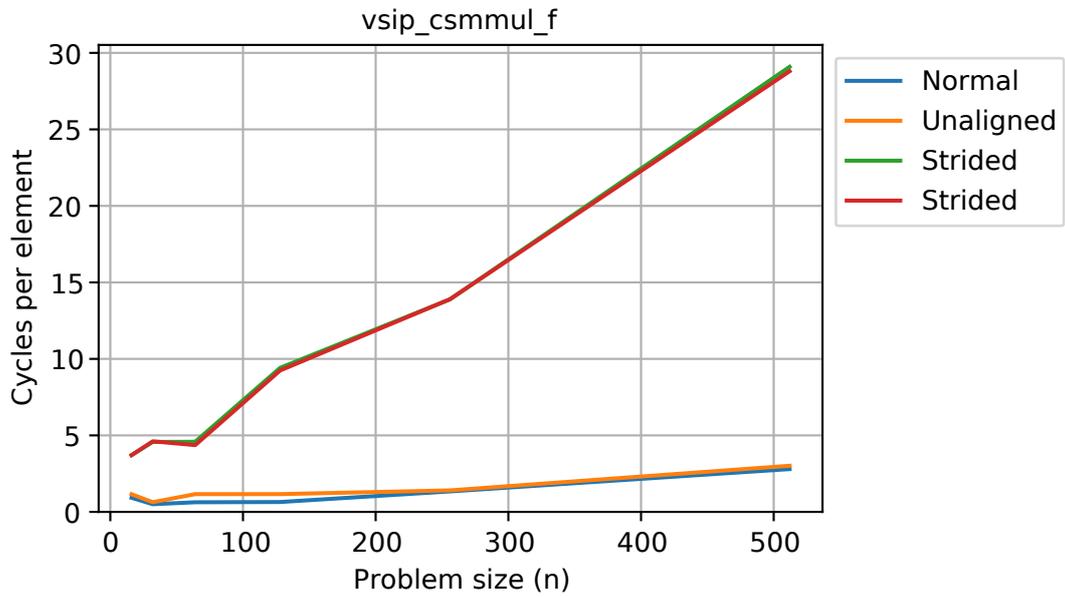




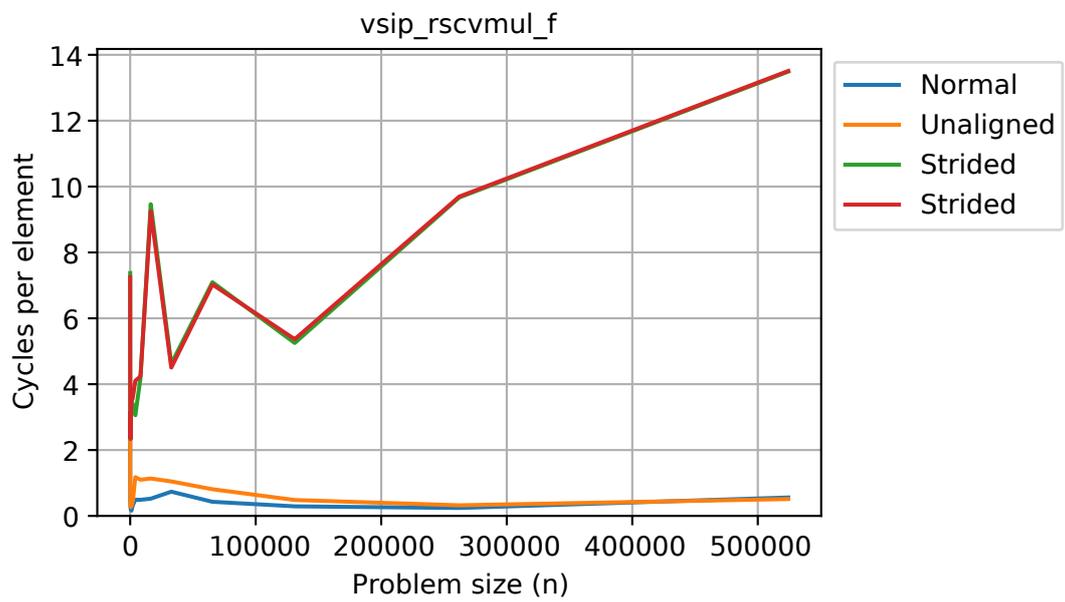


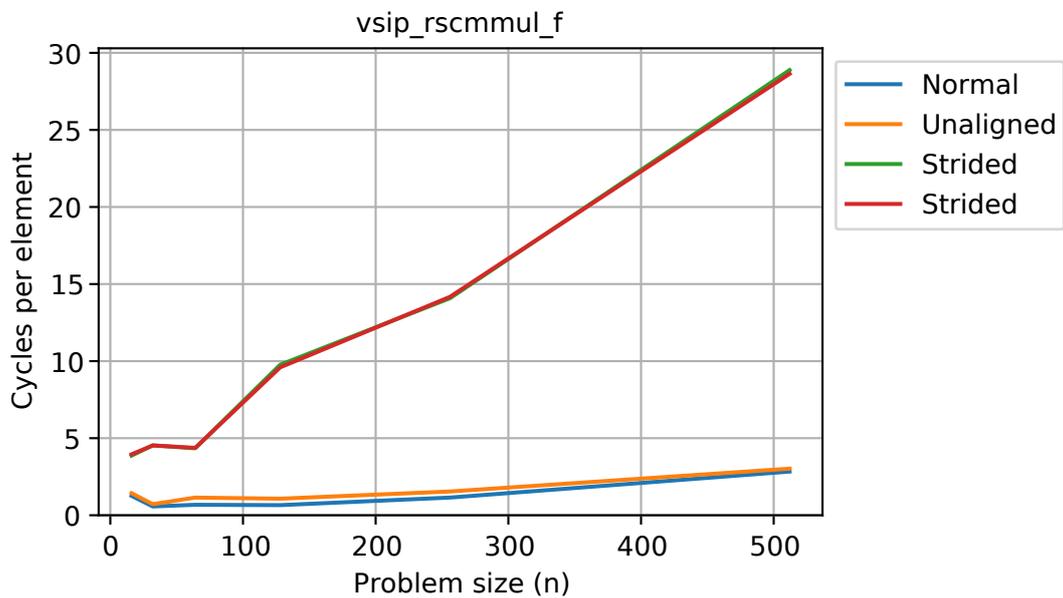
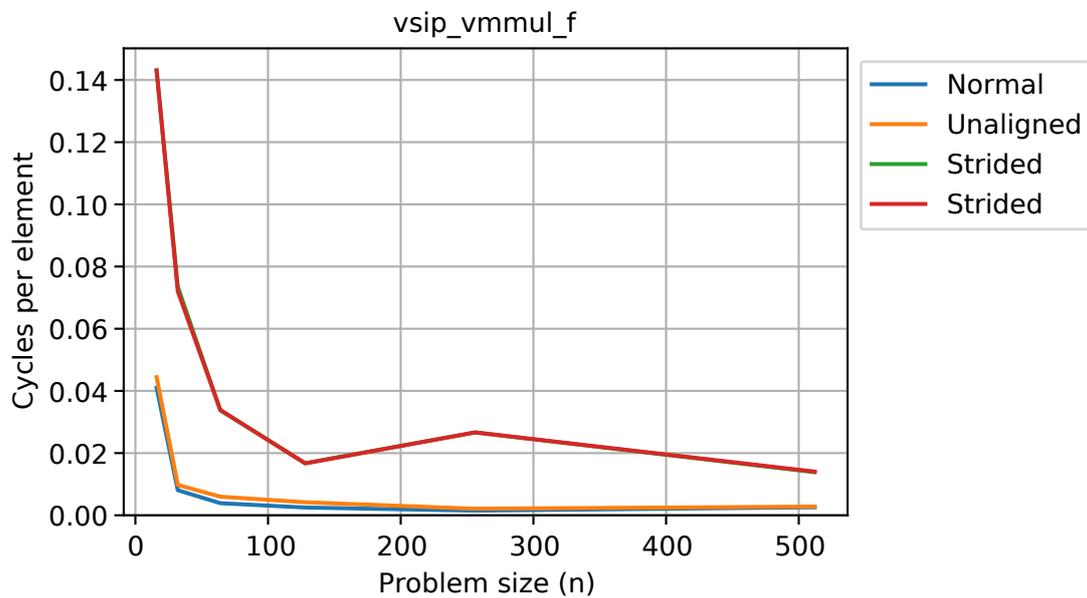
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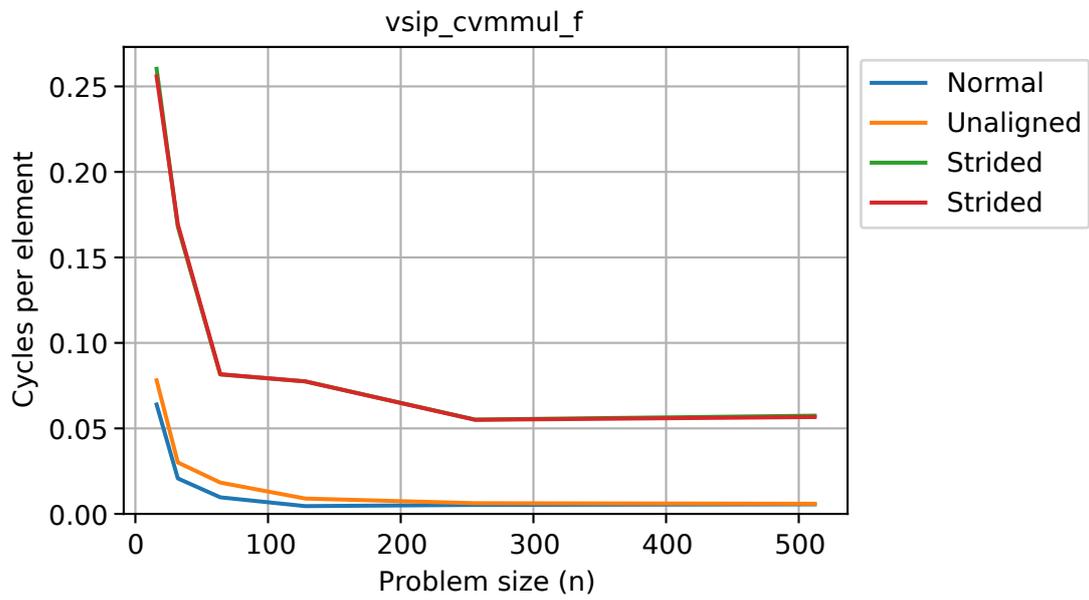




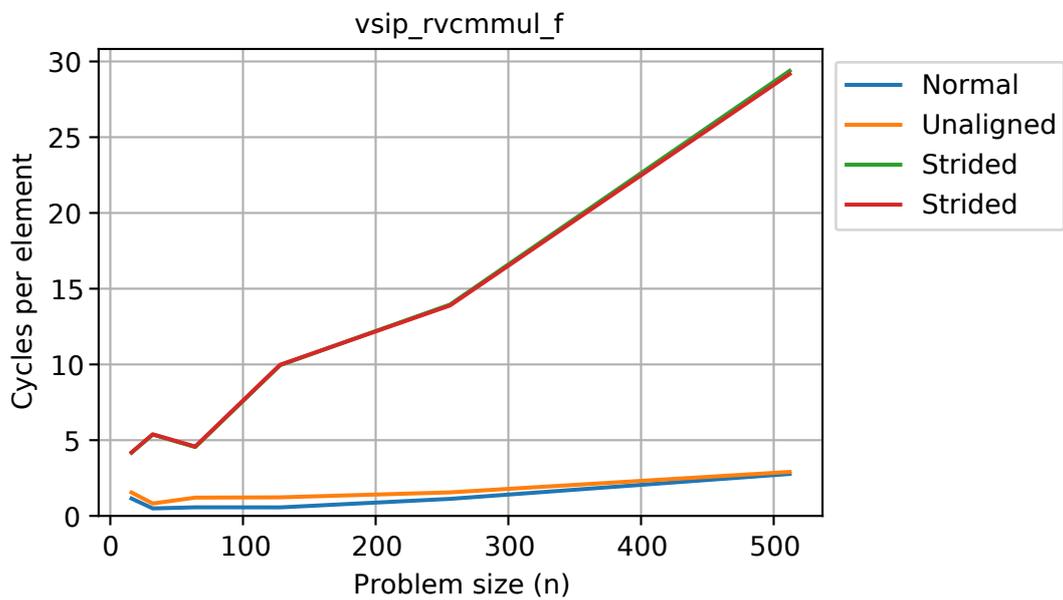
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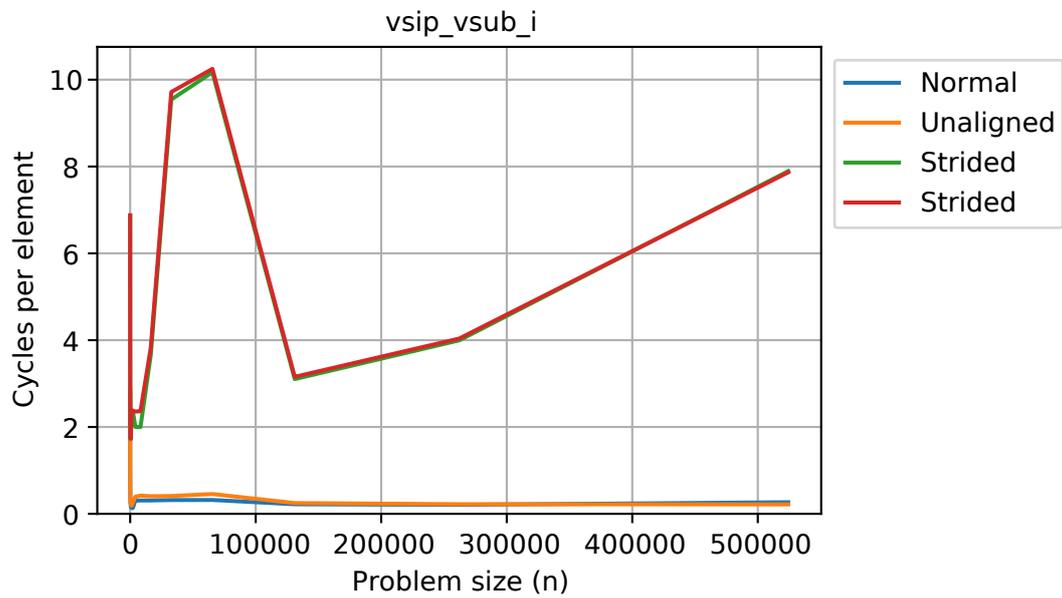
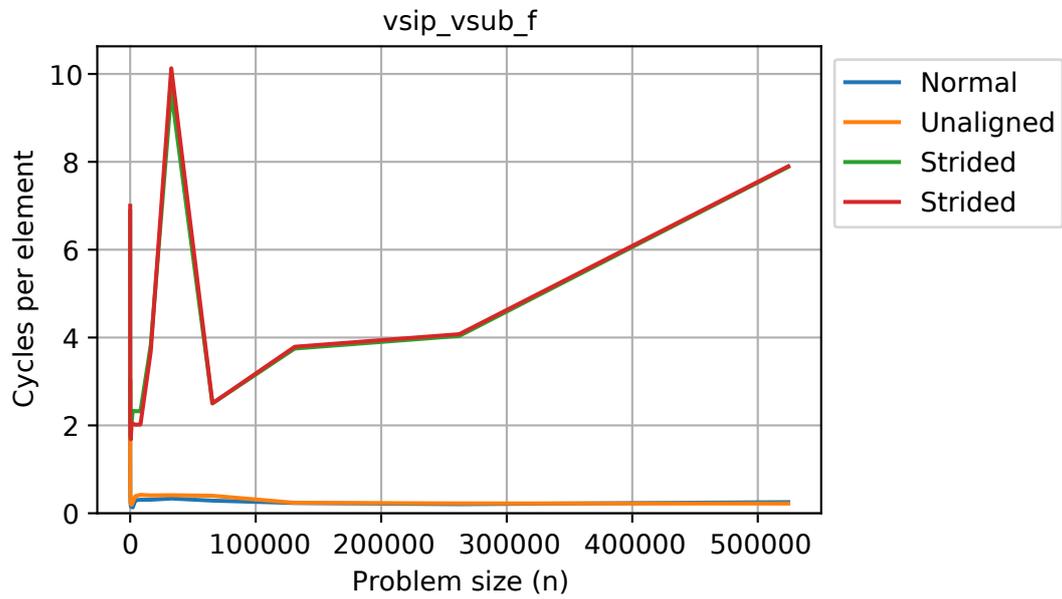


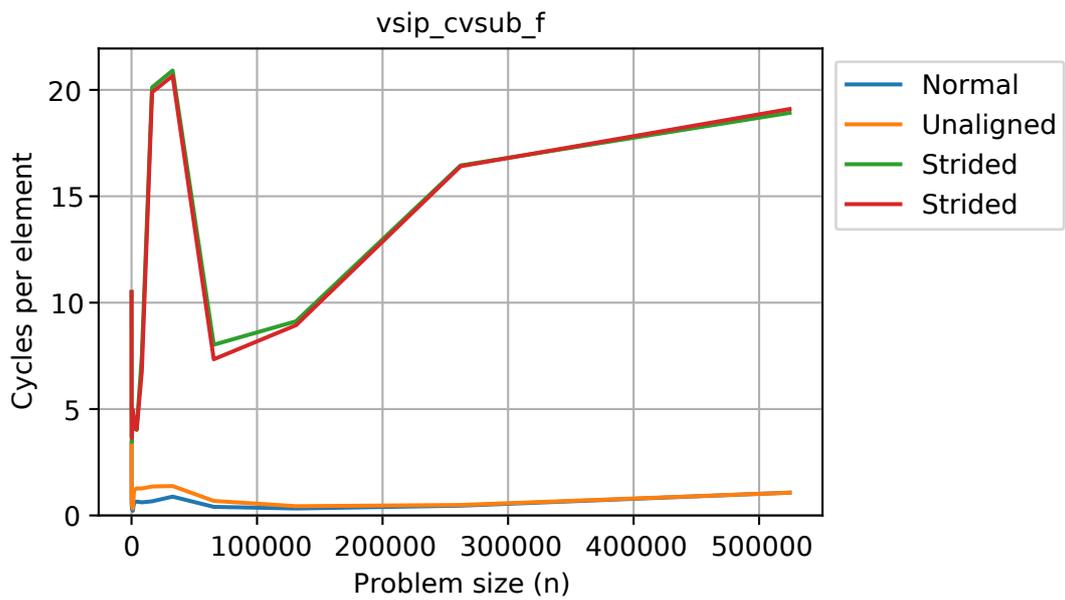
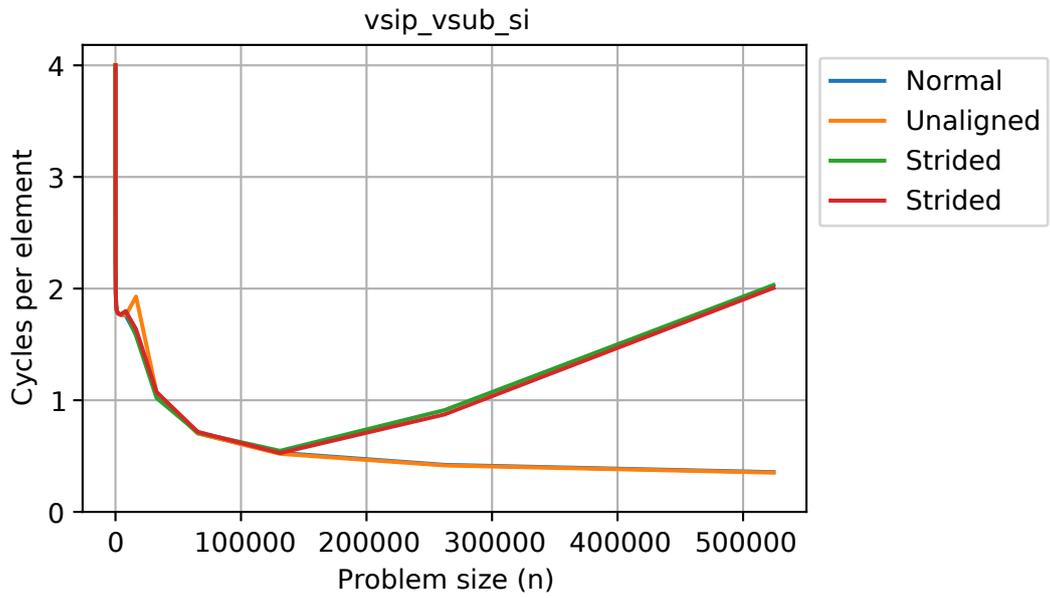
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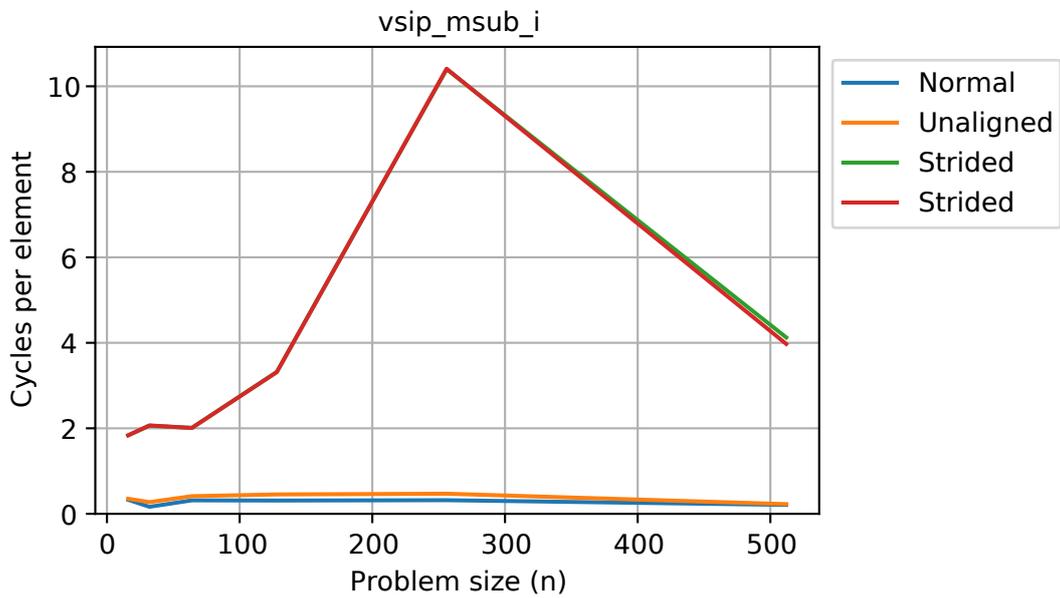
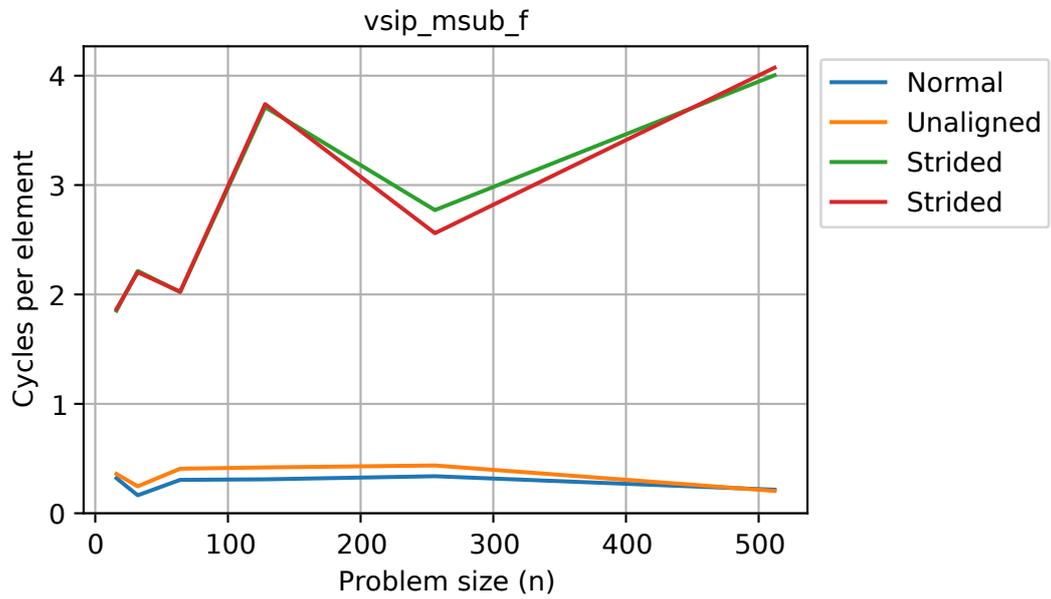
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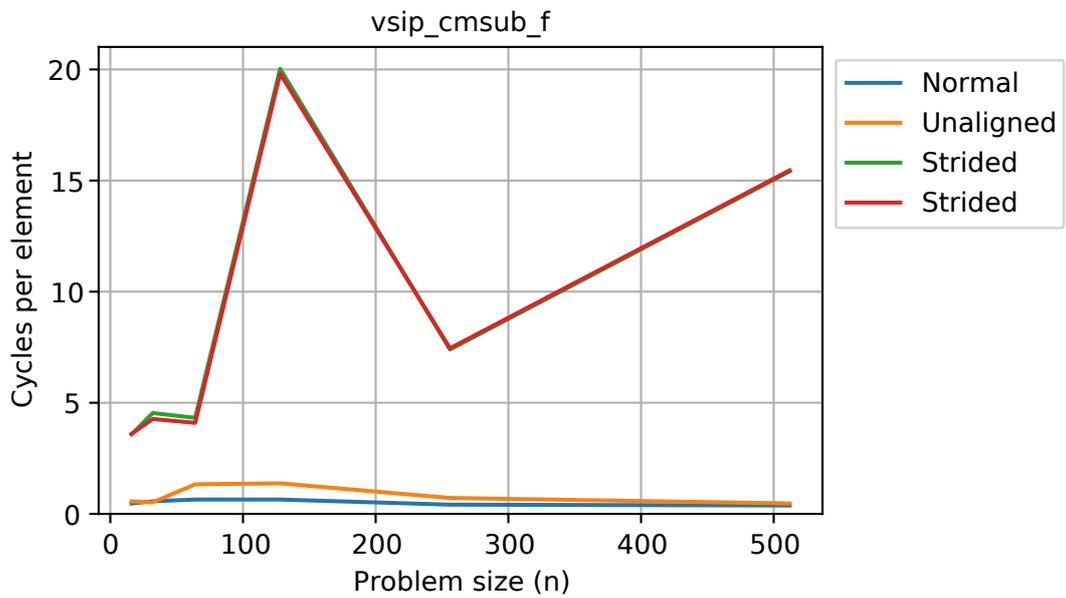


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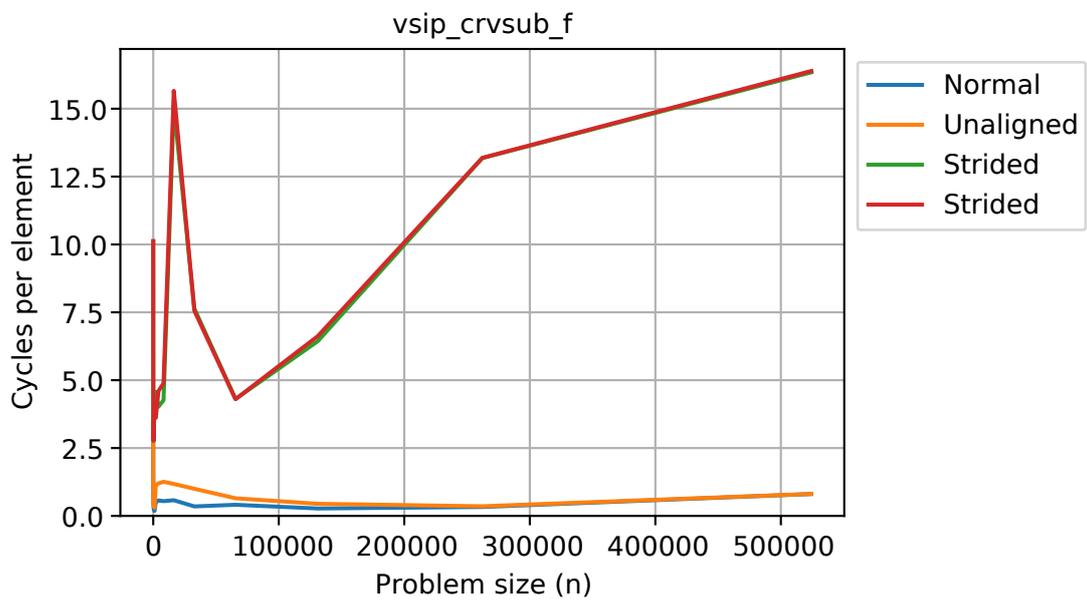


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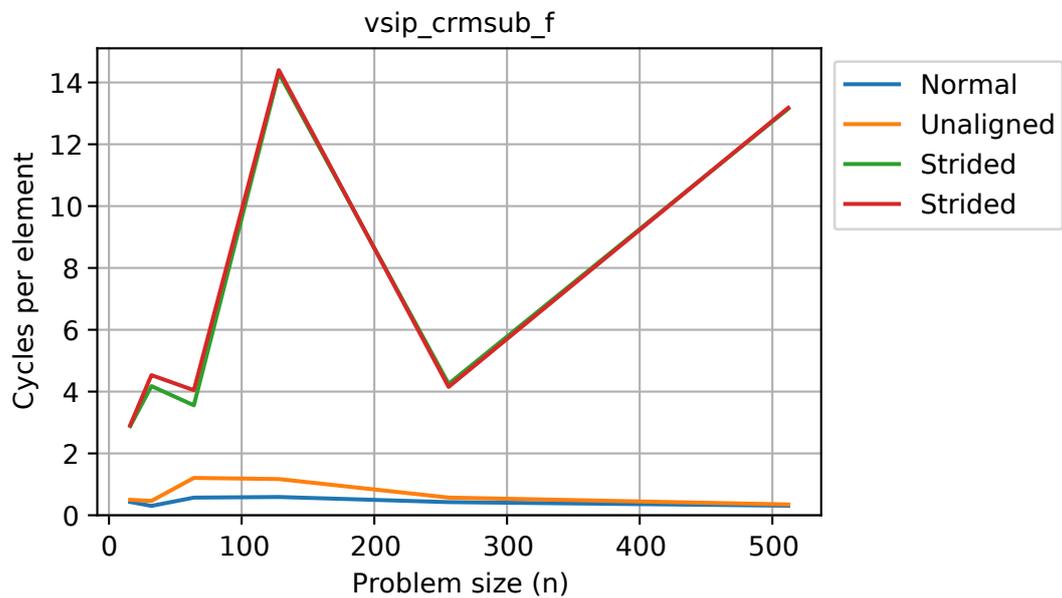




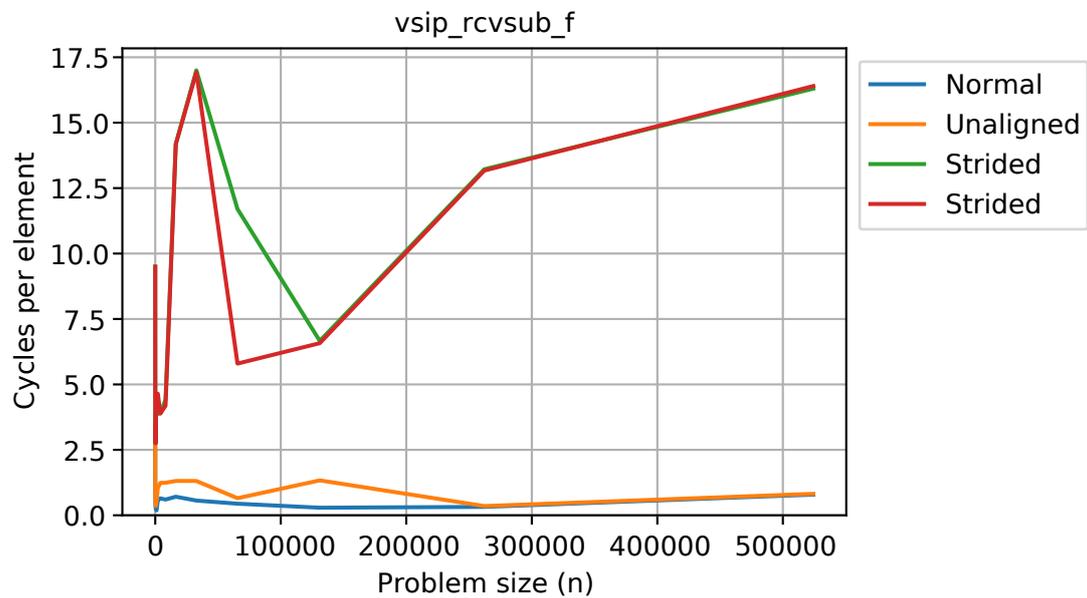
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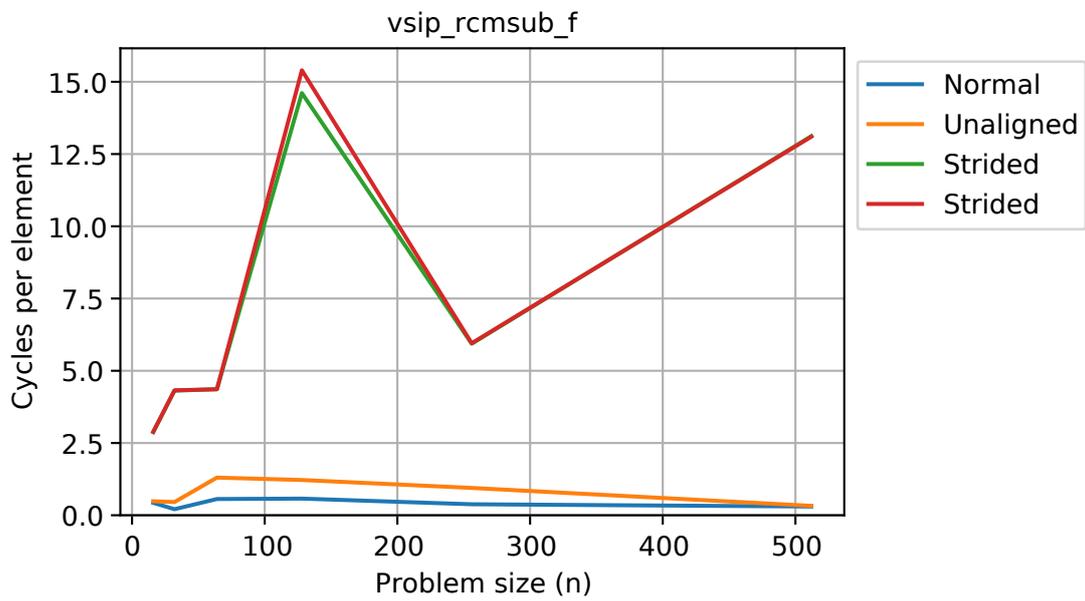
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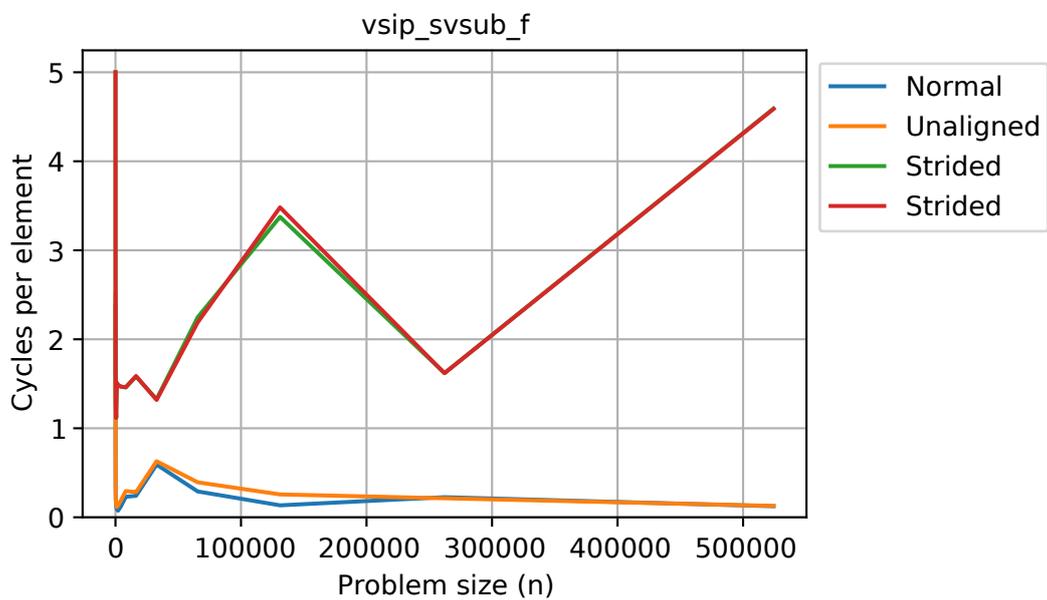
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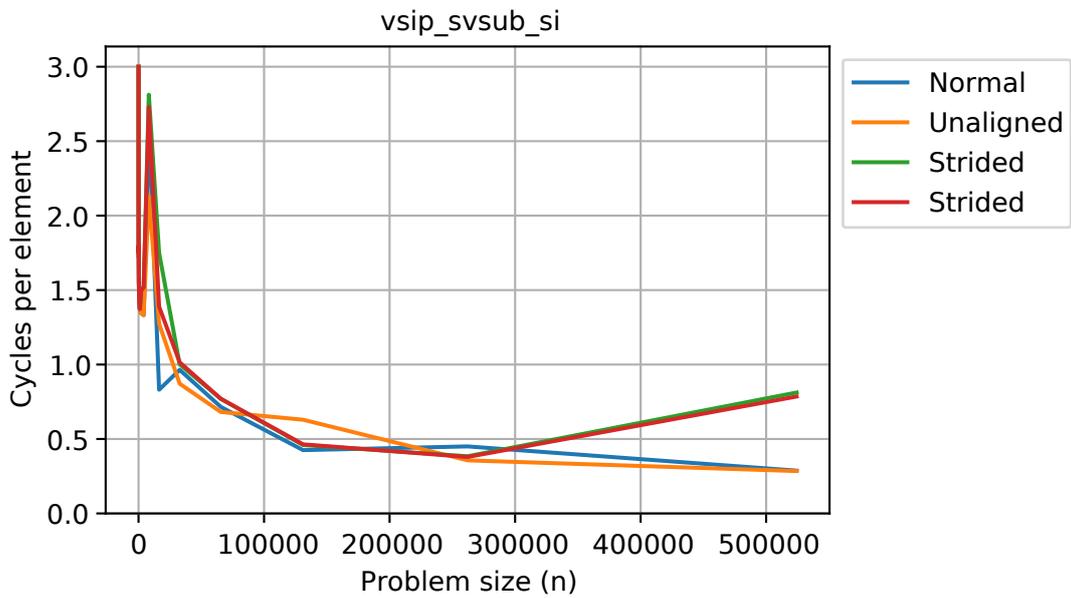
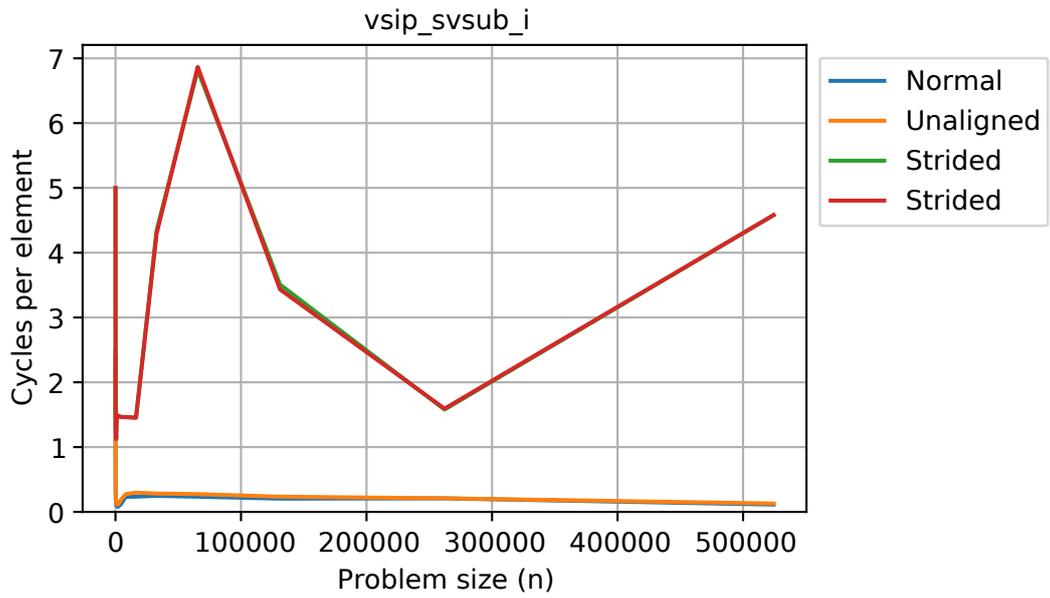


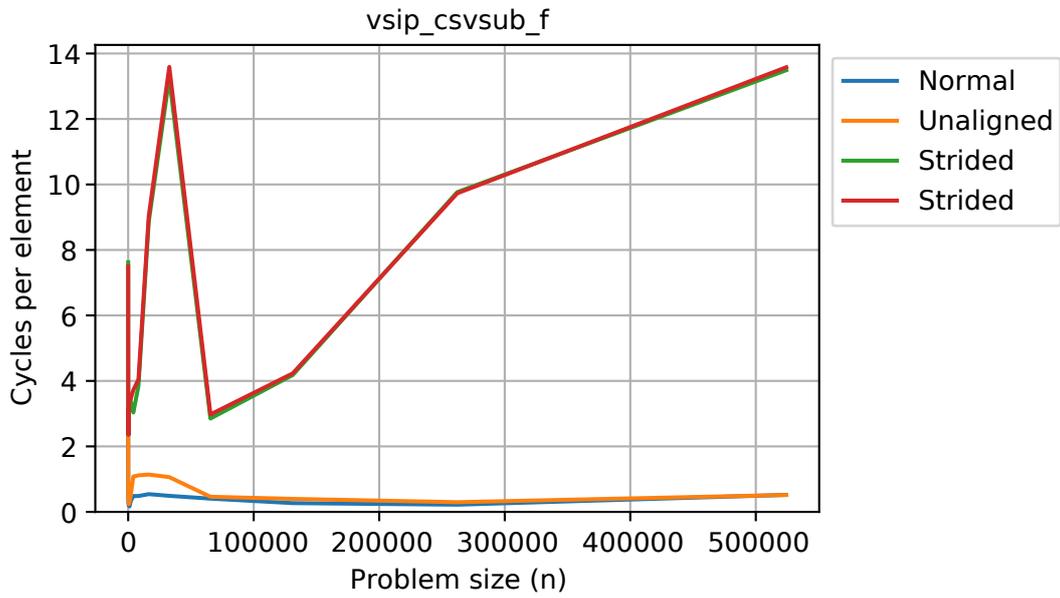
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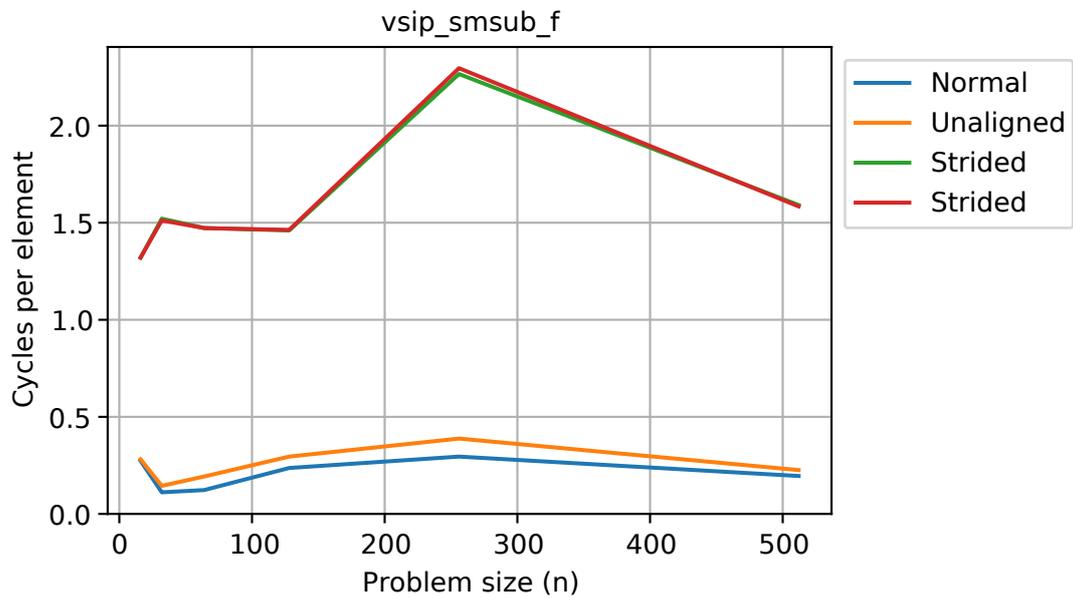
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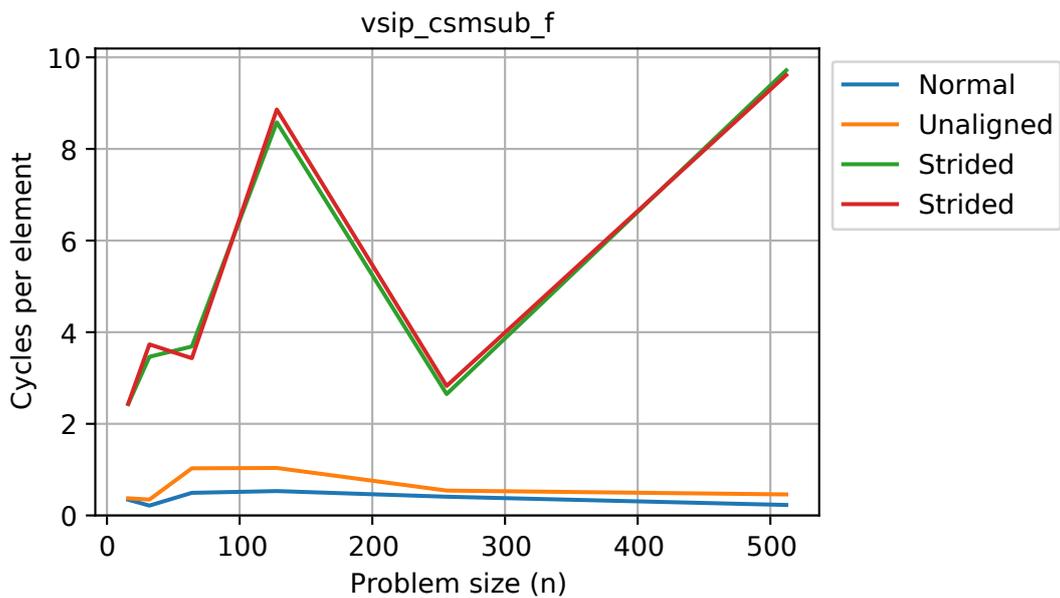
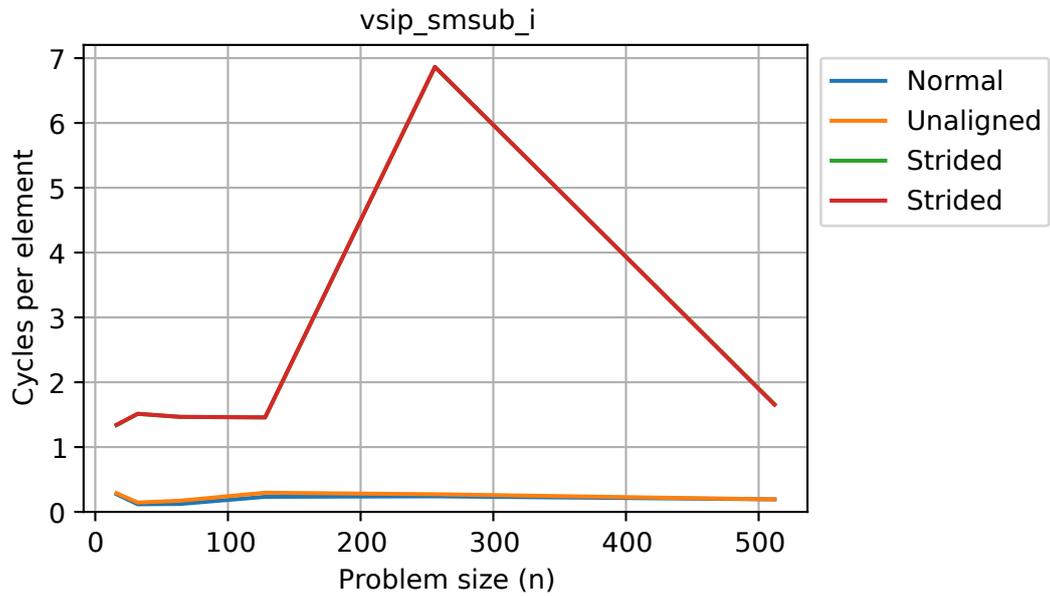






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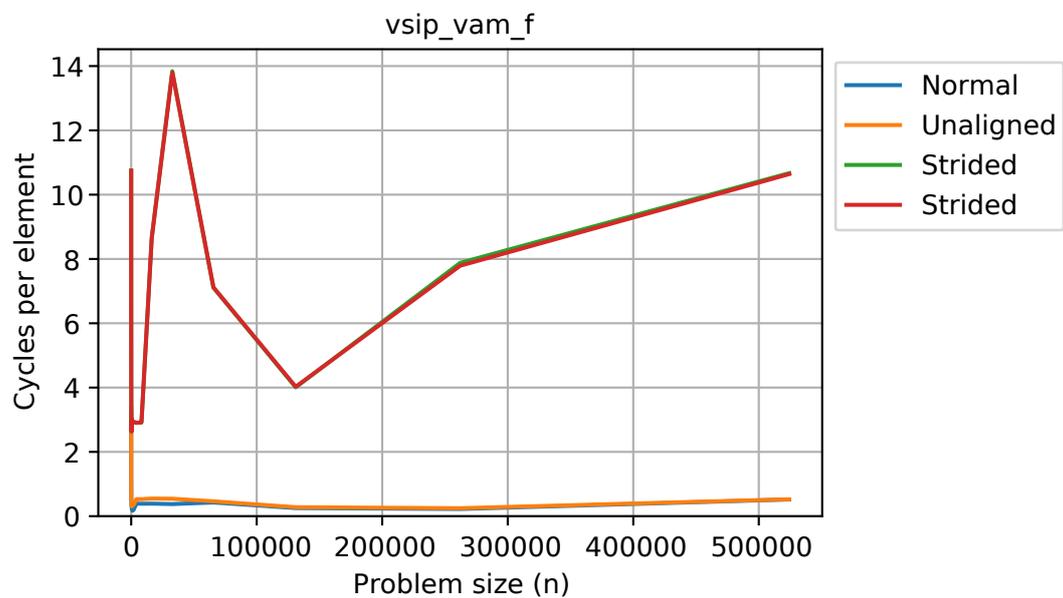


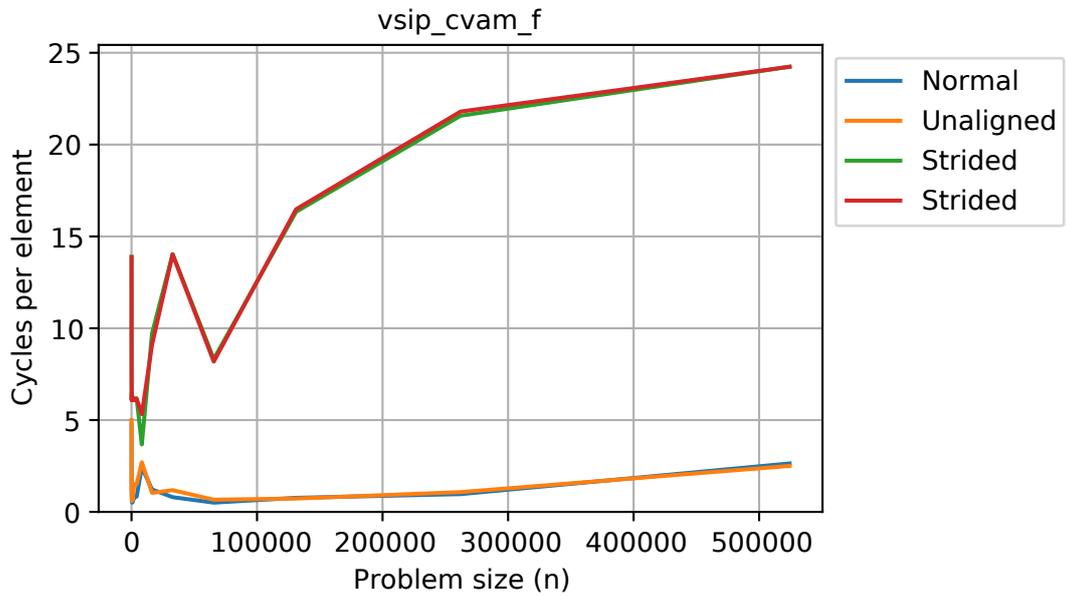


2.4 Ternary Operations

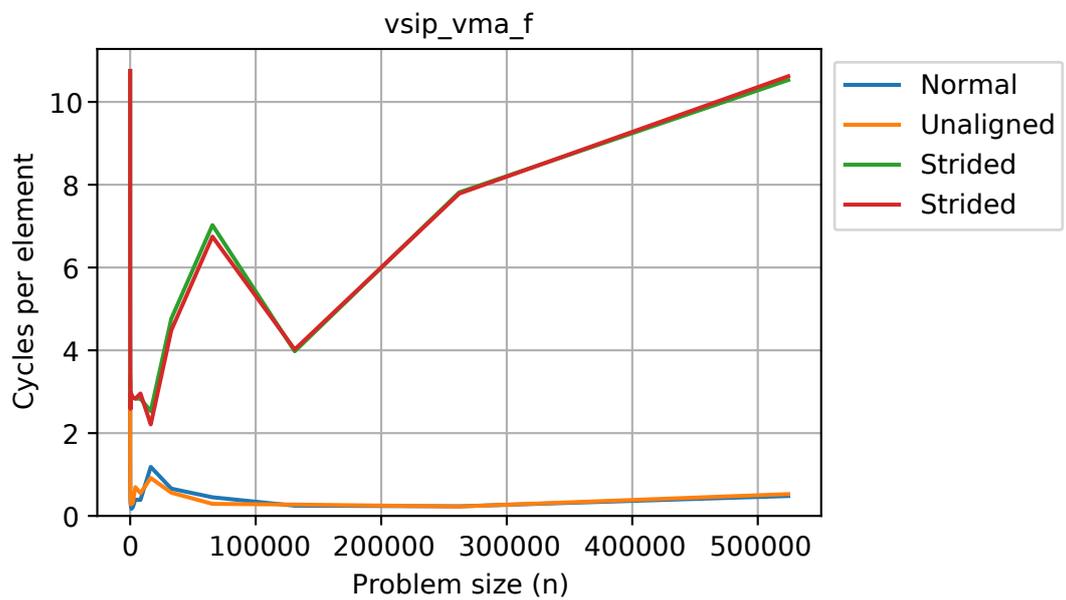
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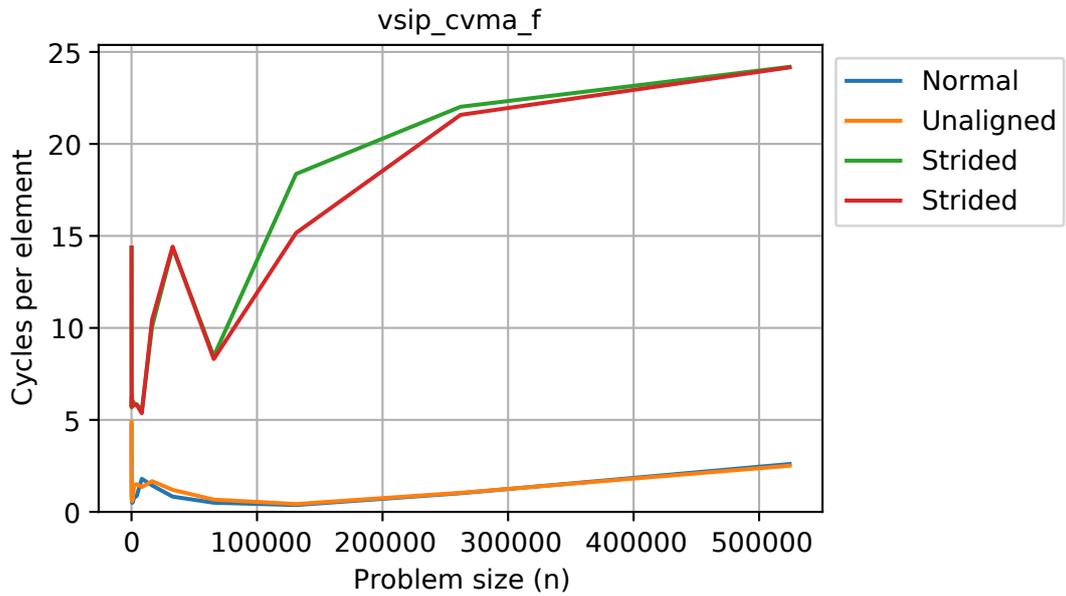
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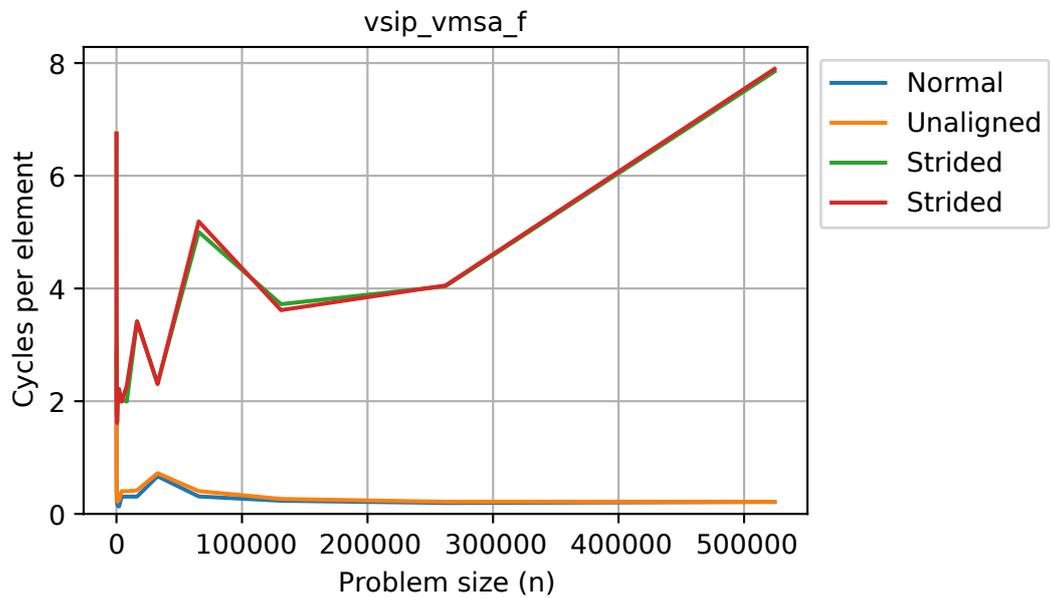


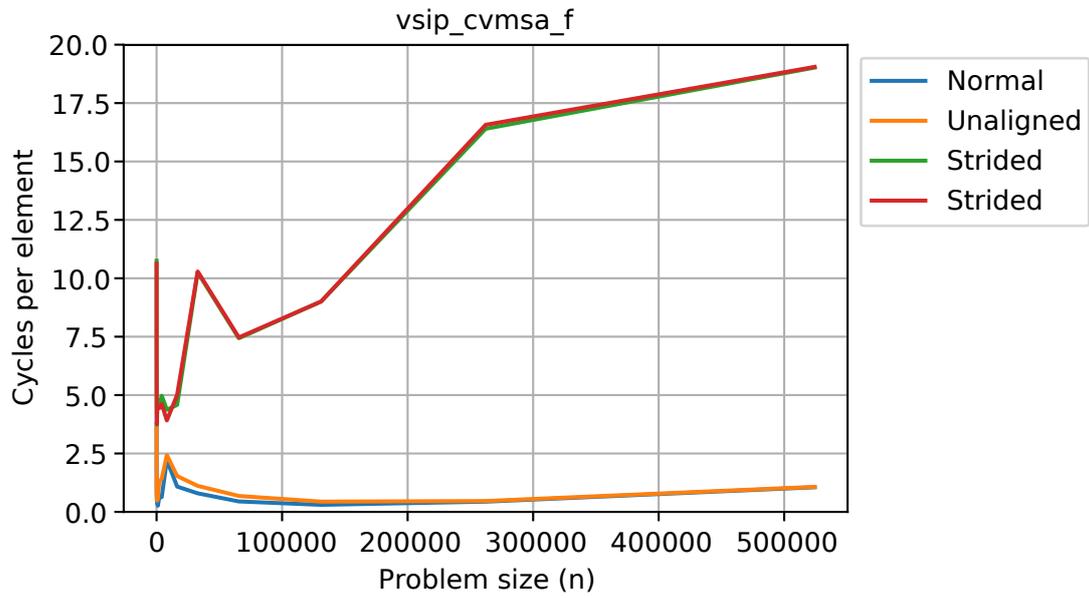
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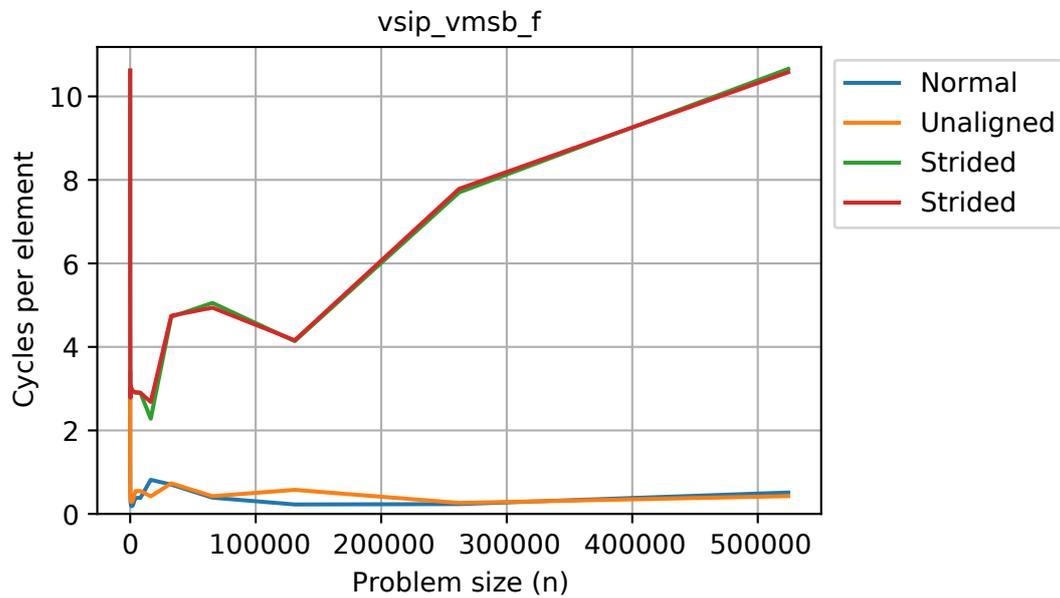


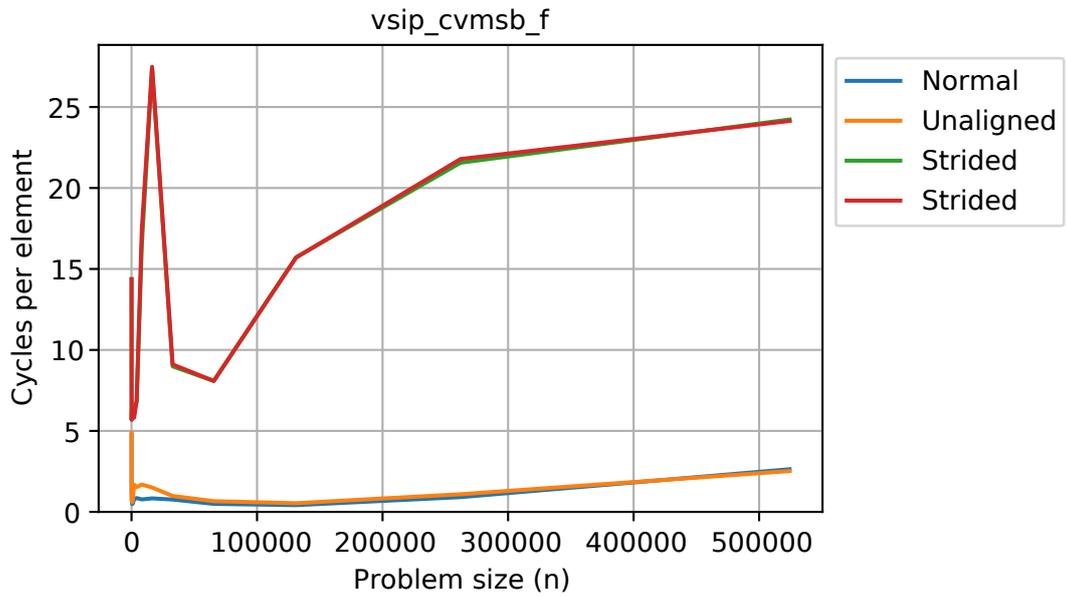
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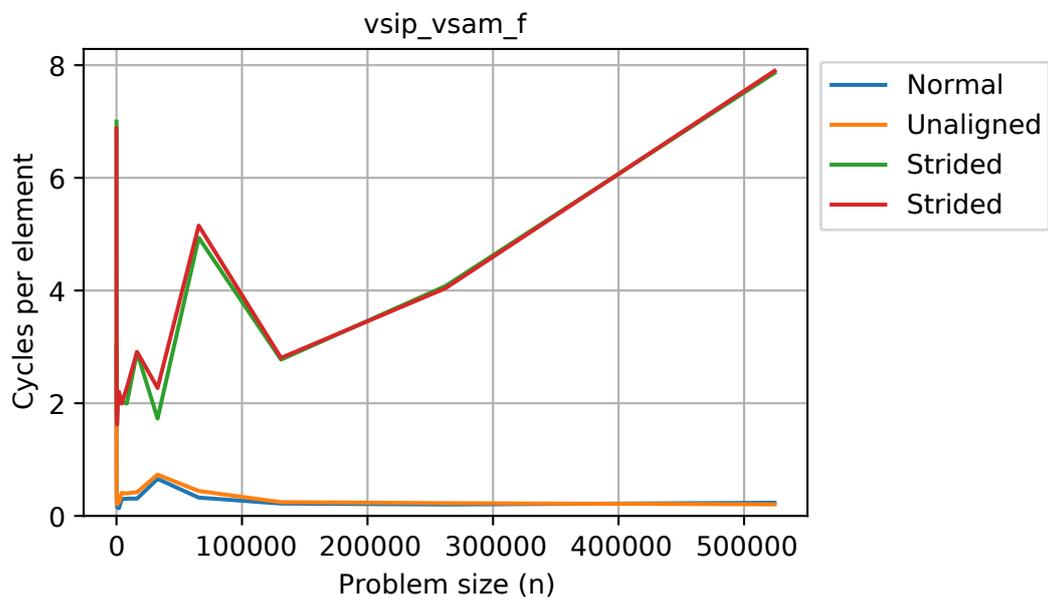


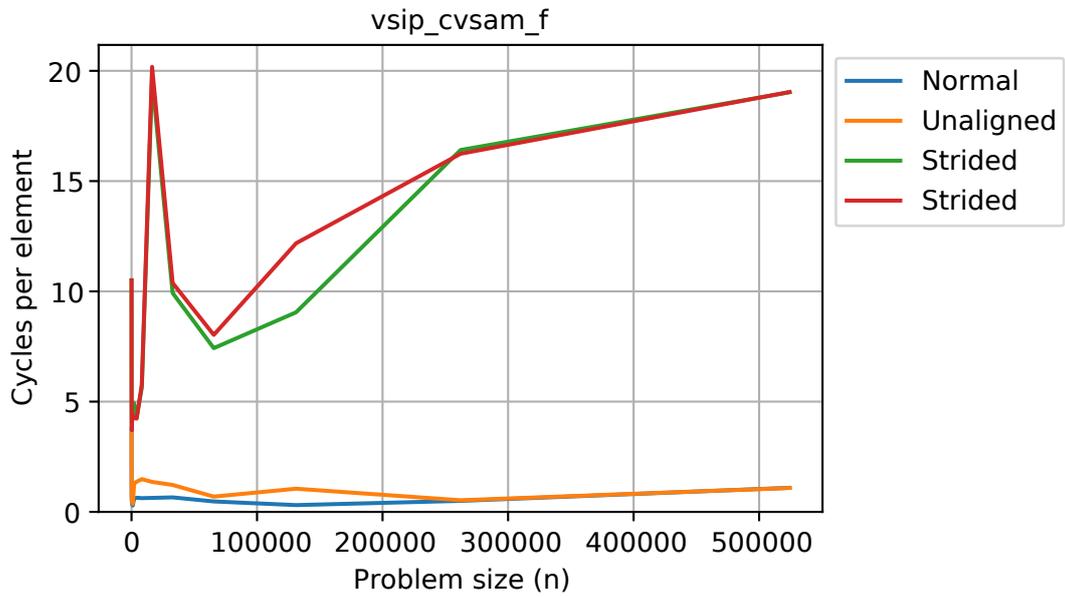
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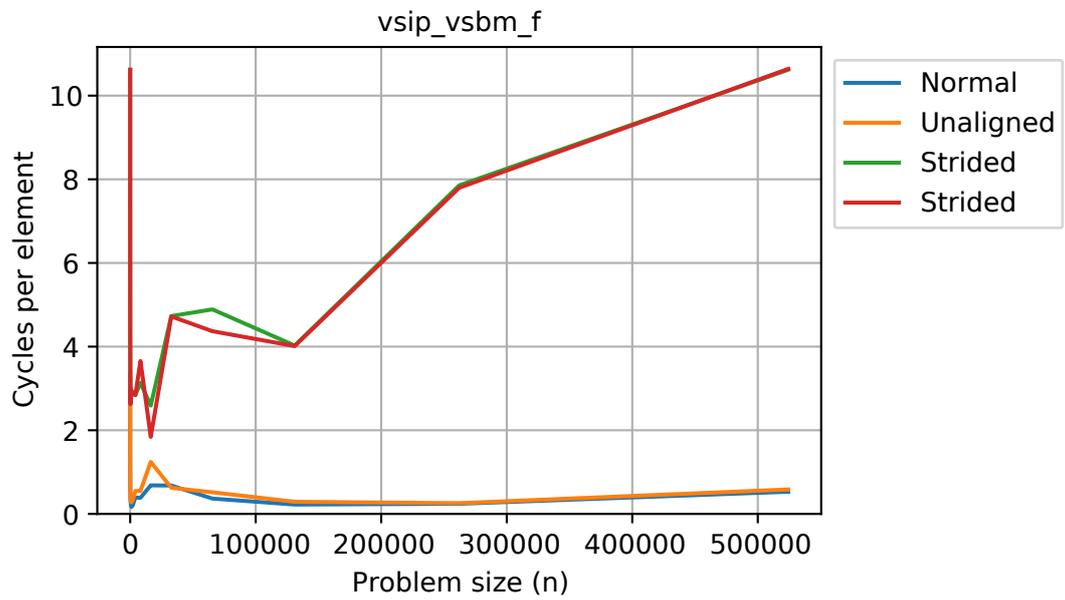


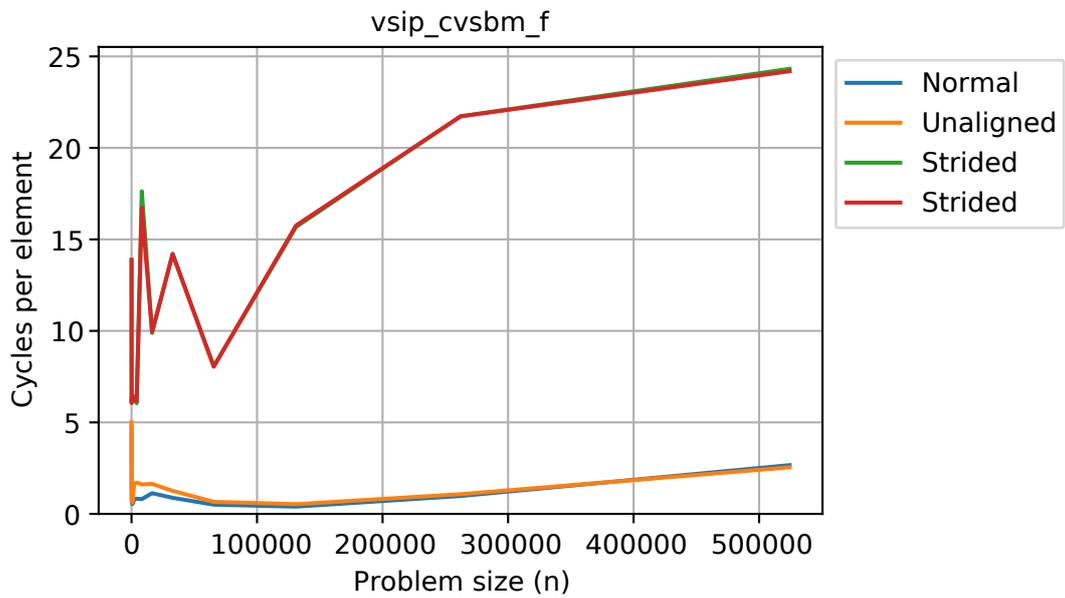
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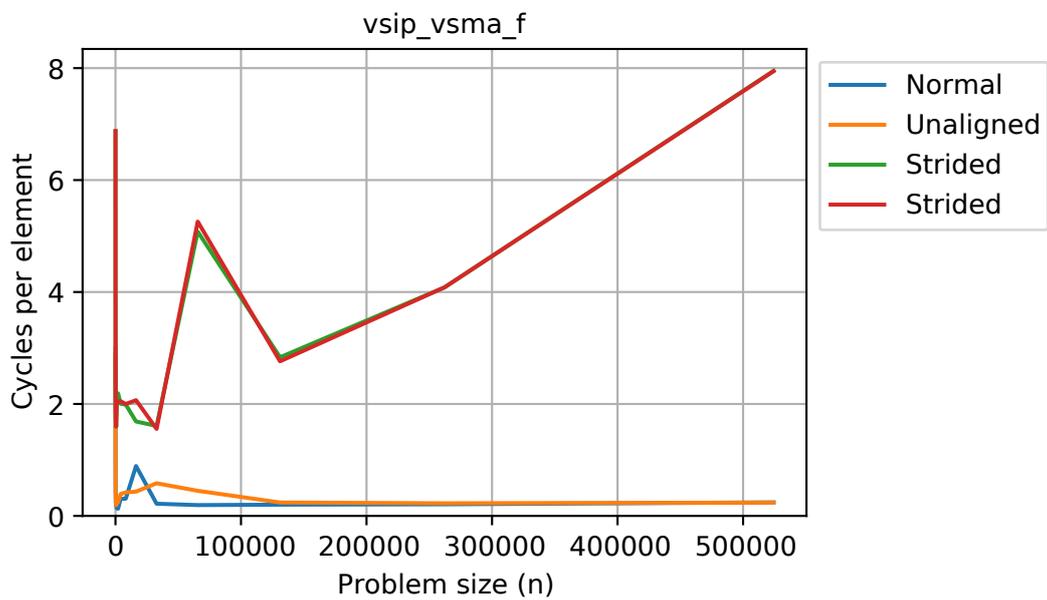


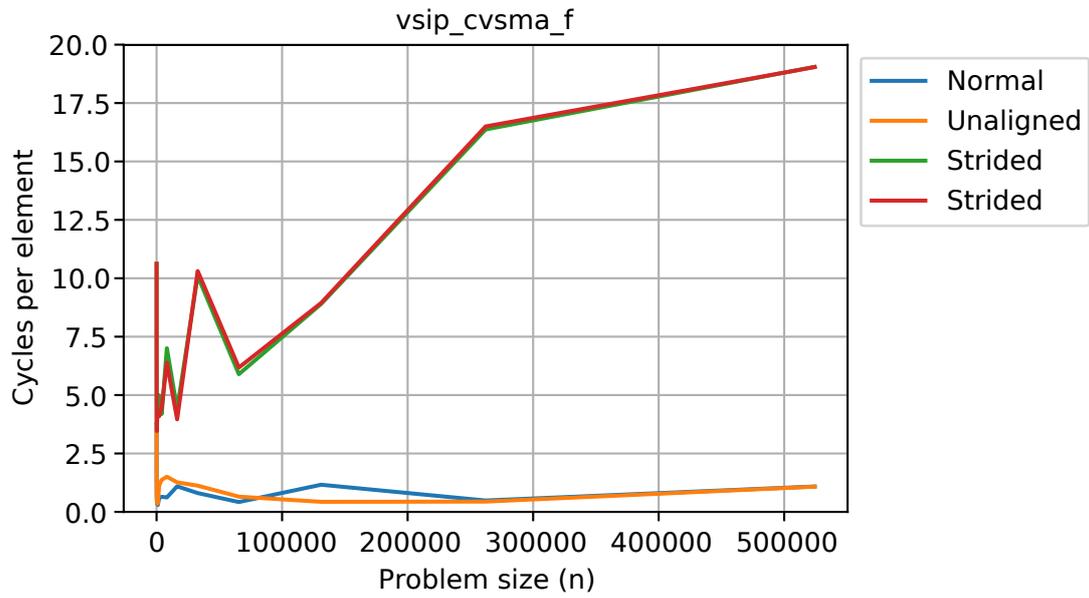
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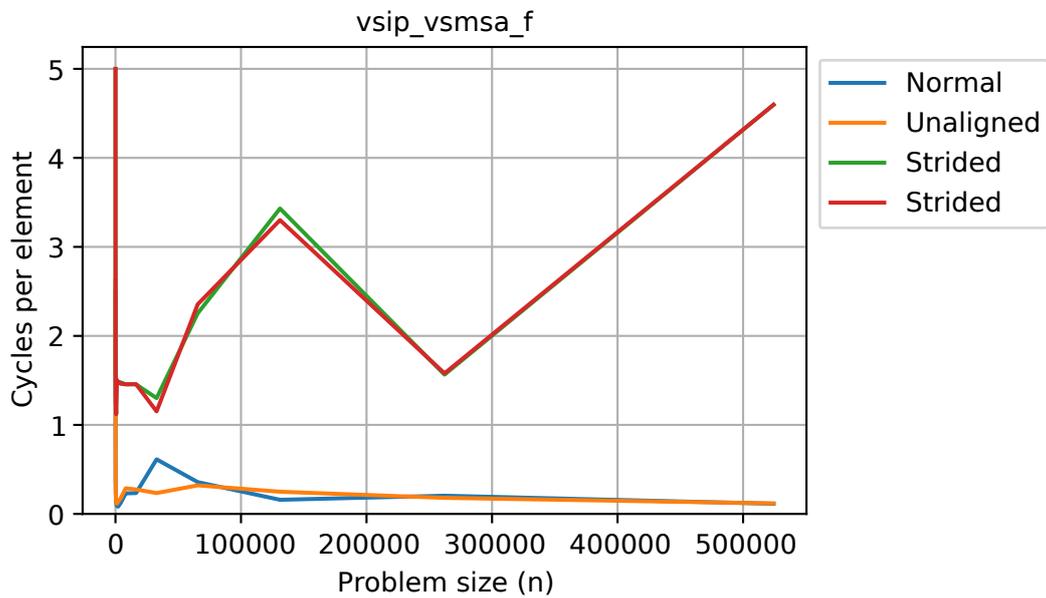


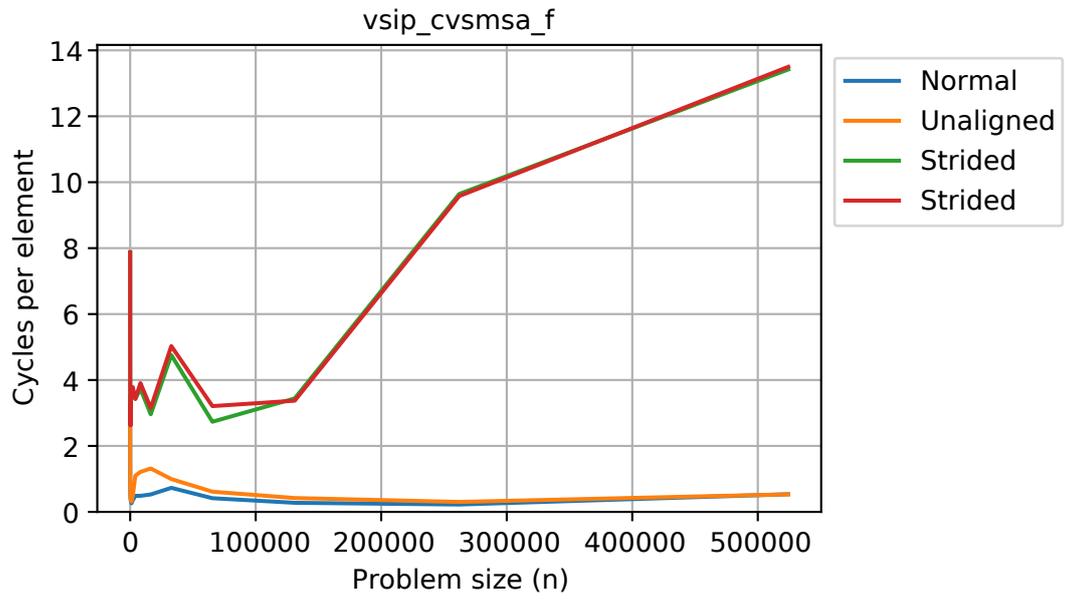
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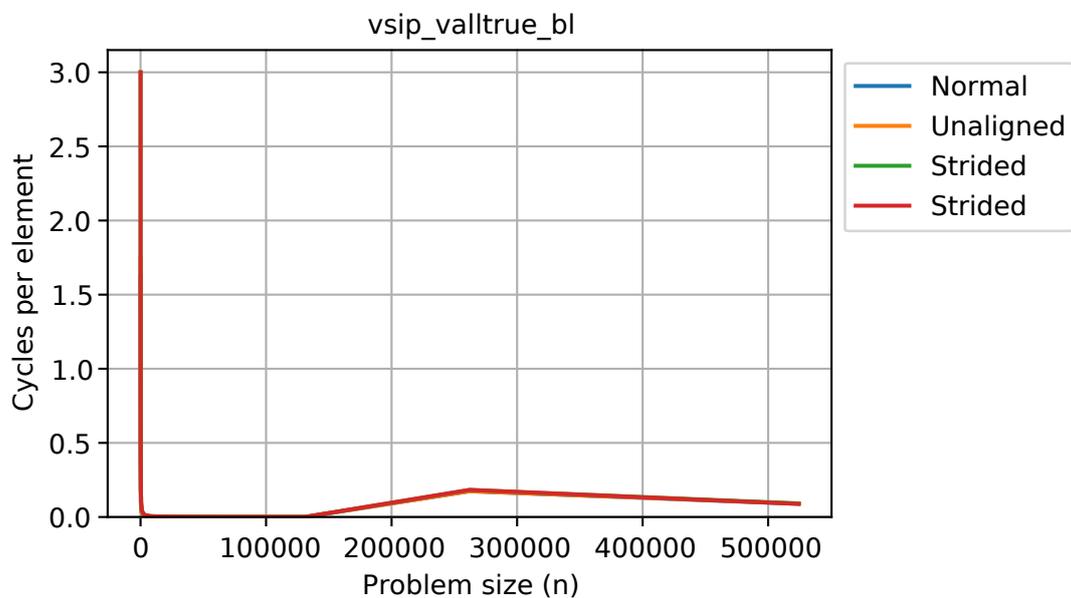


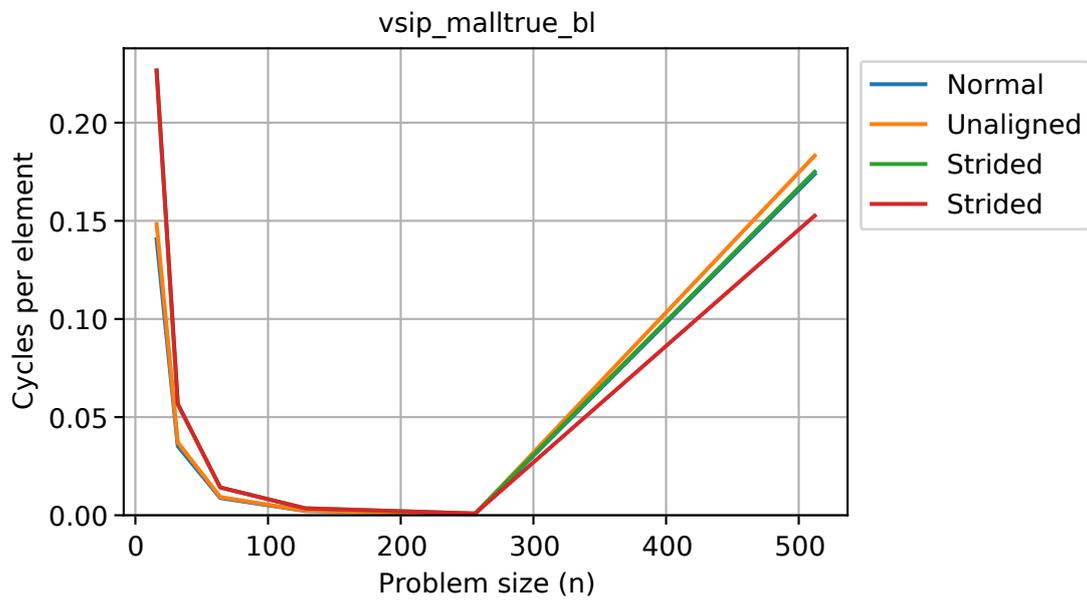
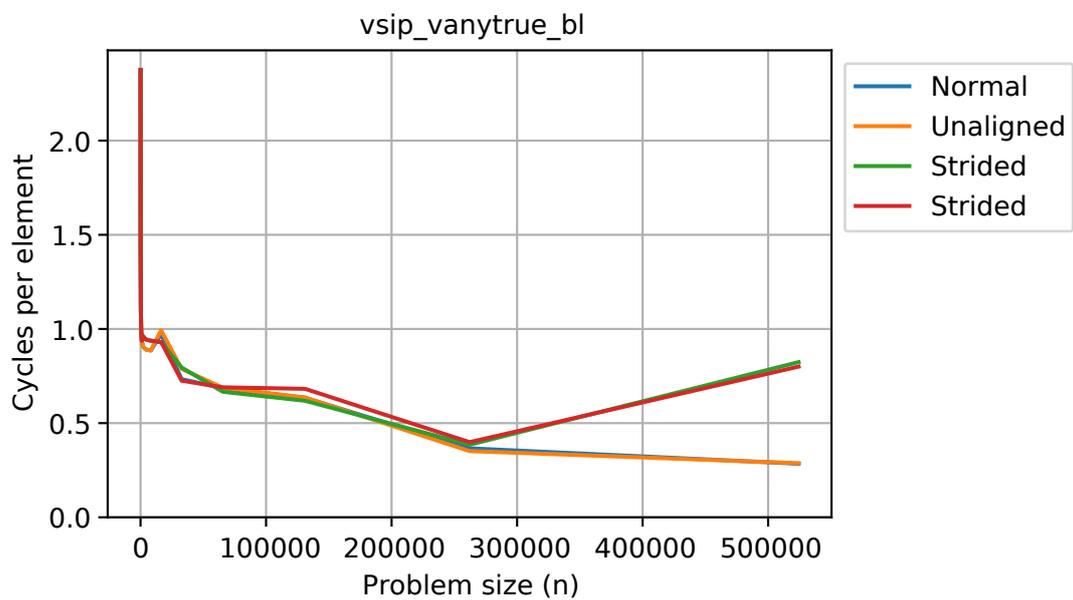


2.5 Logical Operations

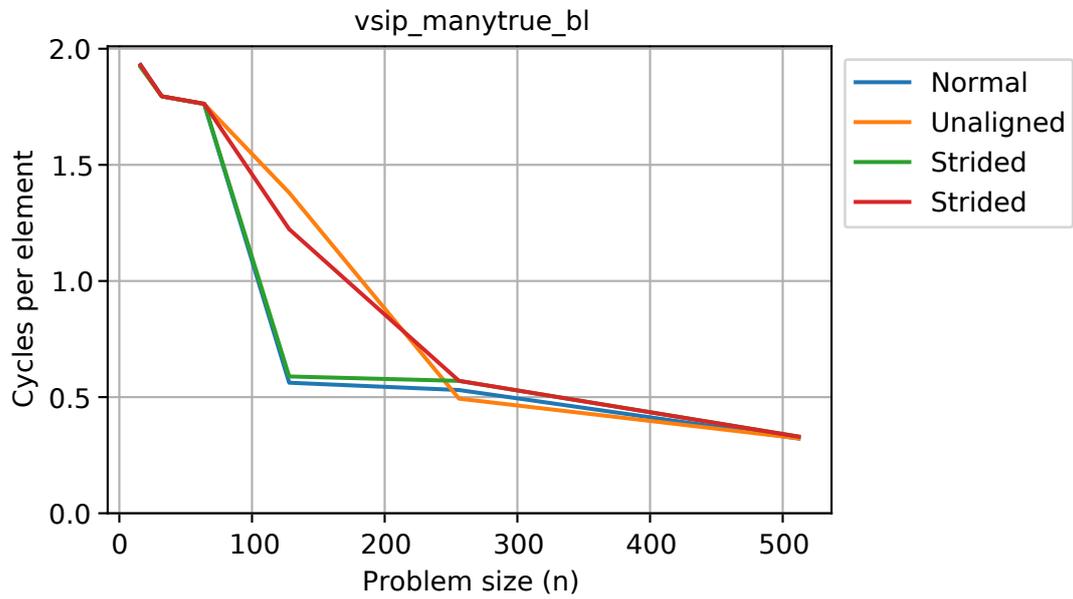
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- `vsip_malltrue_bl`
- `vsip_vanytrue_bl`
- `vsip_manytrue_bl`
- `vsip_Dvleq_P`
- `vsip_Dmleq_P`
- `vsip_vlge_P`
- `vsip_mlge_P`
- `vsip_vlgt_P`
- `vsip_mlgt_P`
- `vsip_vlle_P`
- `vsip_mlle_P`
- `vsip_vllt_P`
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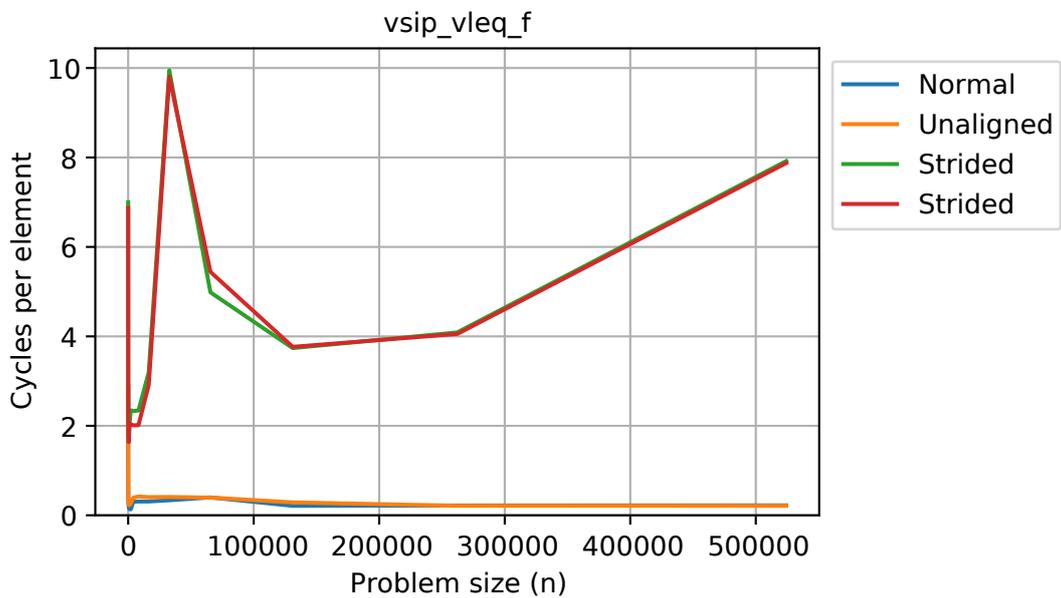


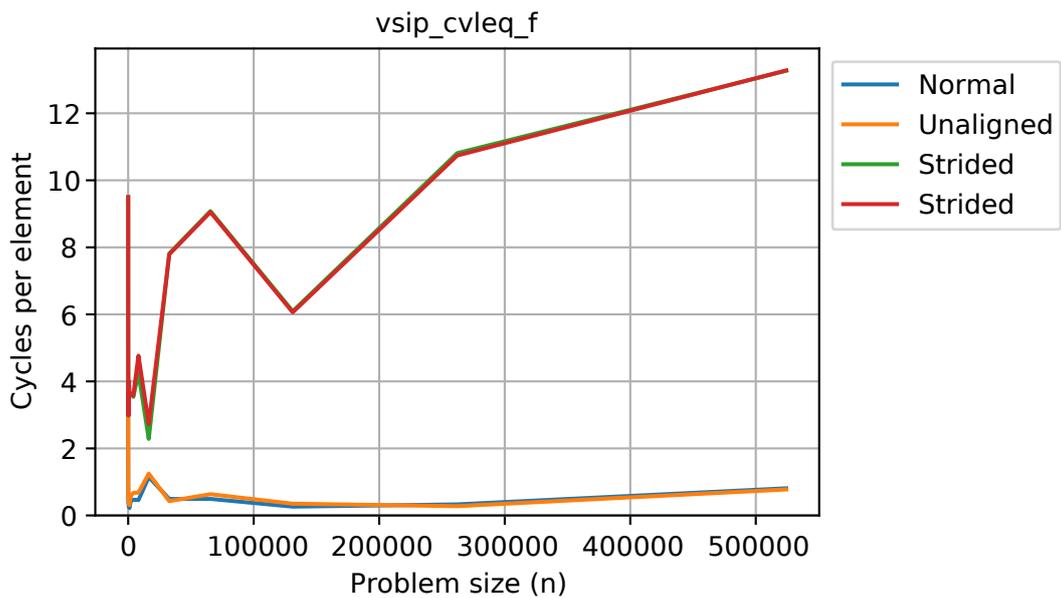
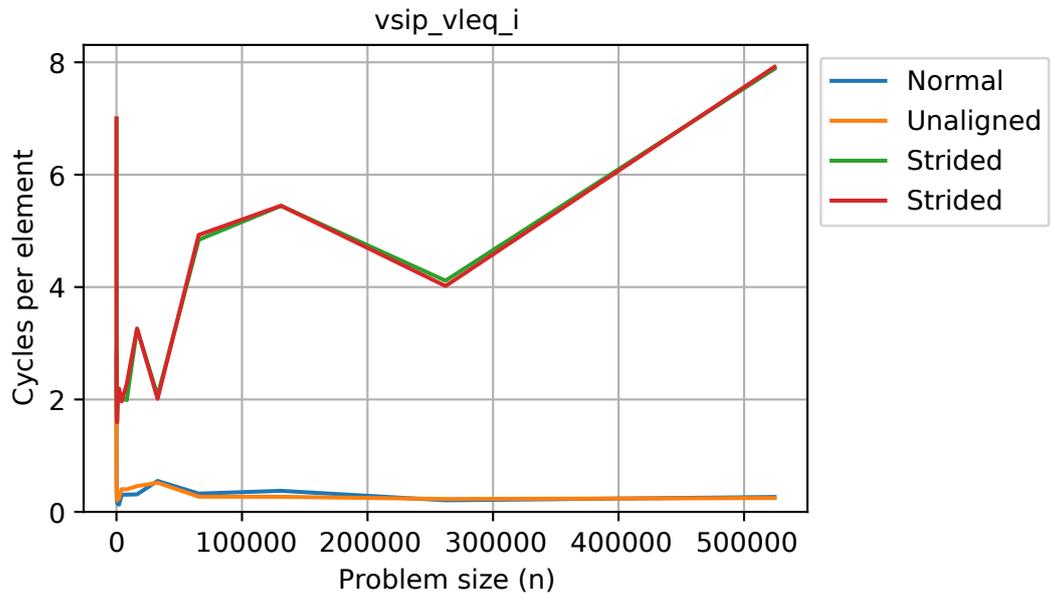
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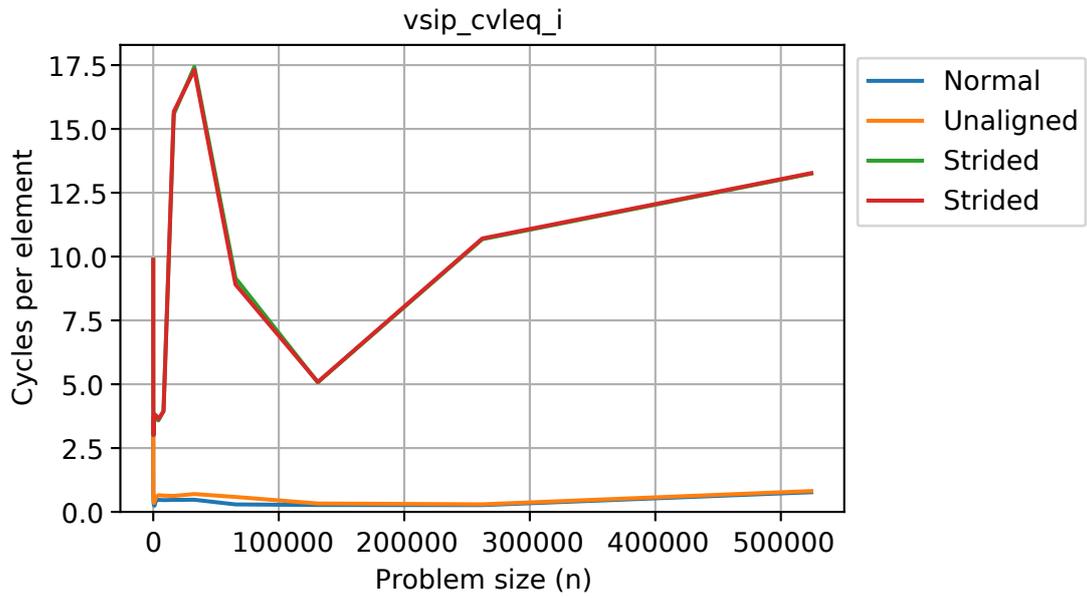
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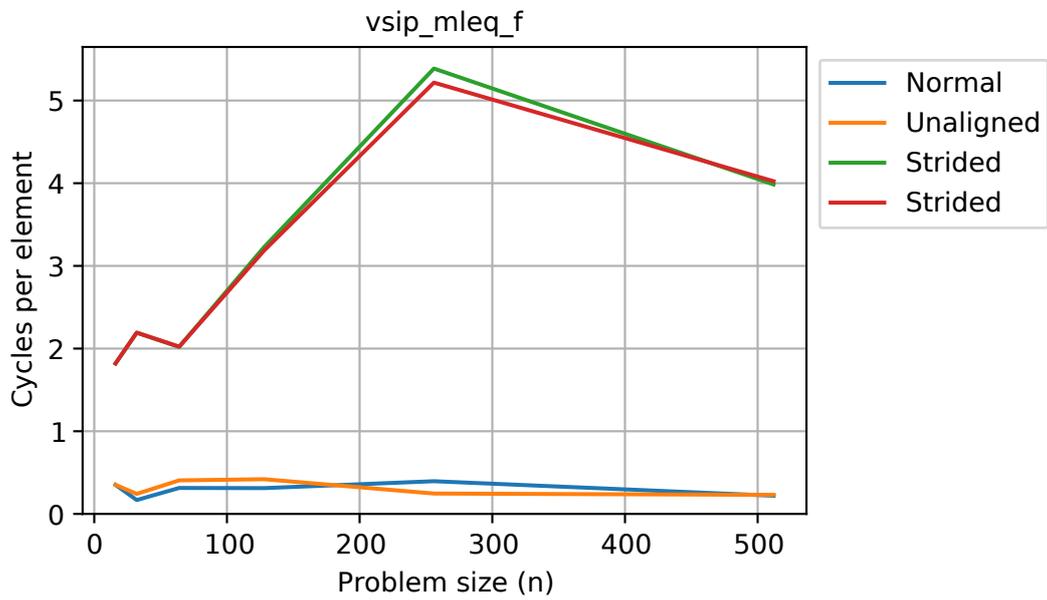
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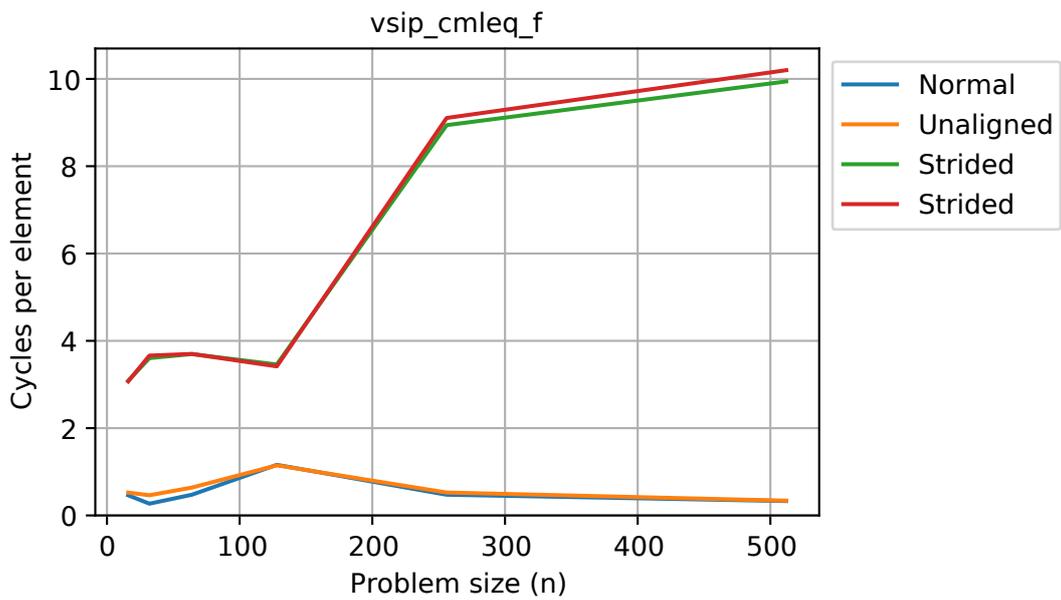
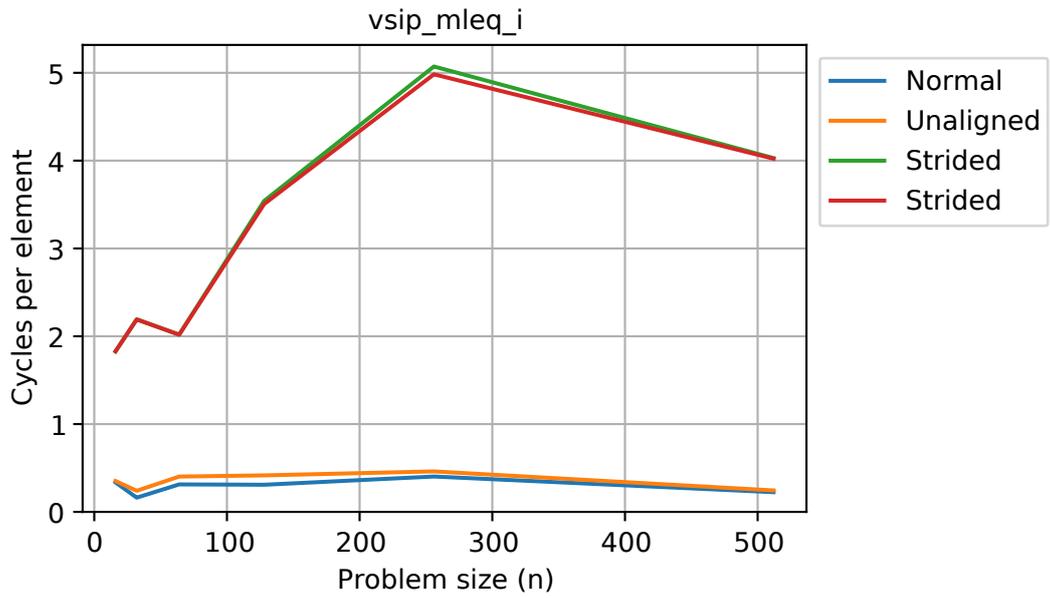


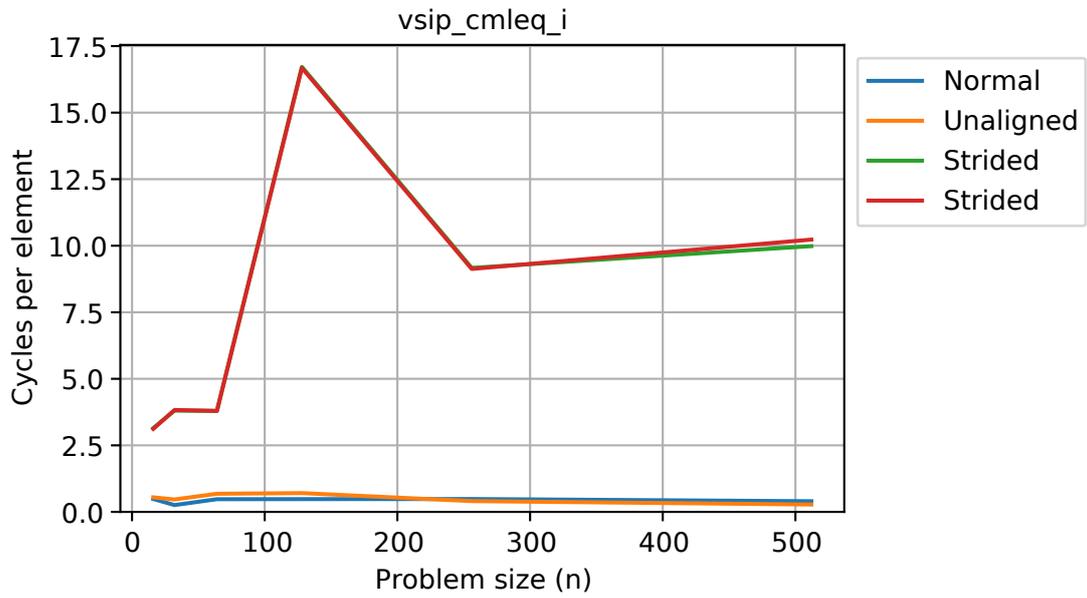




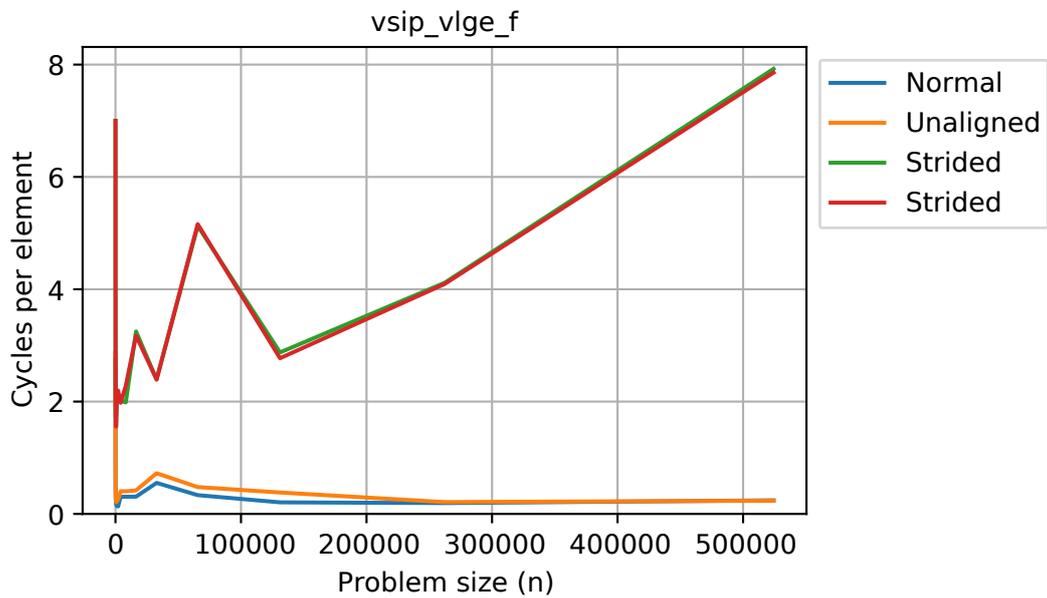
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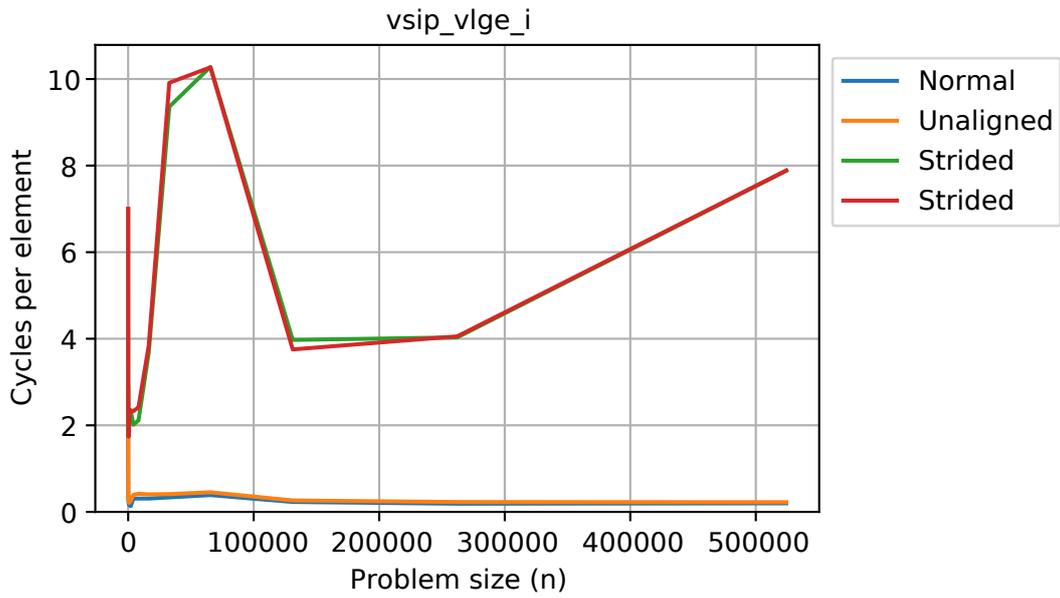




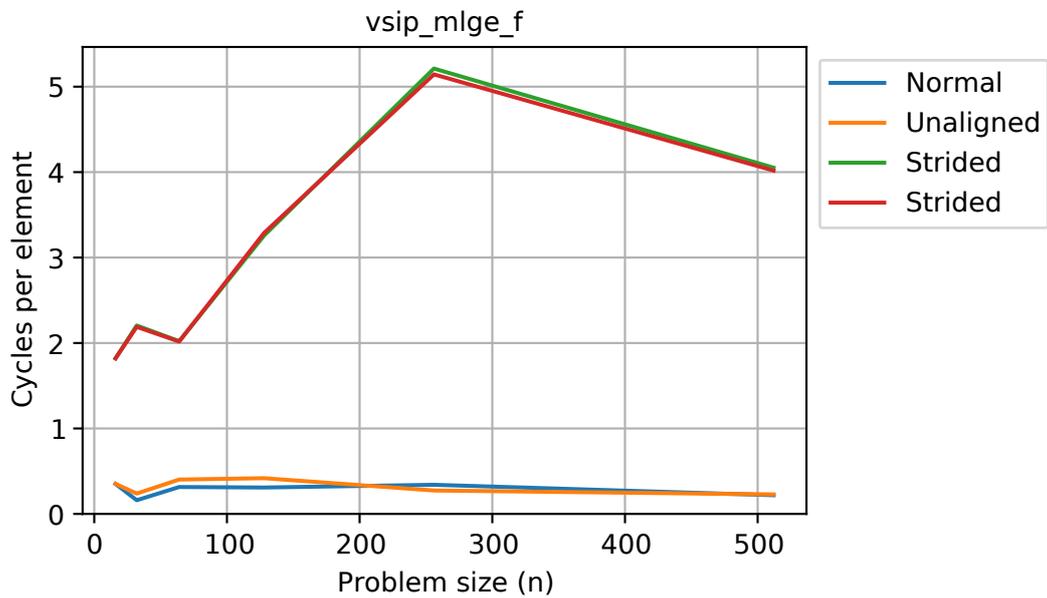


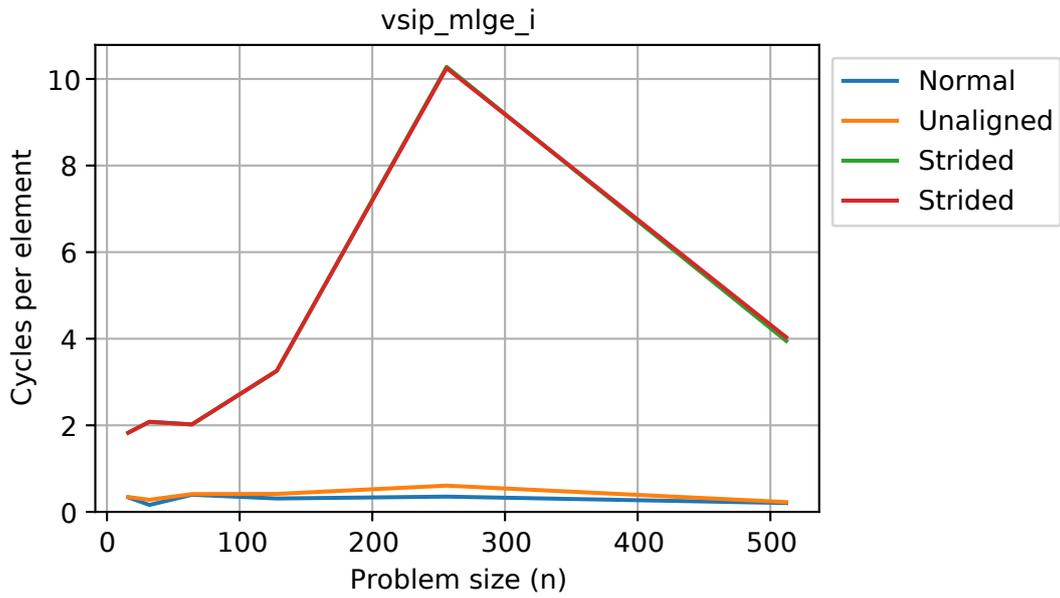
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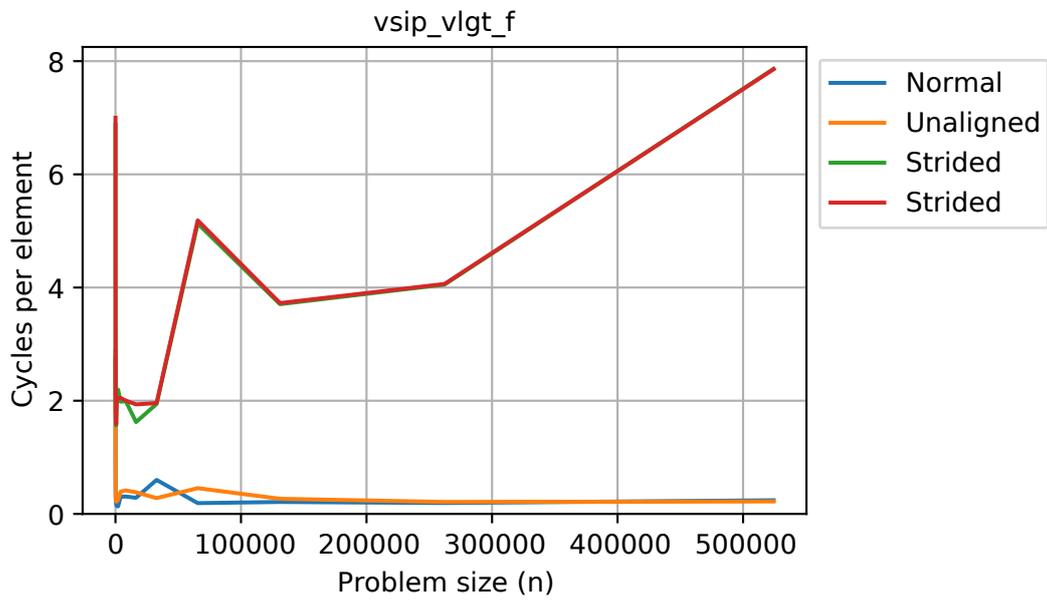


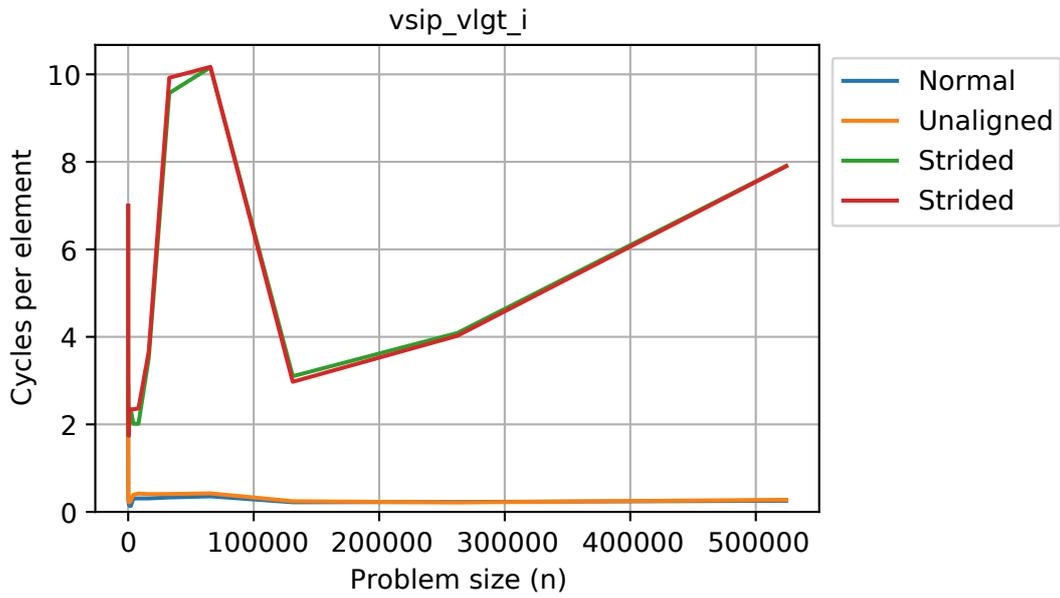
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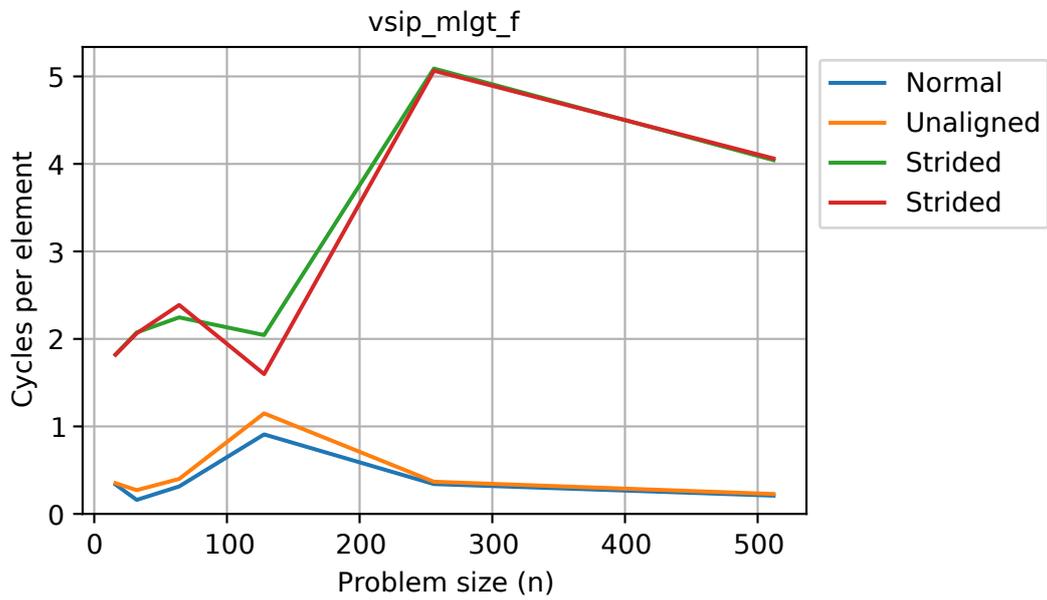


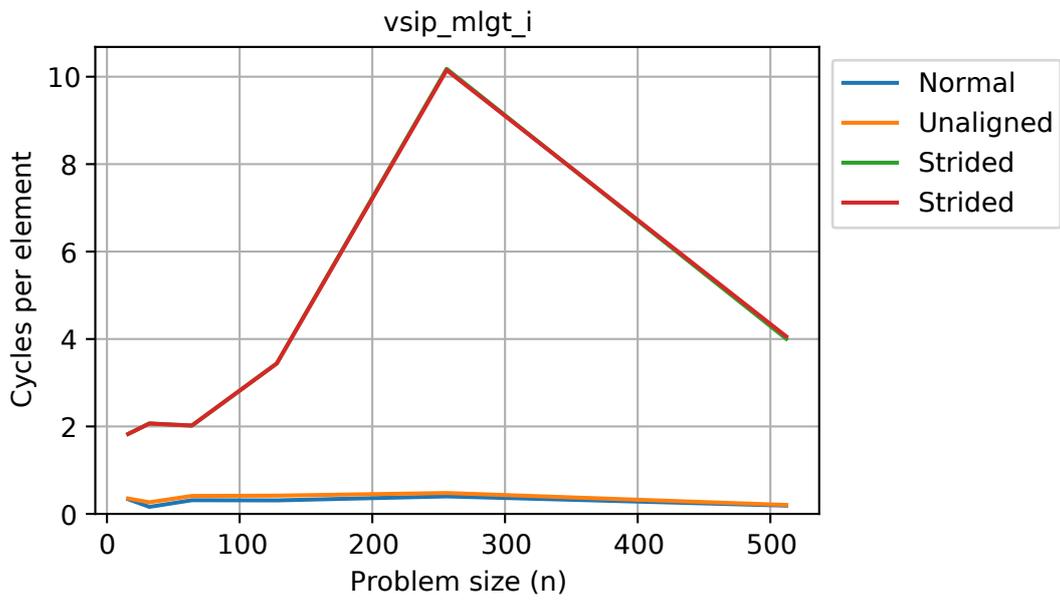
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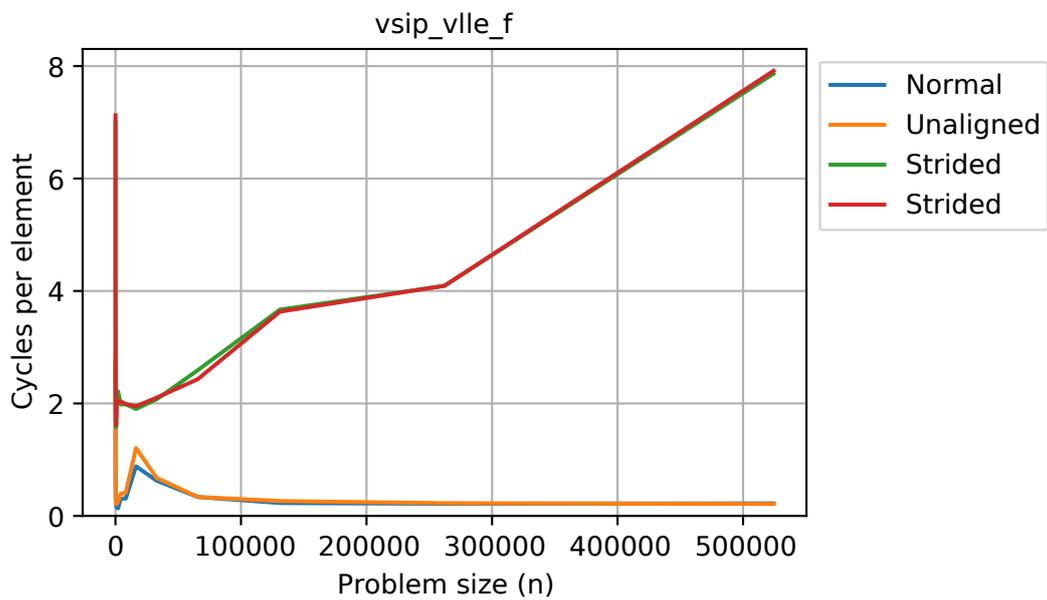


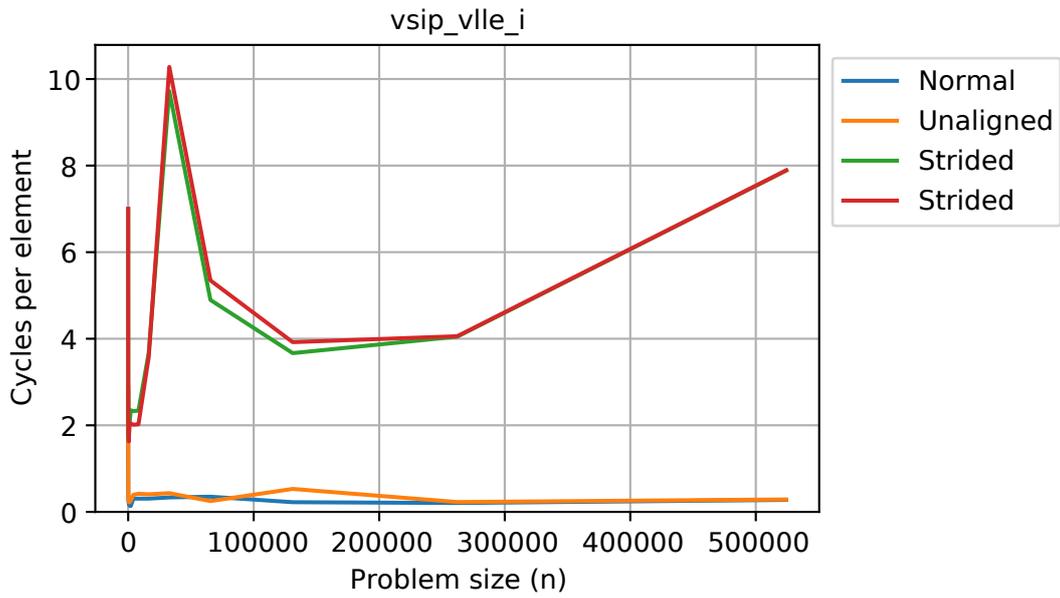
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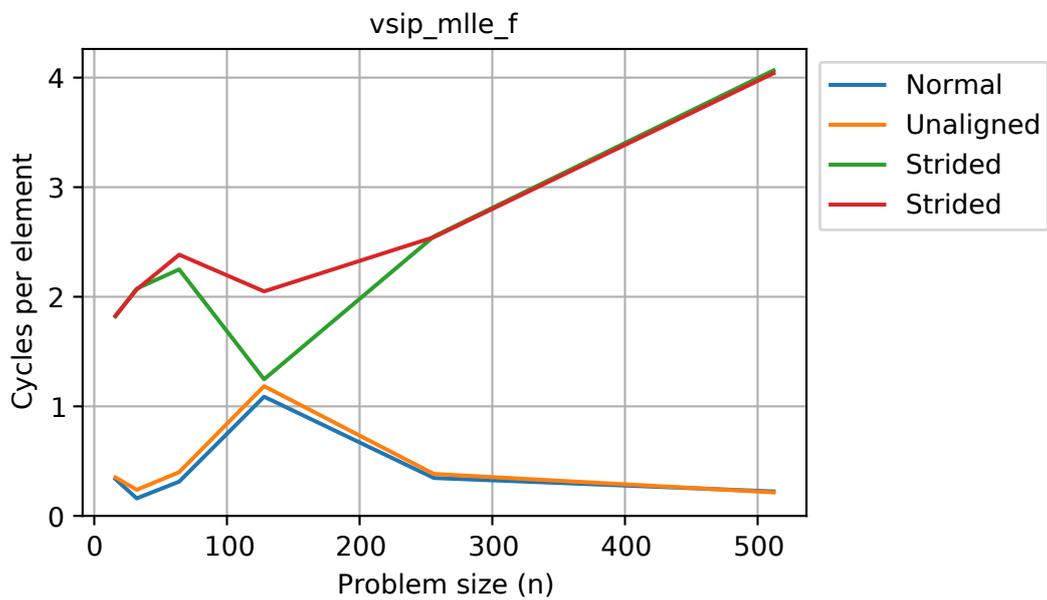


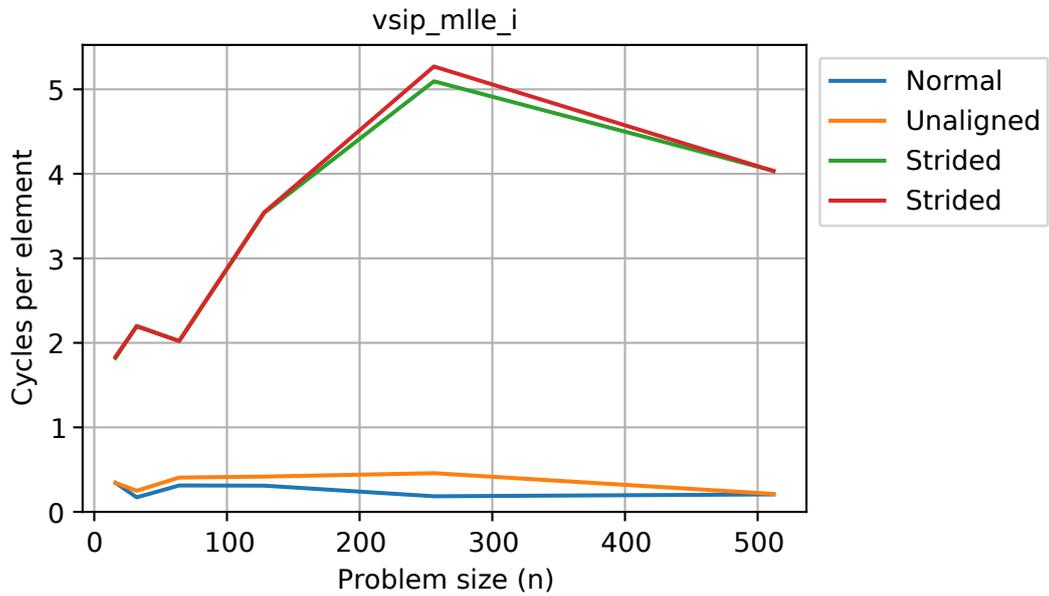
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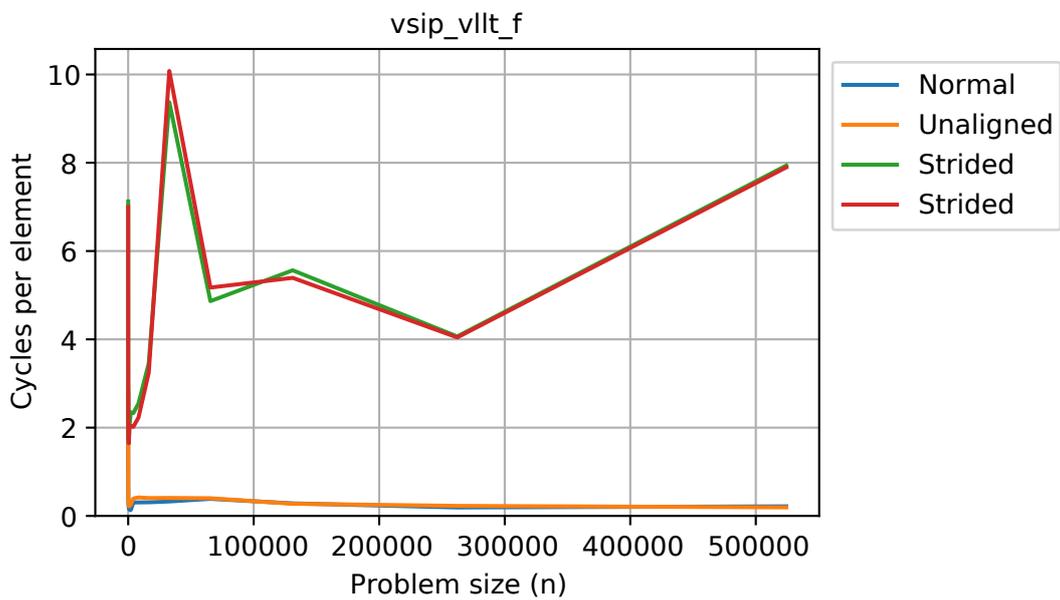


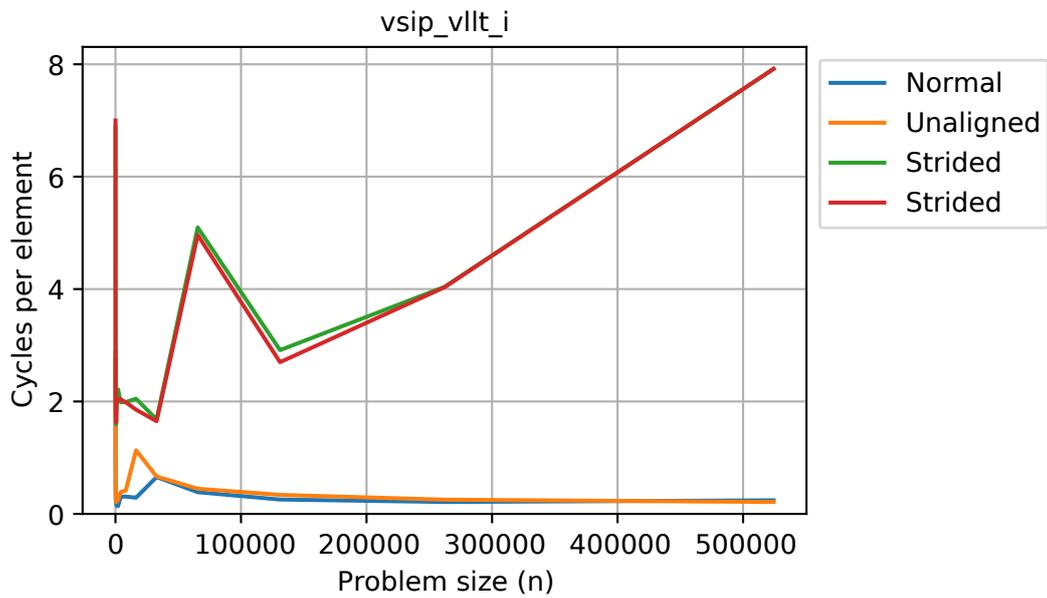
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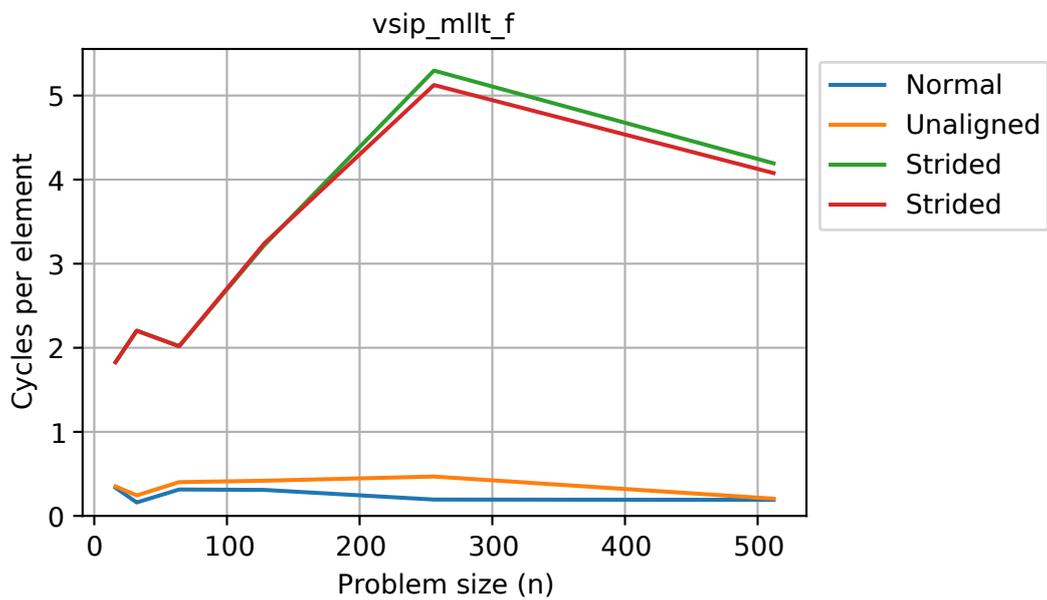


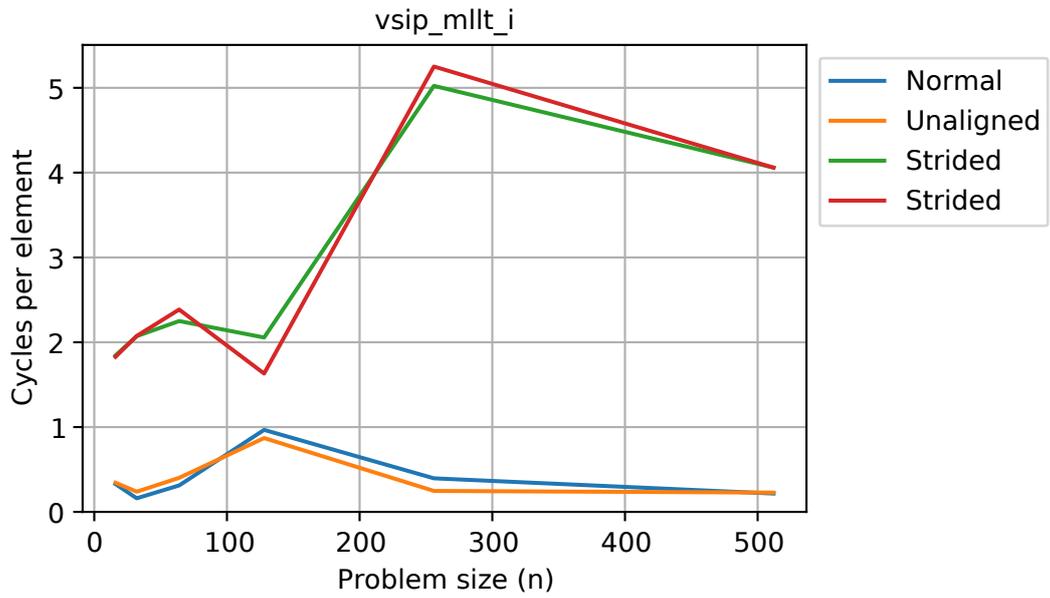
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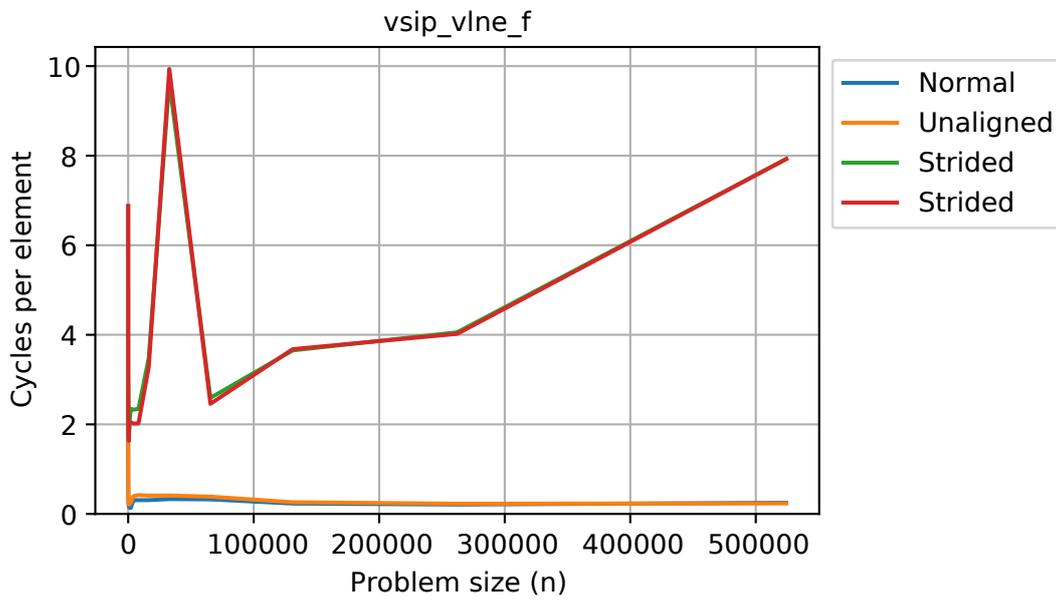


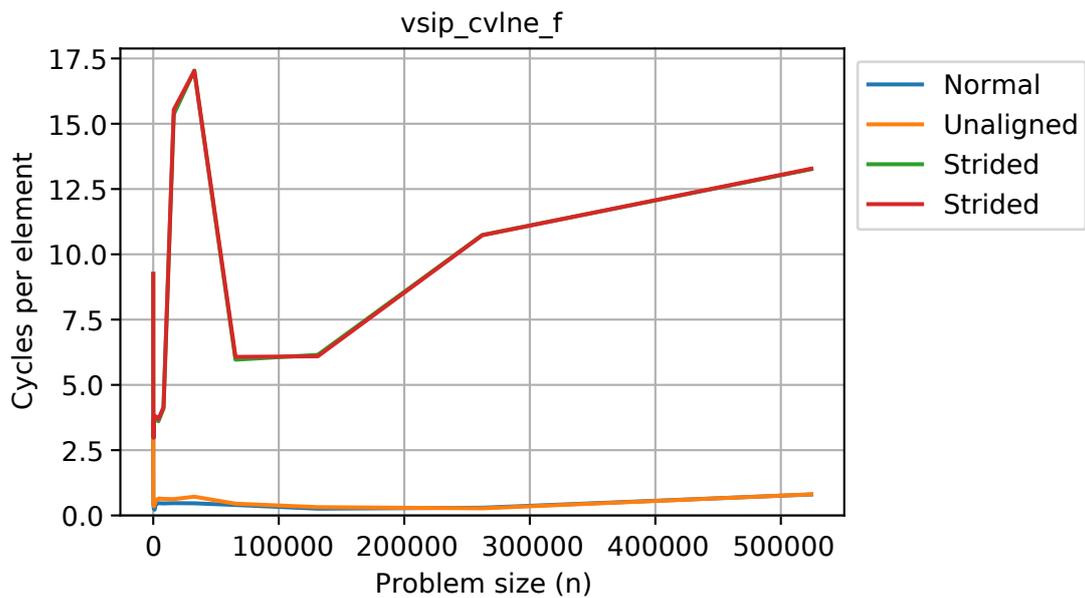
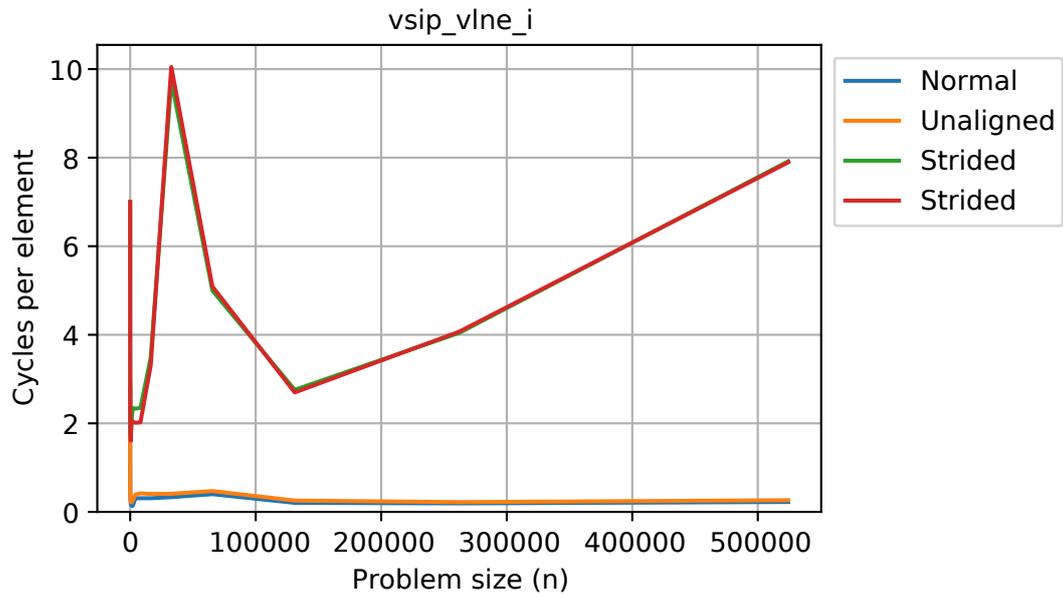
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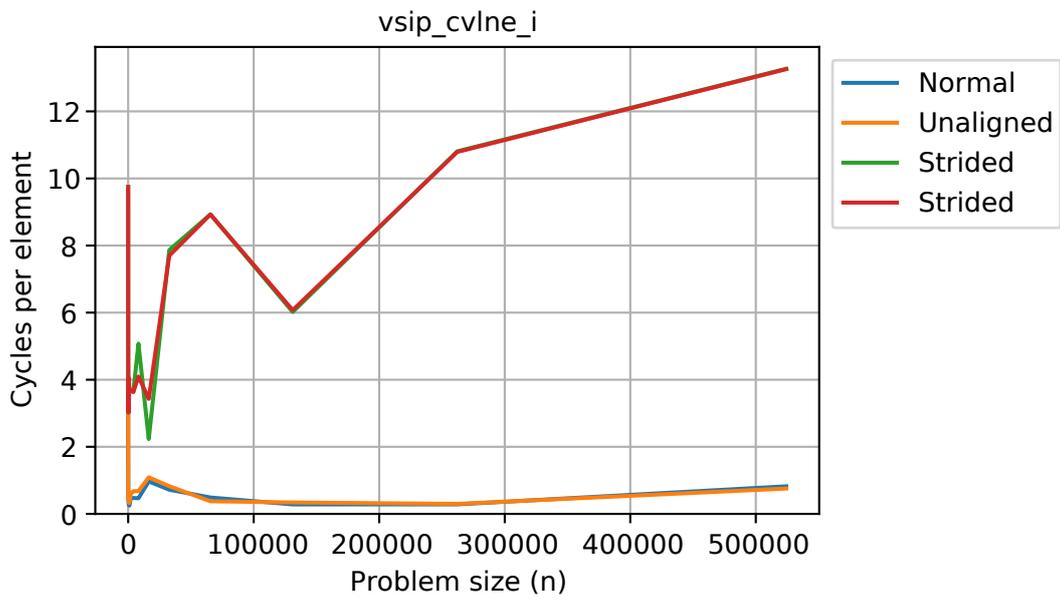




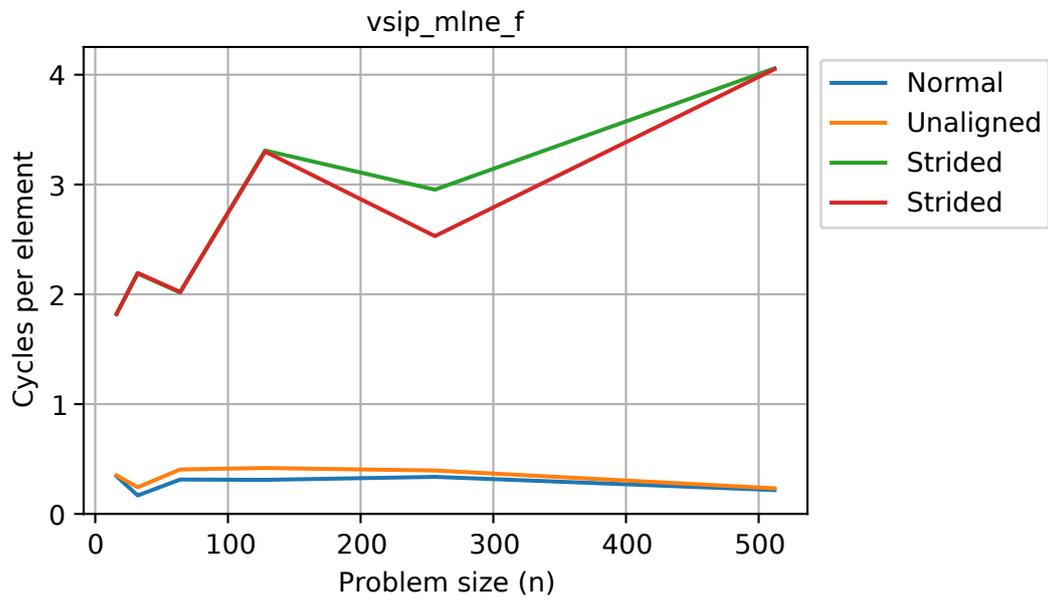
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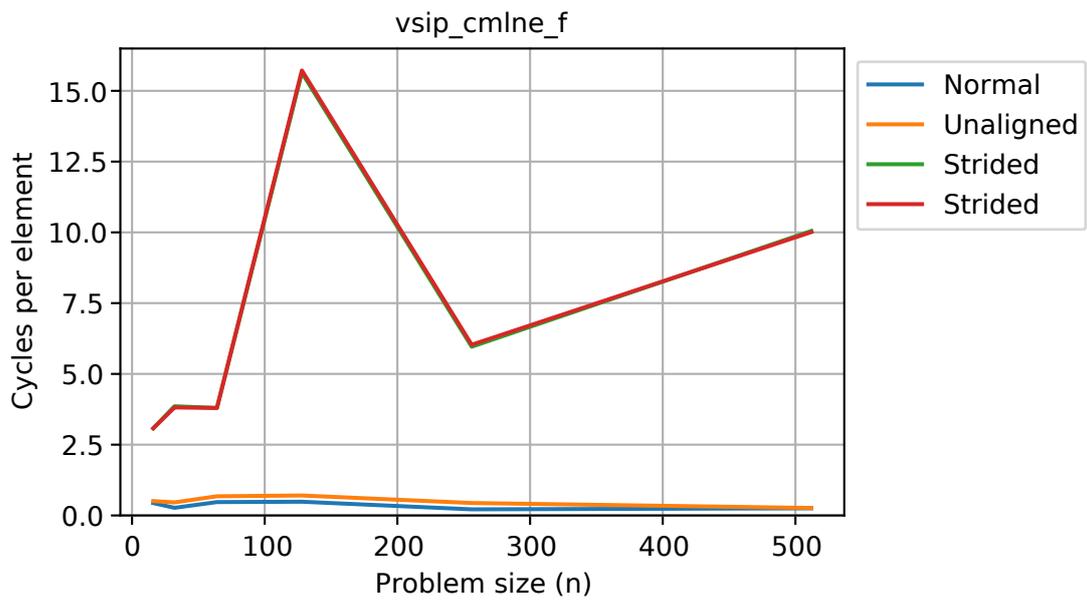
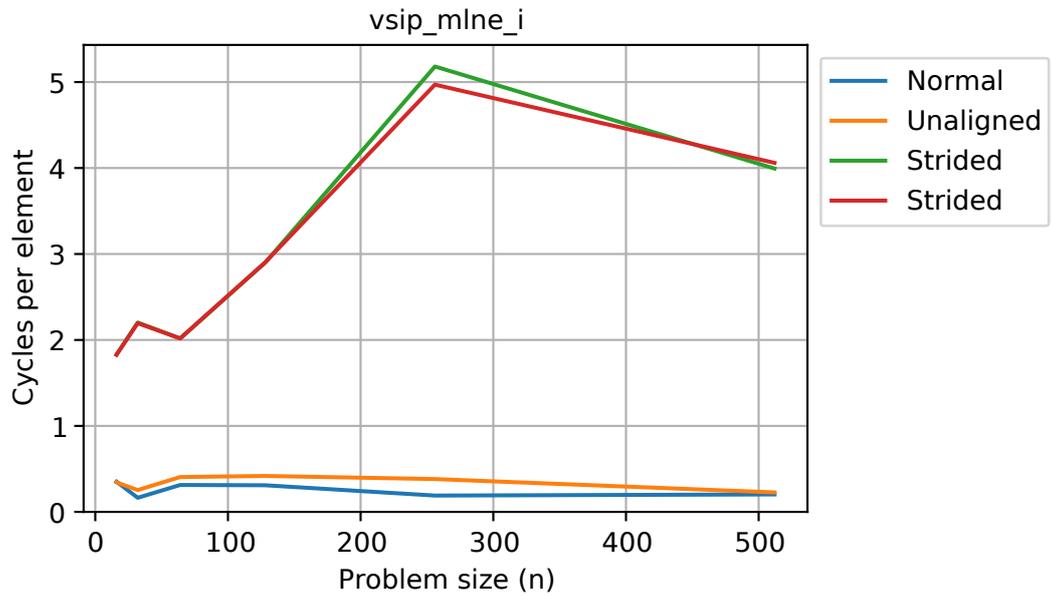


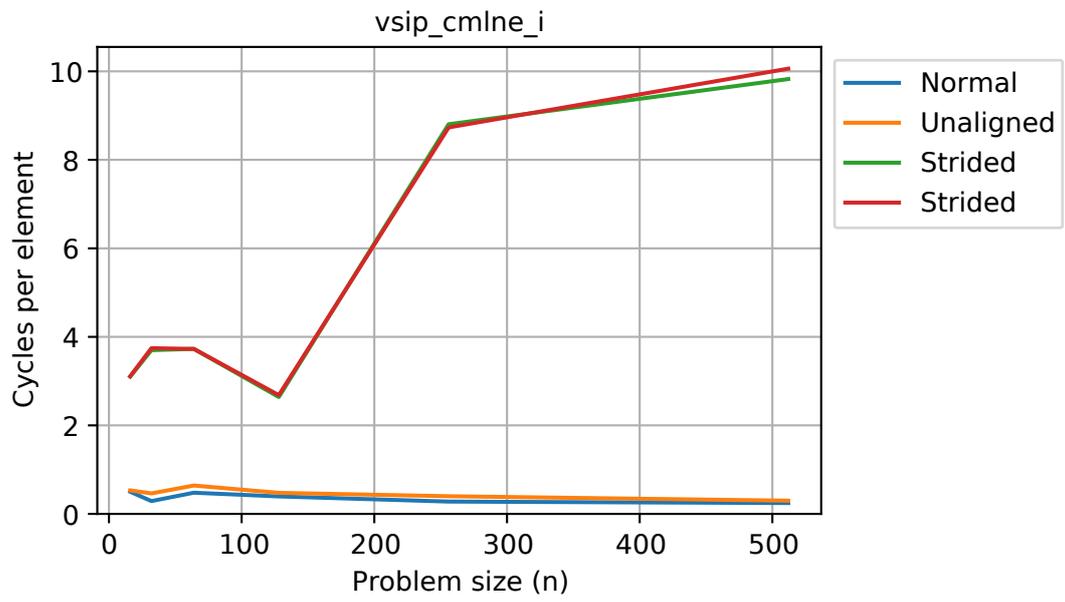




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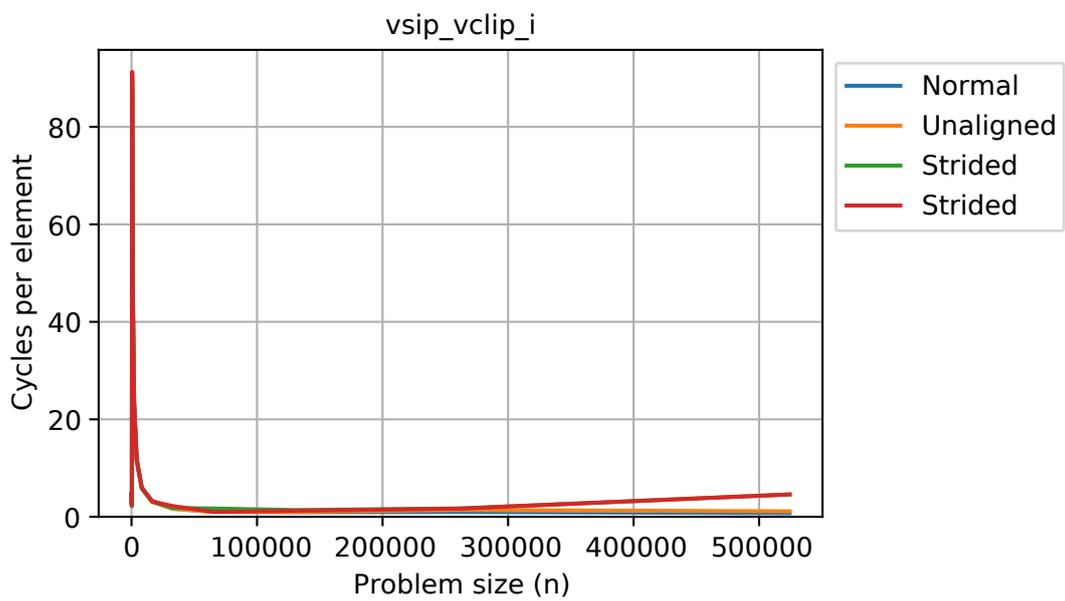
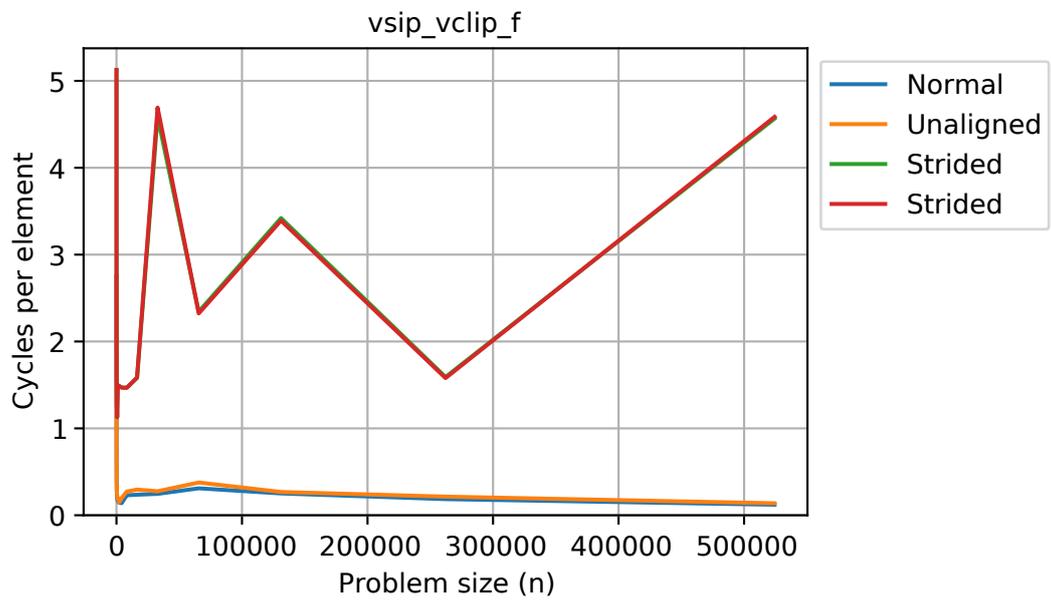


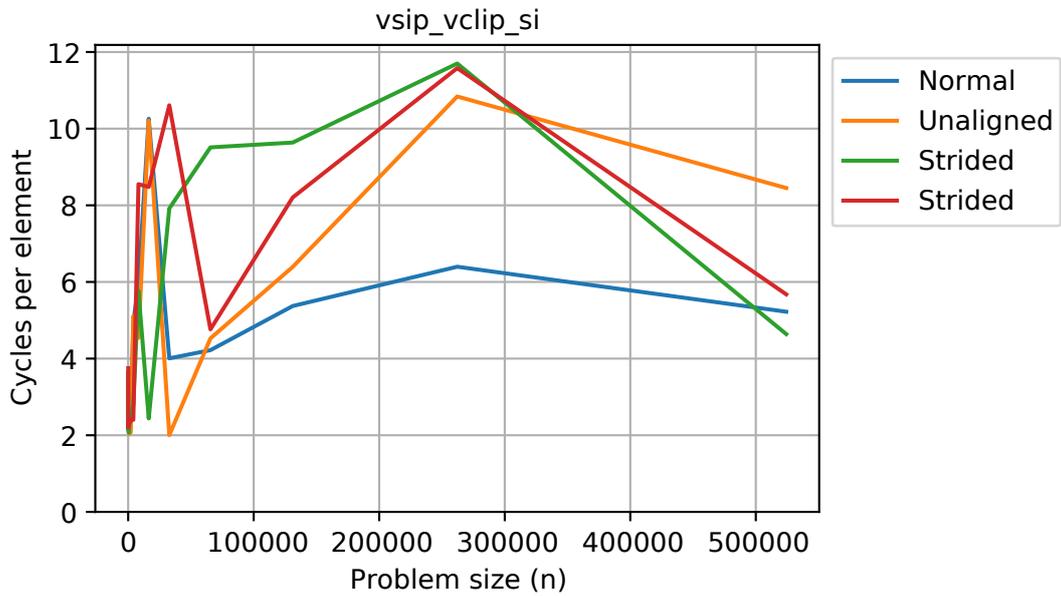


2.6 Selection Operations

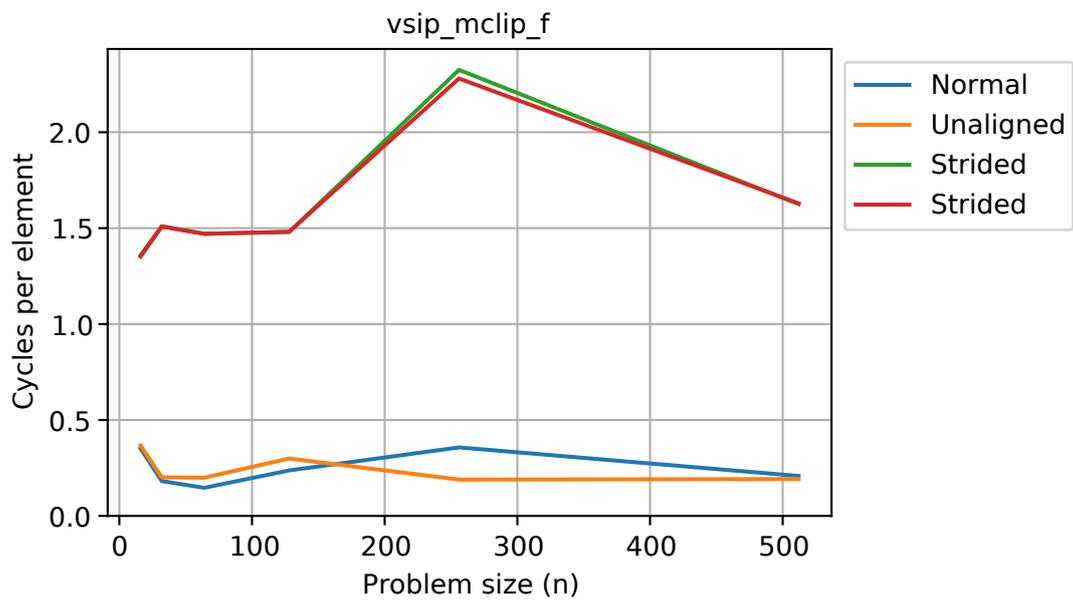
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- `vsip_mclip_f`
- `vsip_vinvclip_P`
- `vsip_minvclip_f`
- `vsip_vindexbool`
- `vsip_vmax_f`
- `vsip_mmax_f`
- `vsip_vmaxmg_f`
- `vsip_mmaxmg_f`
- `vsip_vcmxmgsg_f`
- `vsip_mcmxmgsg_f`
- `vsip_vcmxmgsgval_f`
- `vsip_mcmxmgsgval_f`
- `vsip_vmaxmgval_f`
- `vsip_mmaxmgval_f`
- `vsip_vmaxval_f`
- `vsip_mmaxval_f`
- `vsip_vmin_f`
- `vsip_mmin_f`
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- `vsip_mminmgsgval_f`
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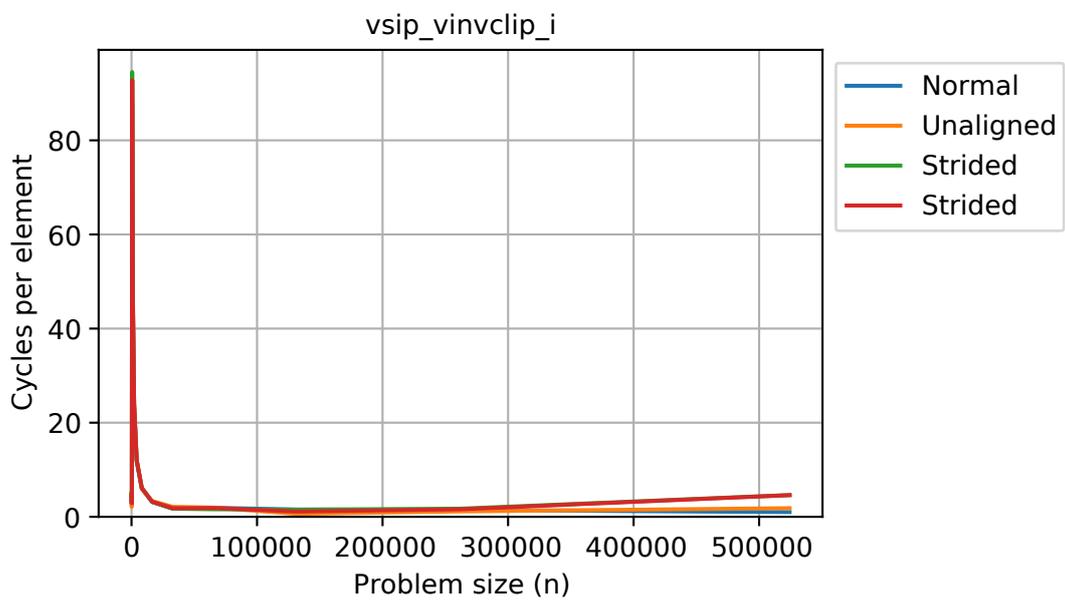
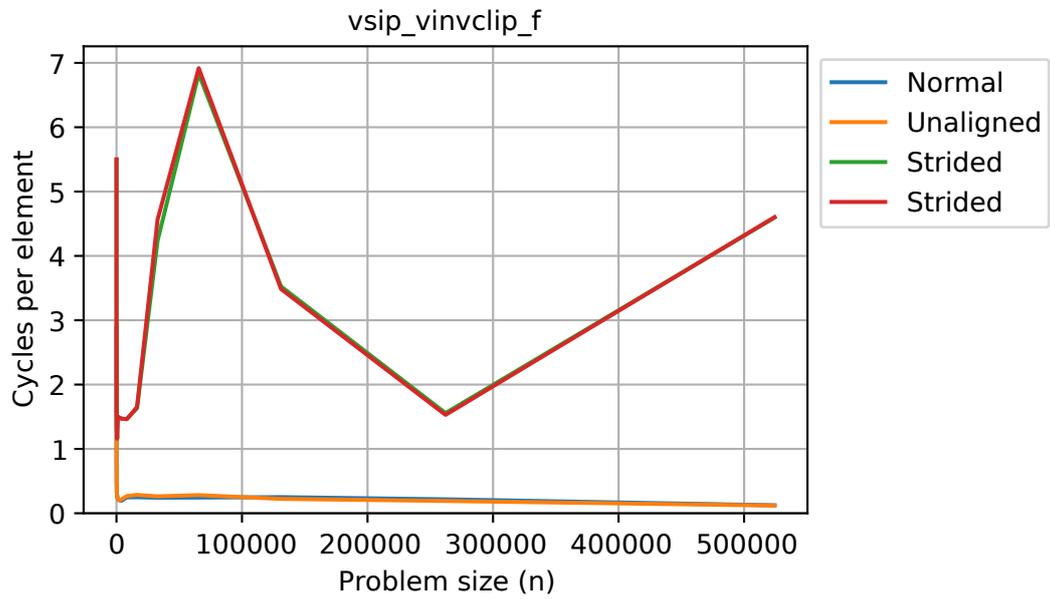
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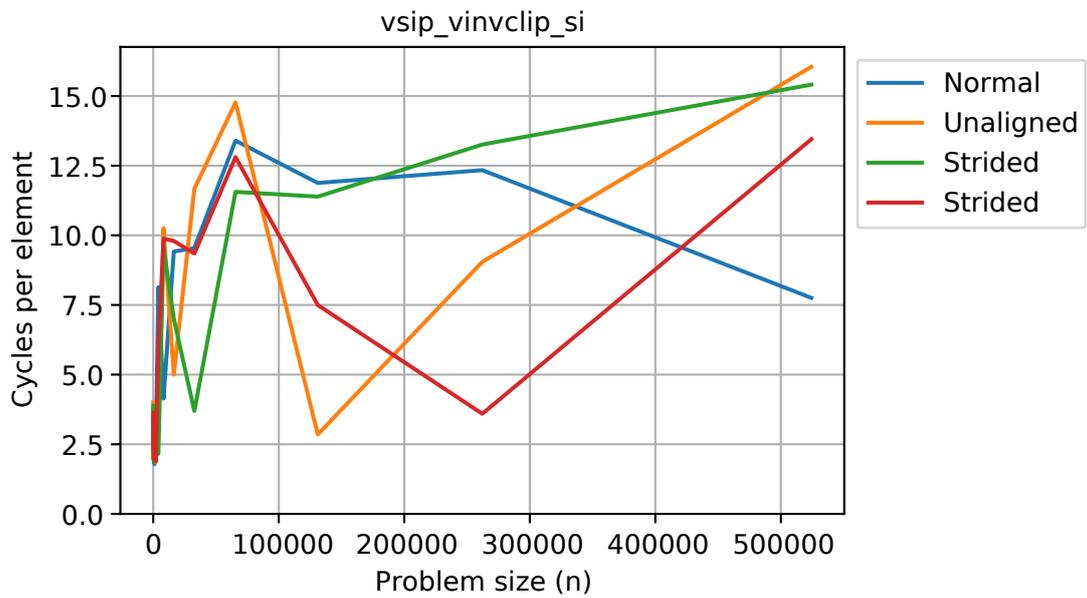




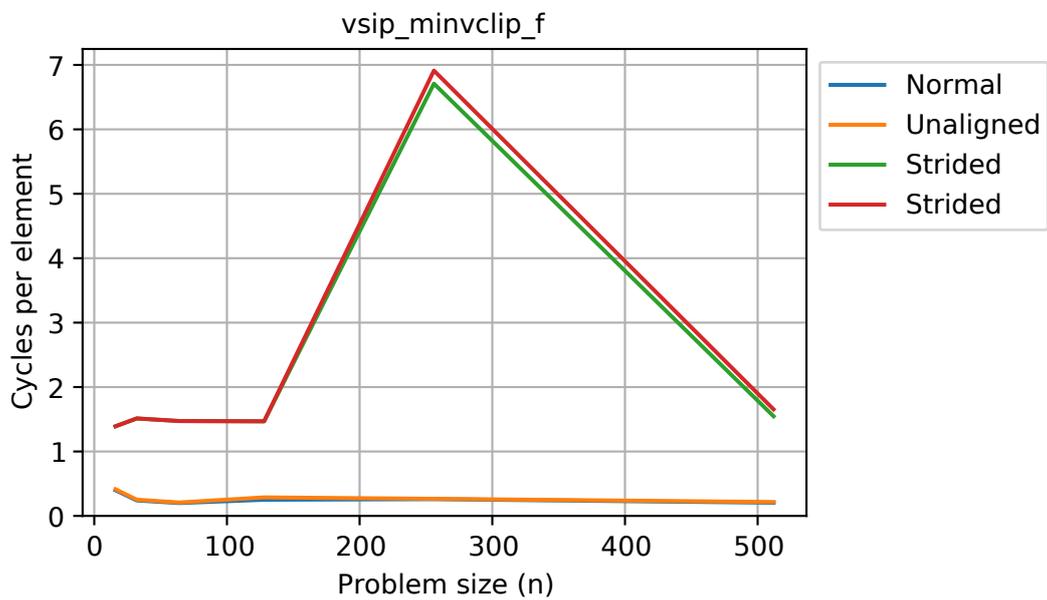
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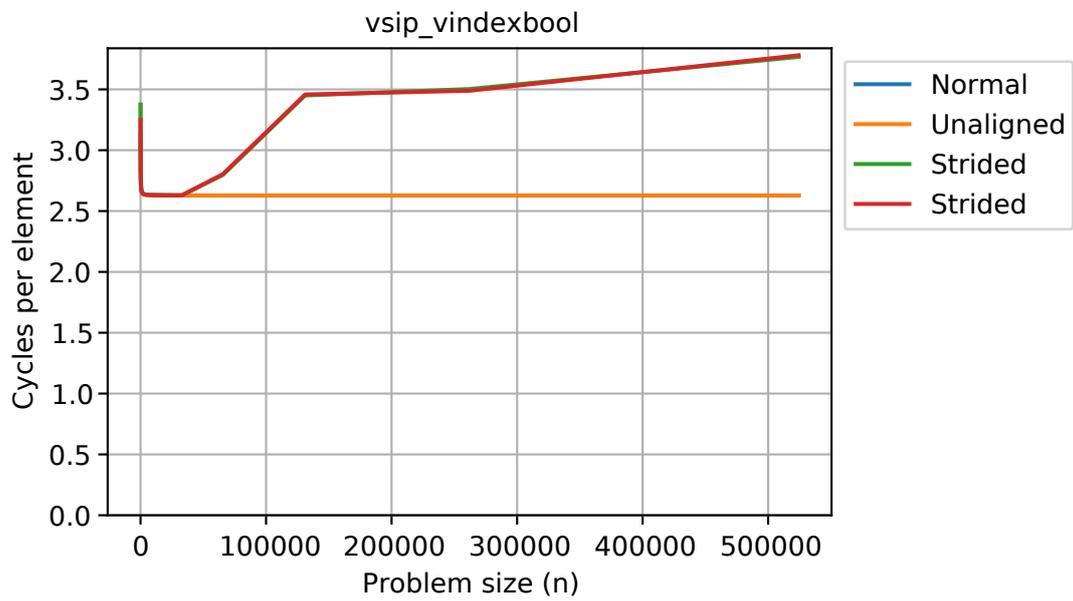
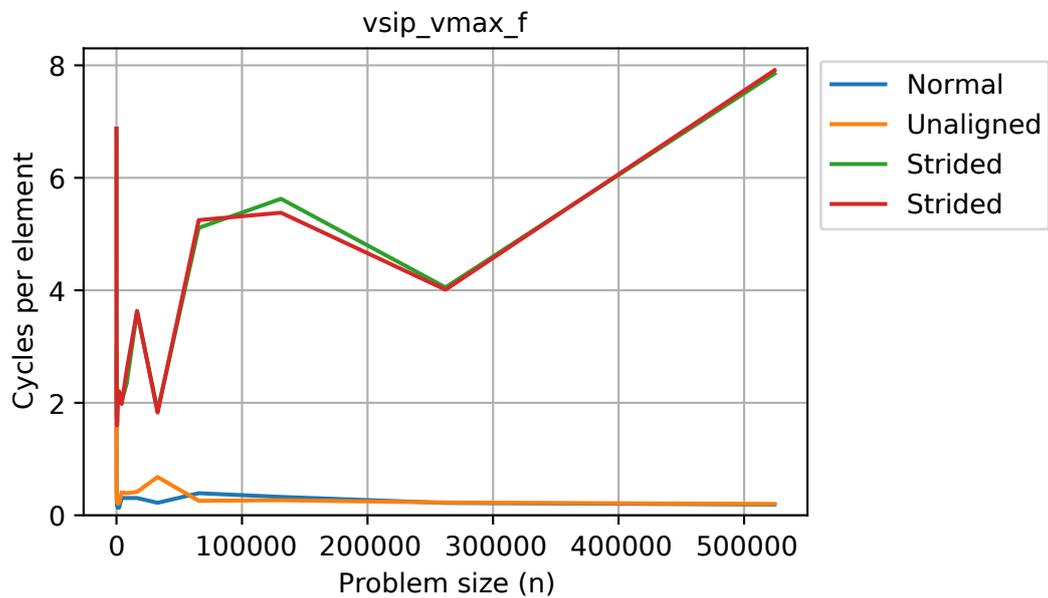


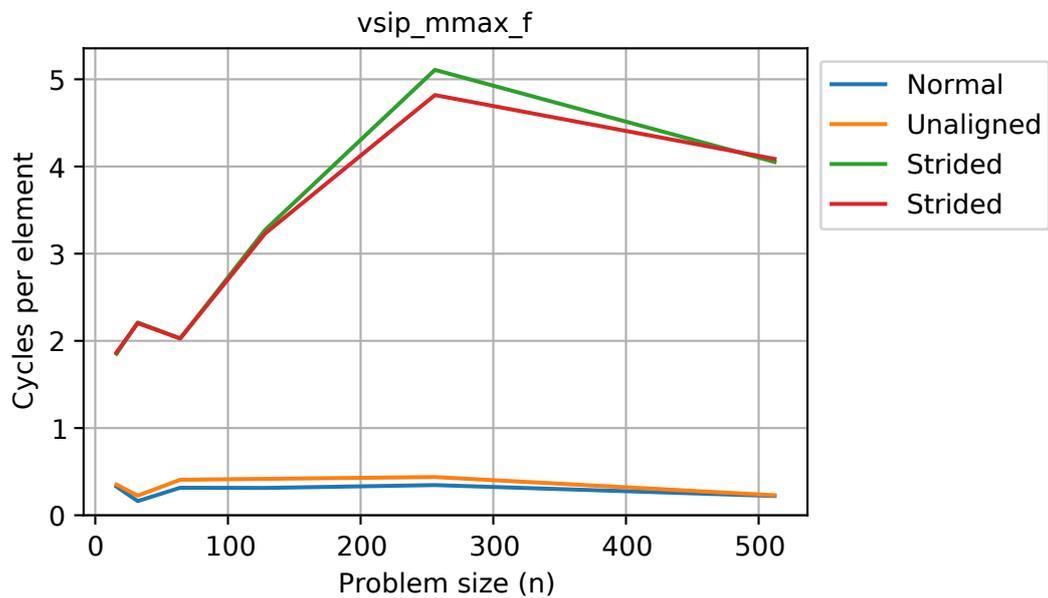
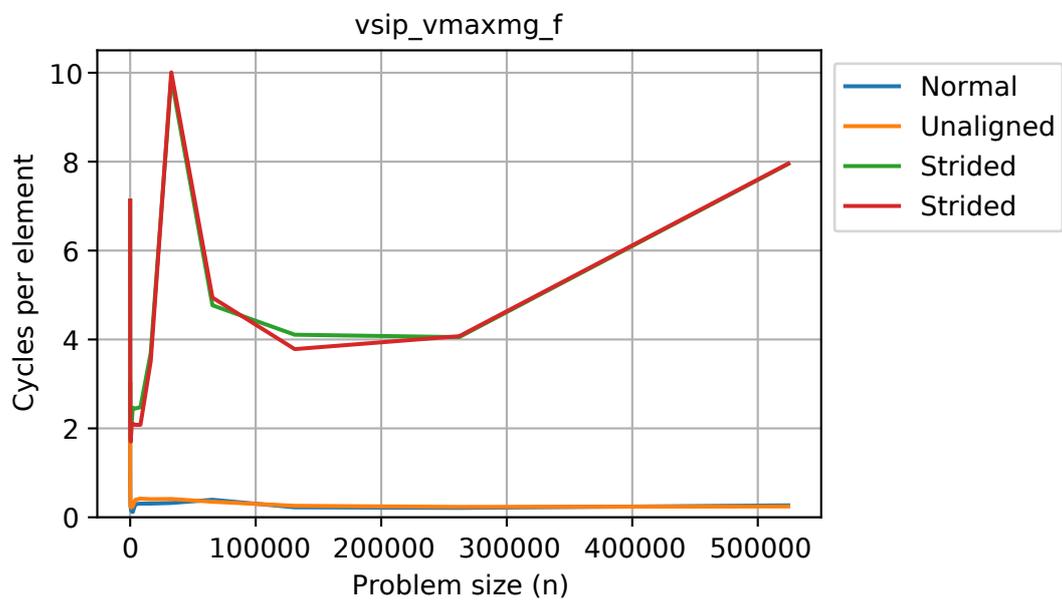
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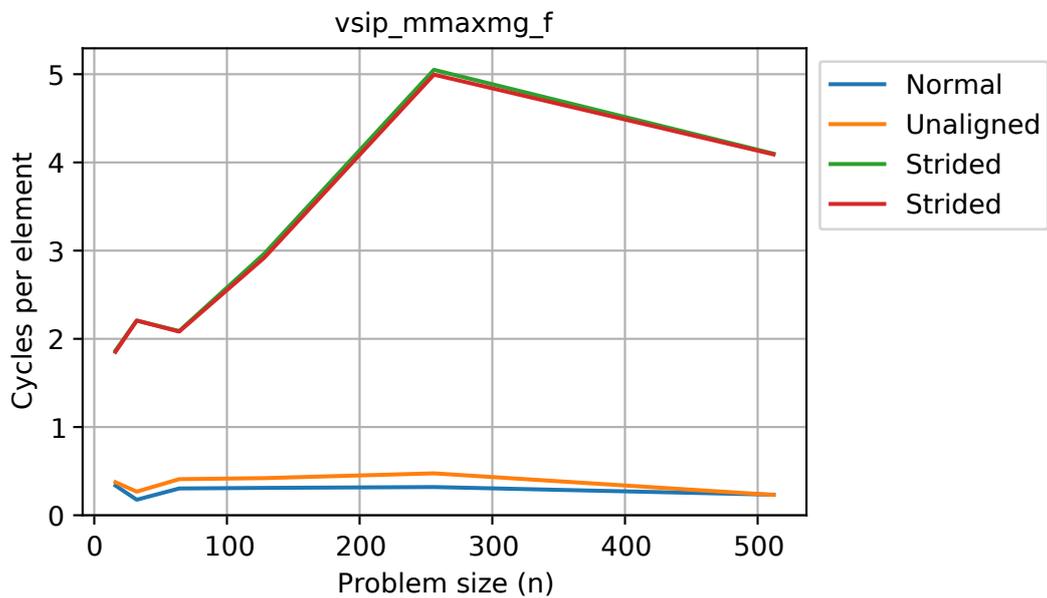
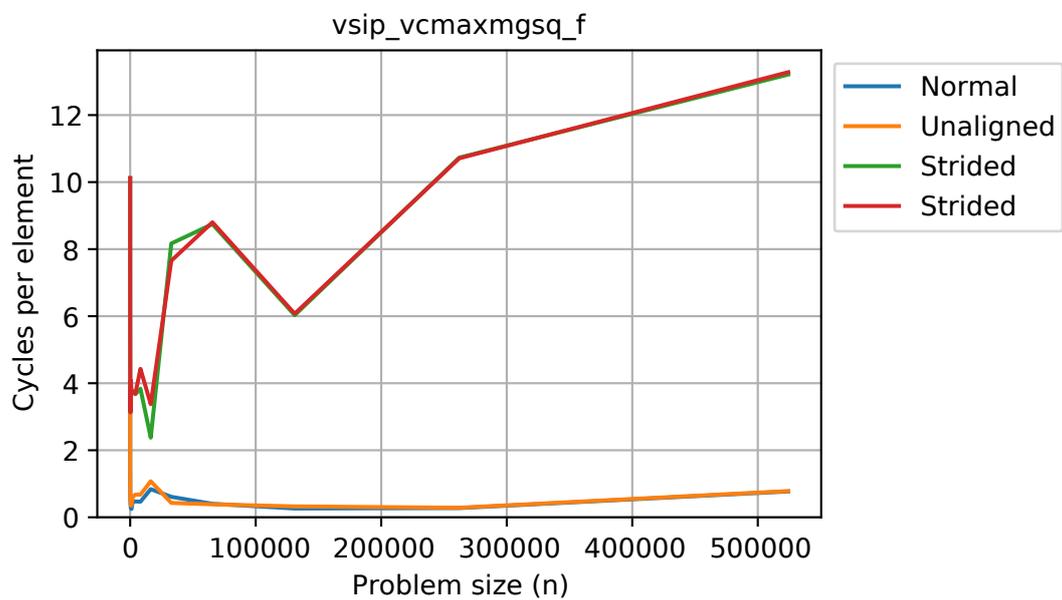


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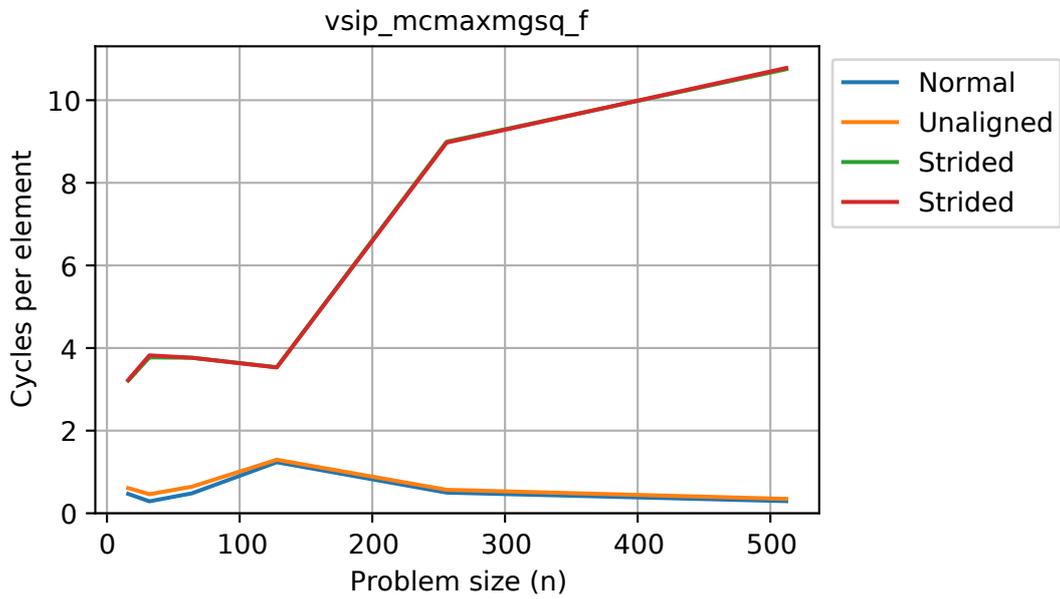


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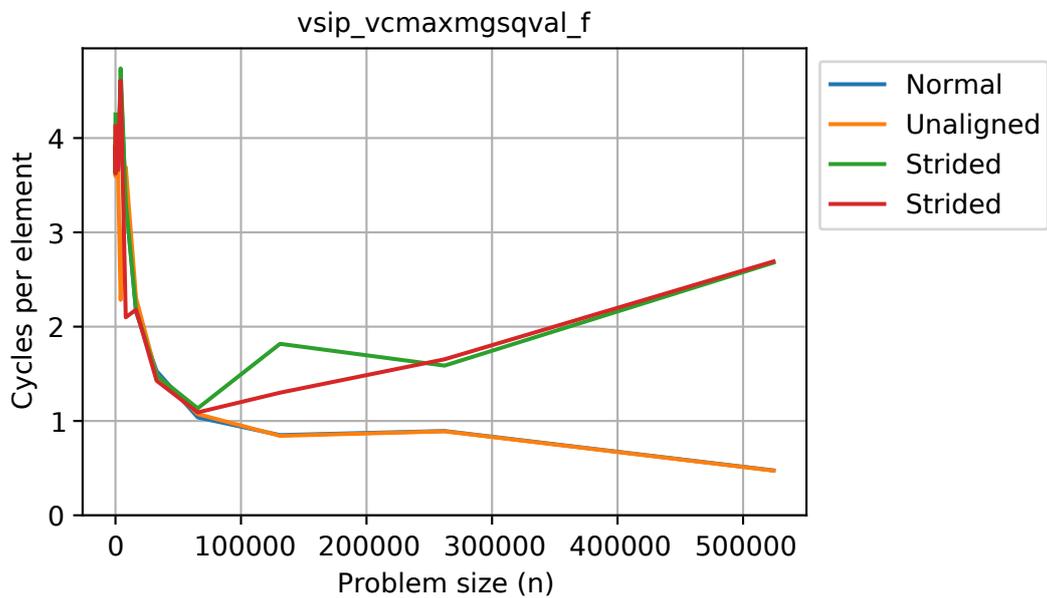
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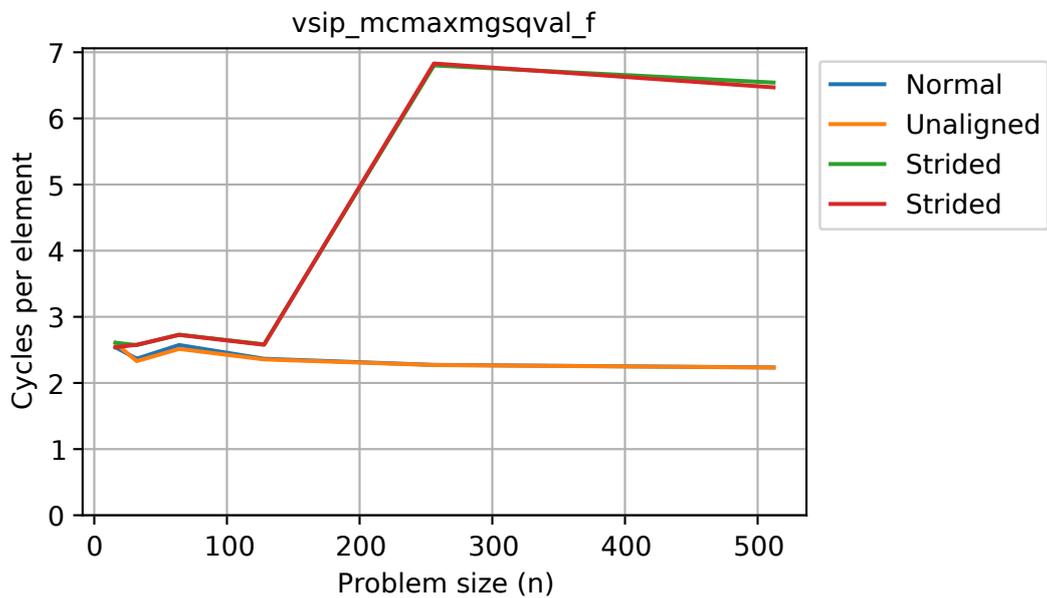
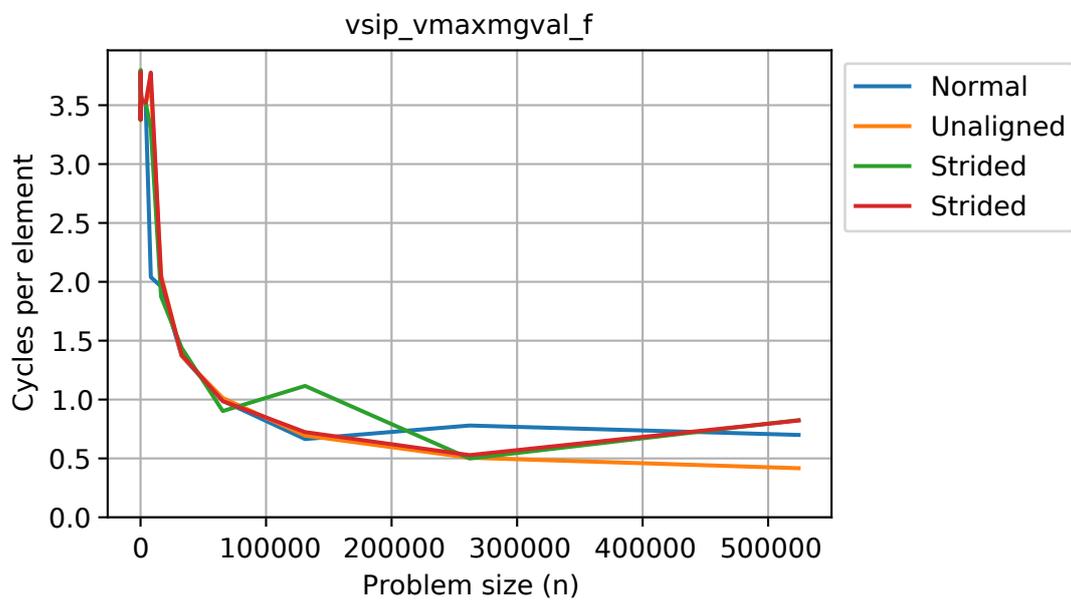
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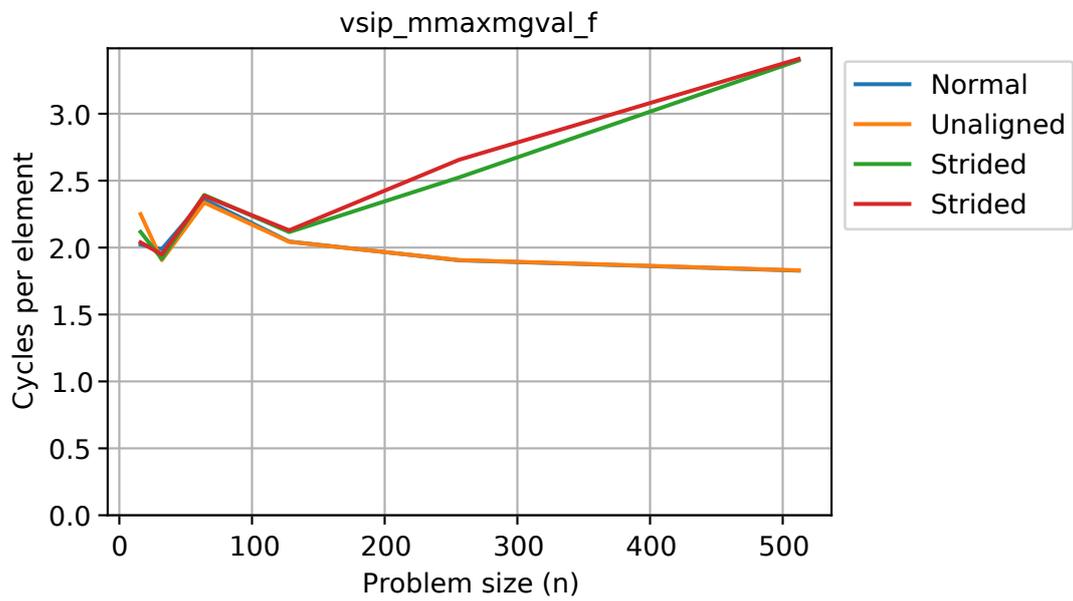
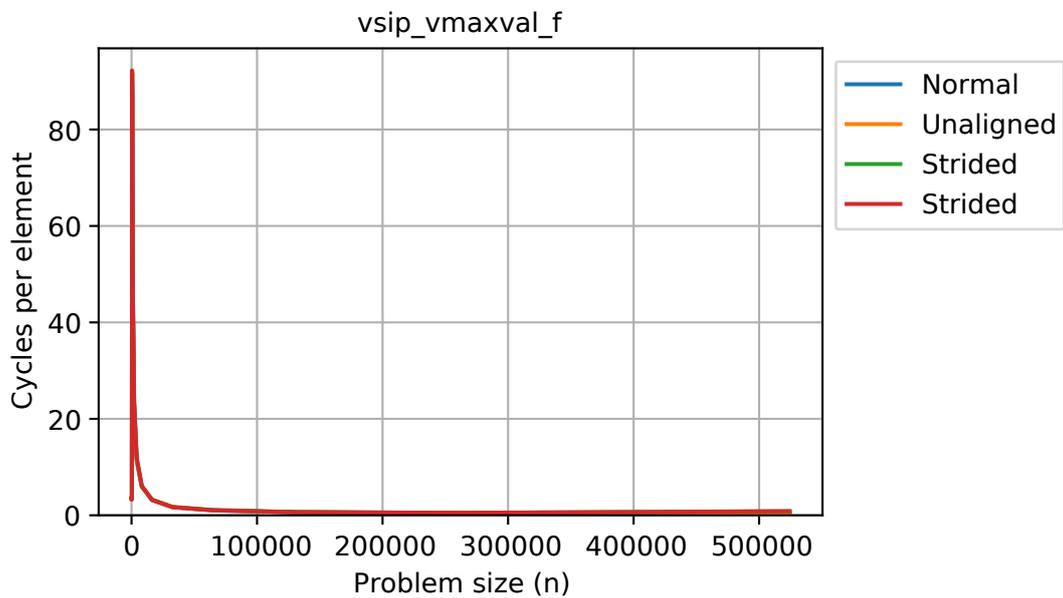
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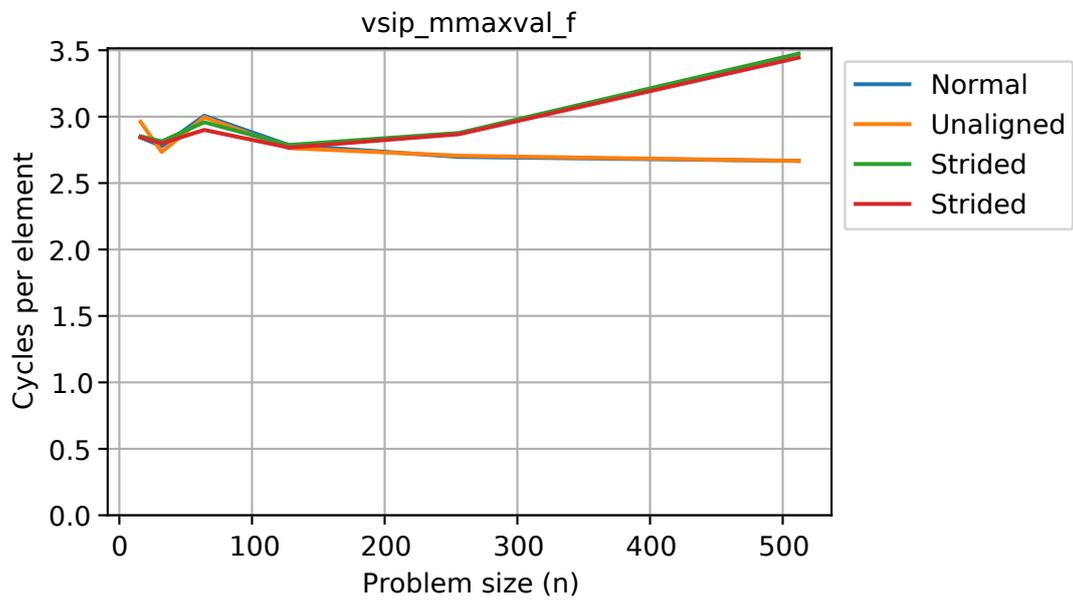
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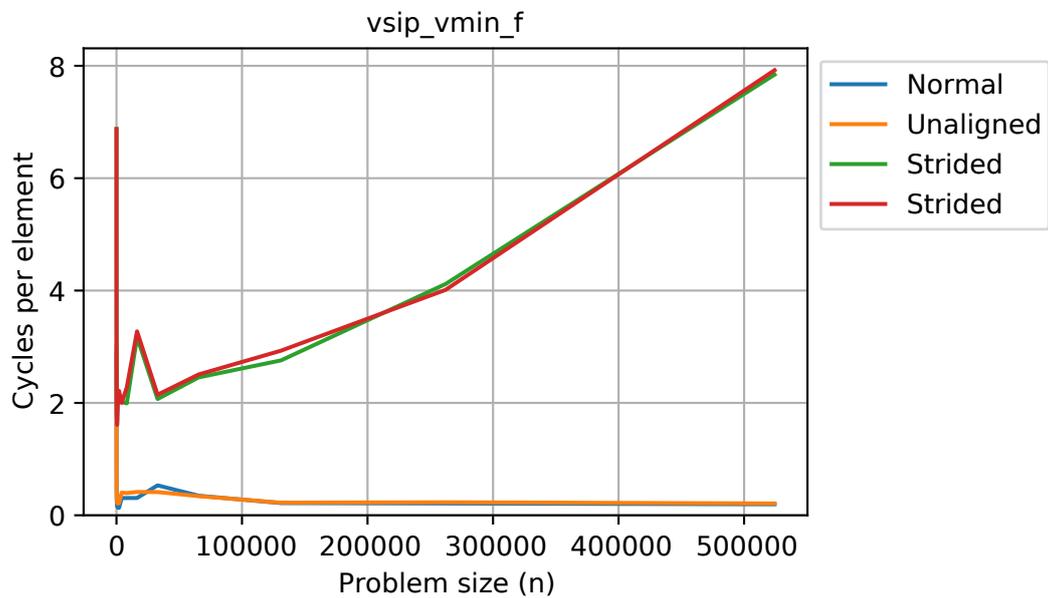
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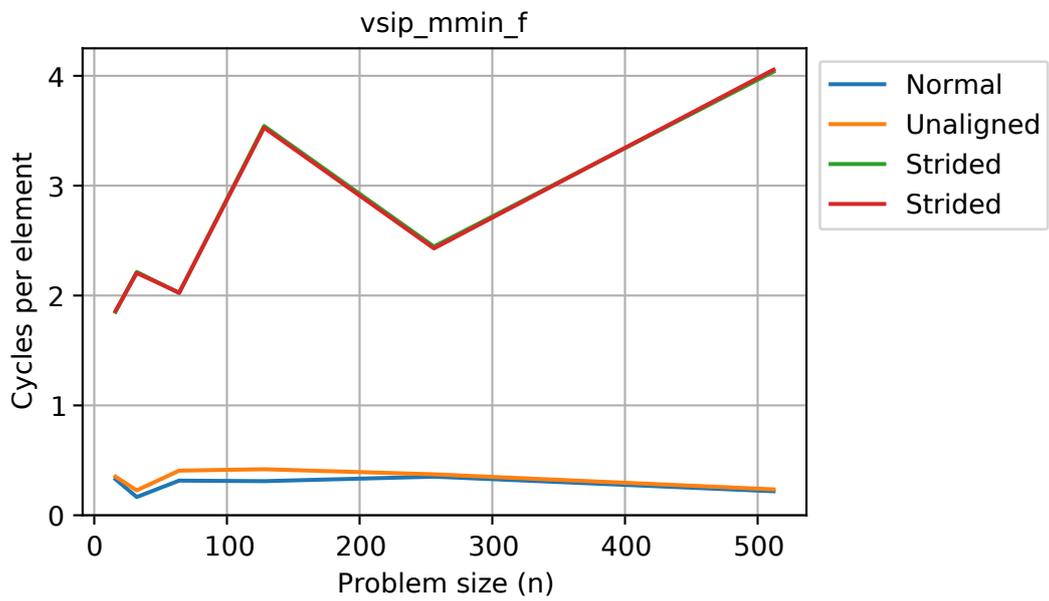
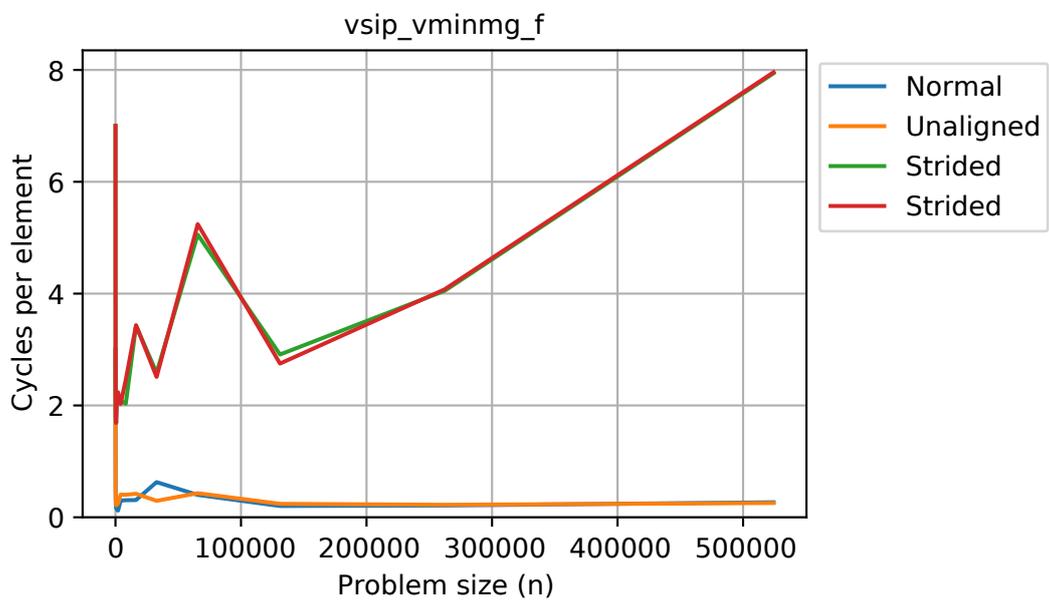
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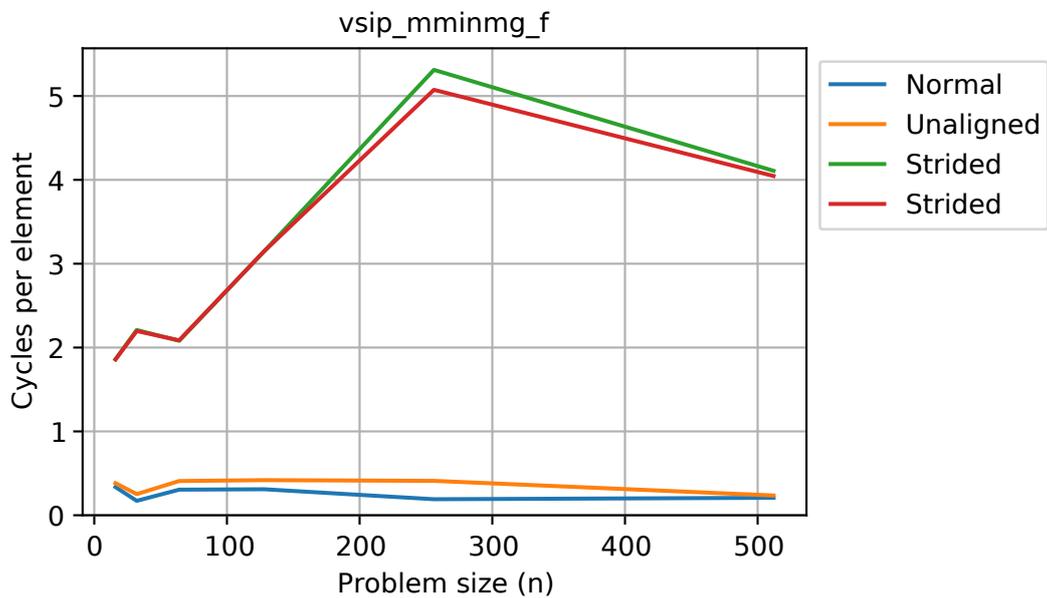
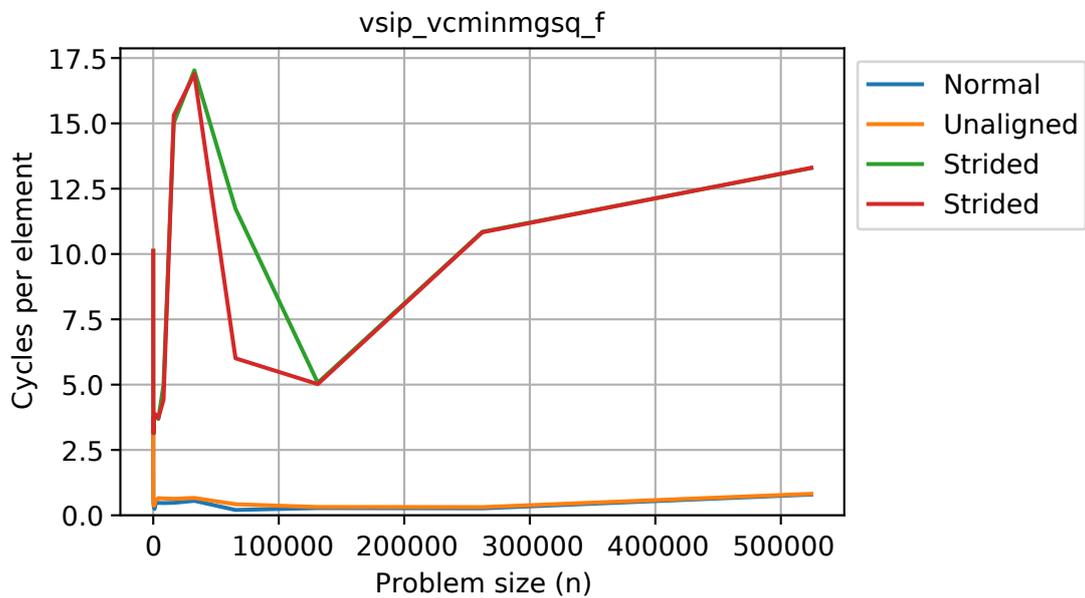
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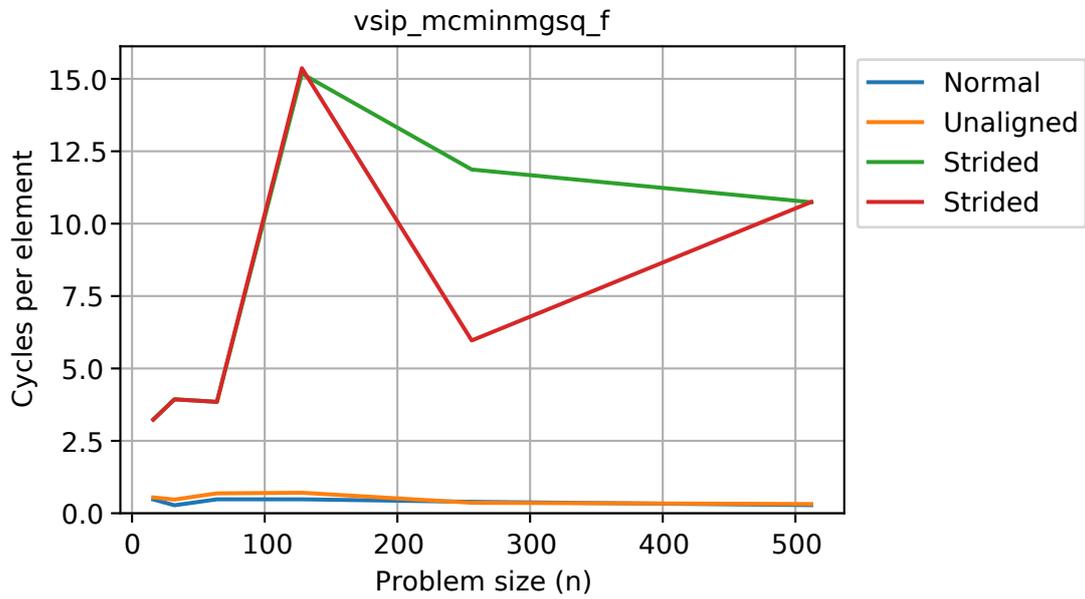
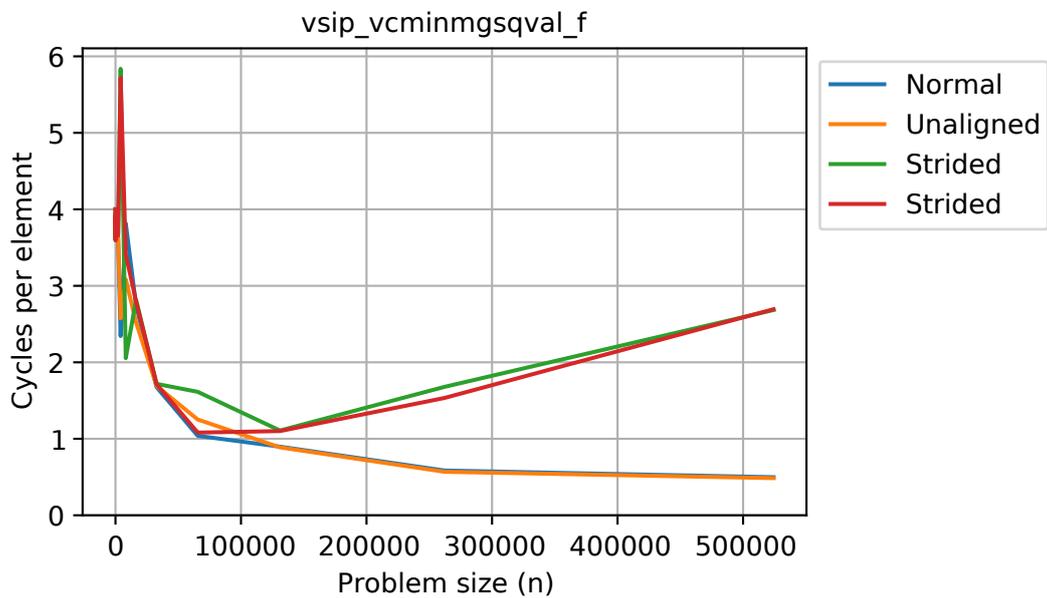


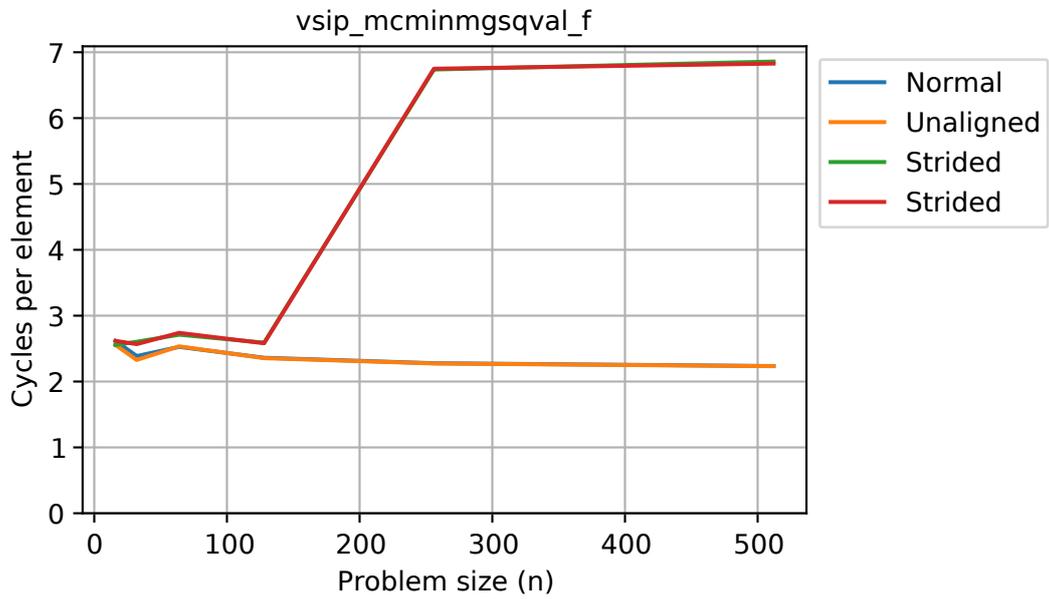
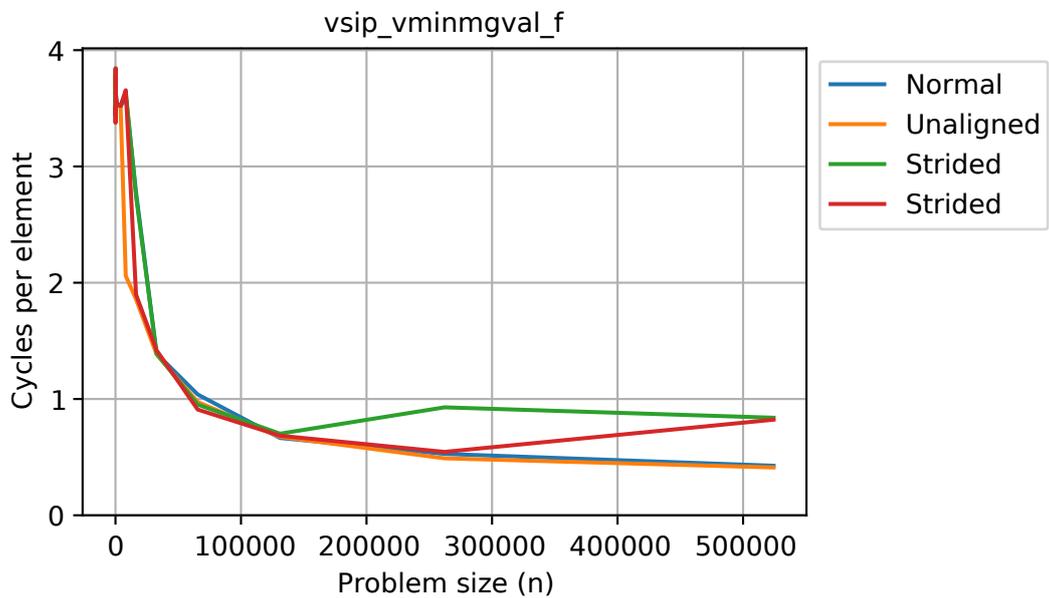
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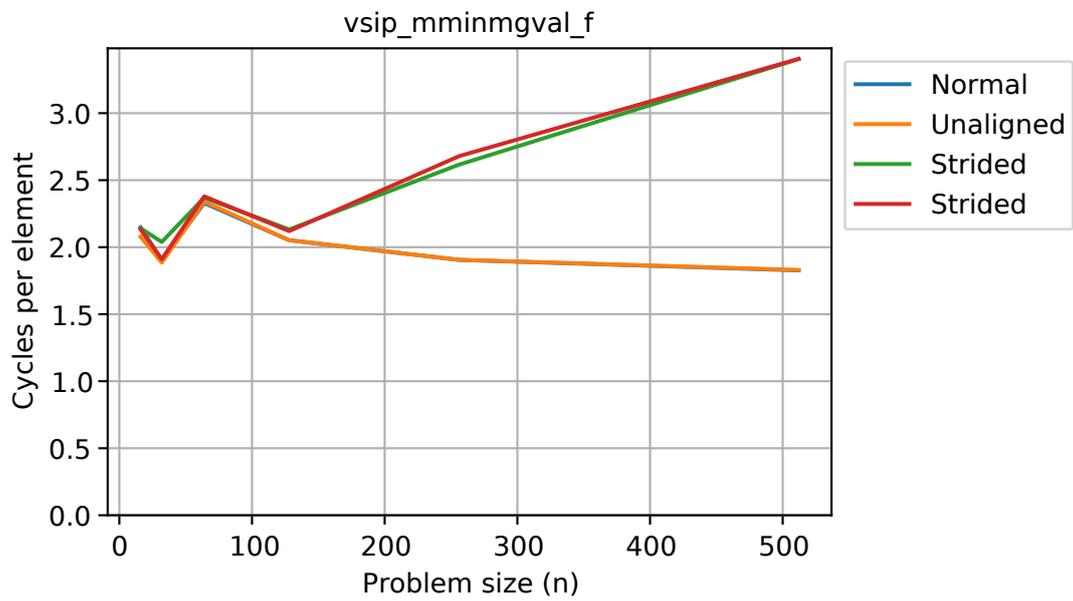
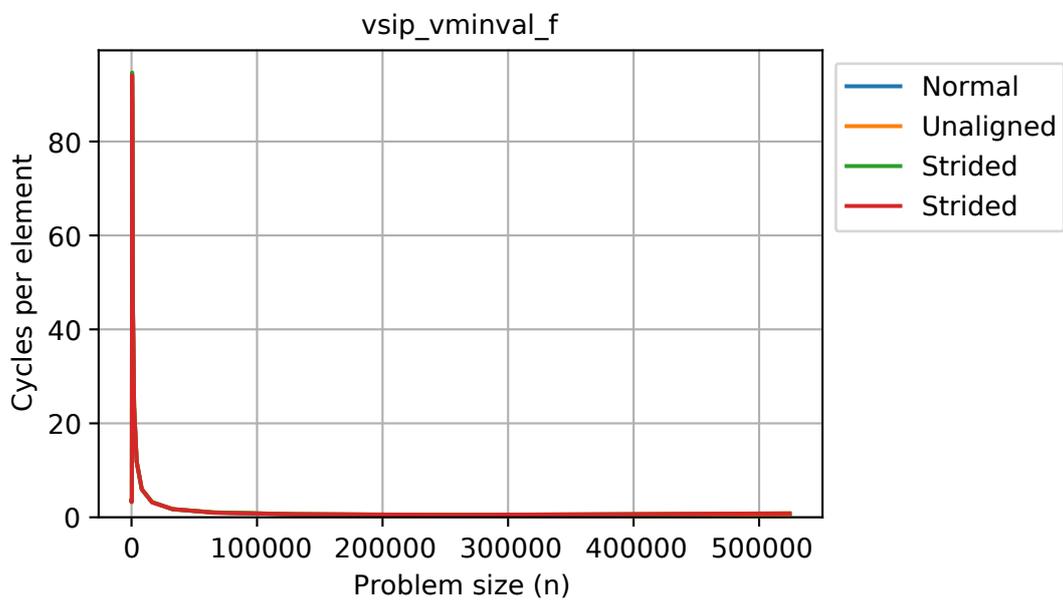


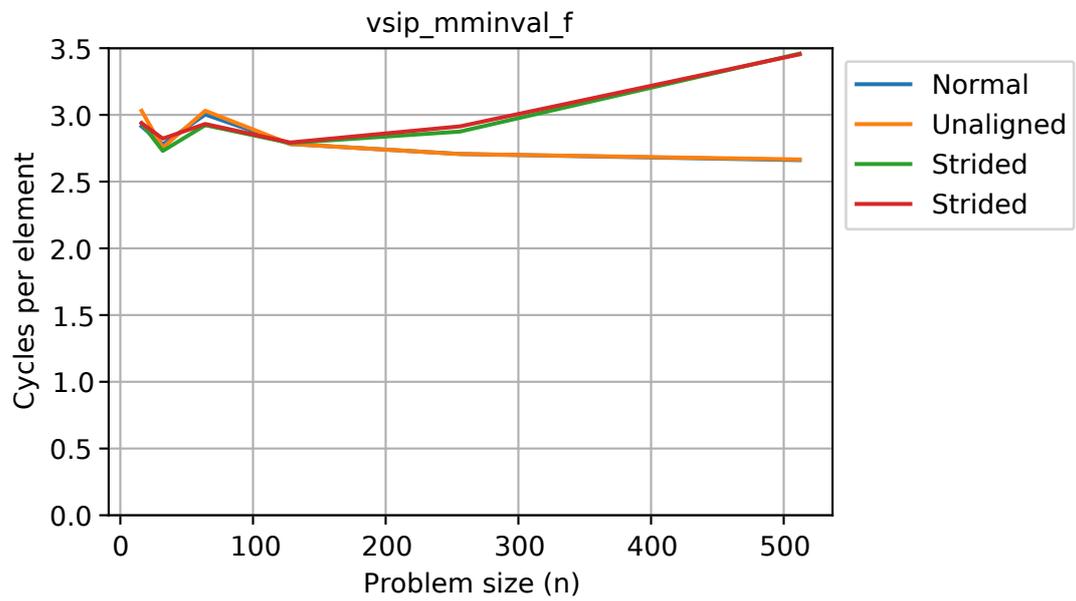
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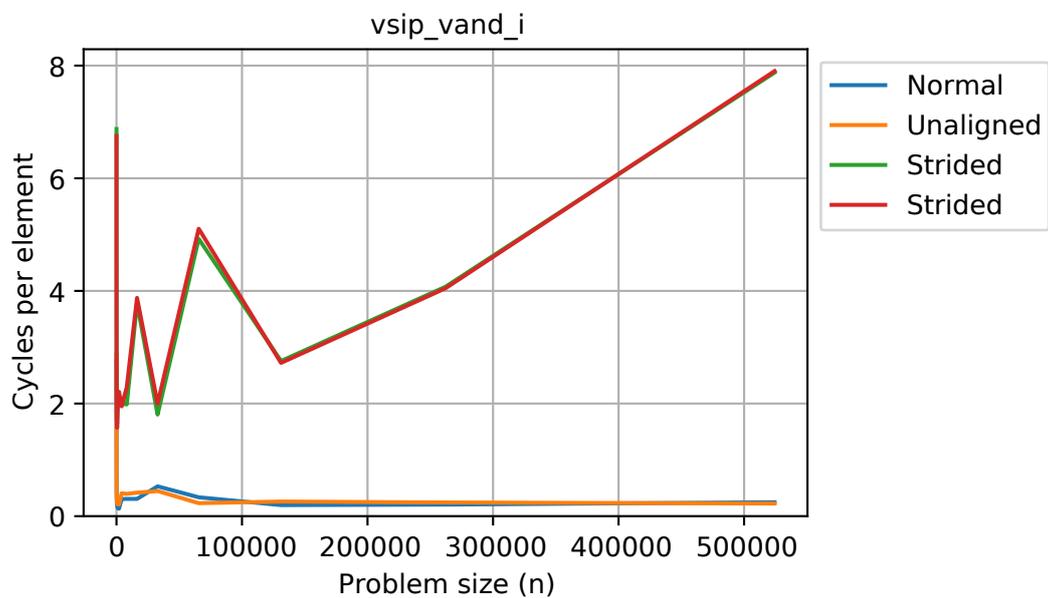
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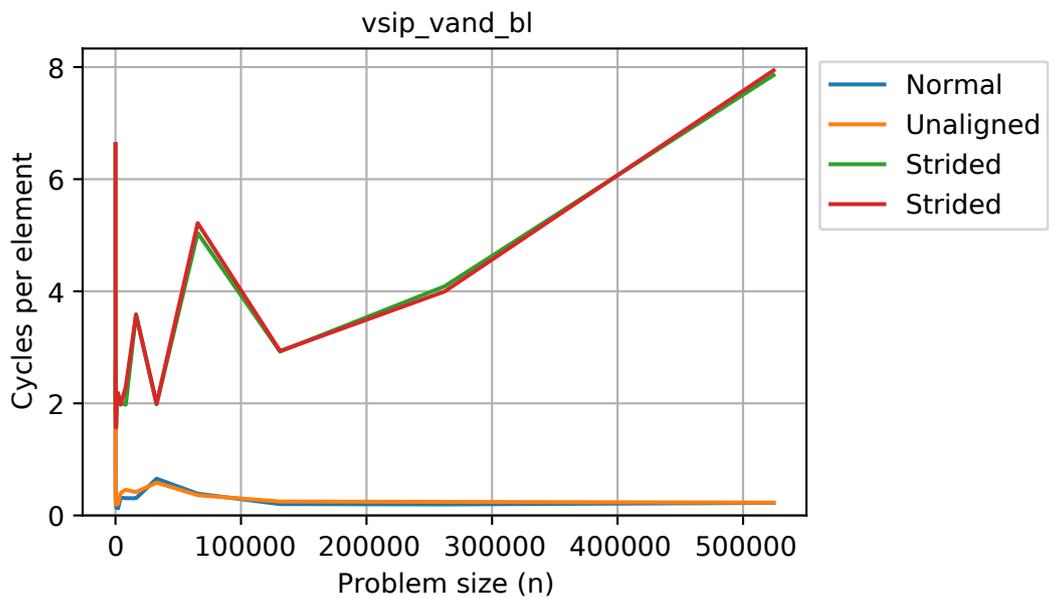
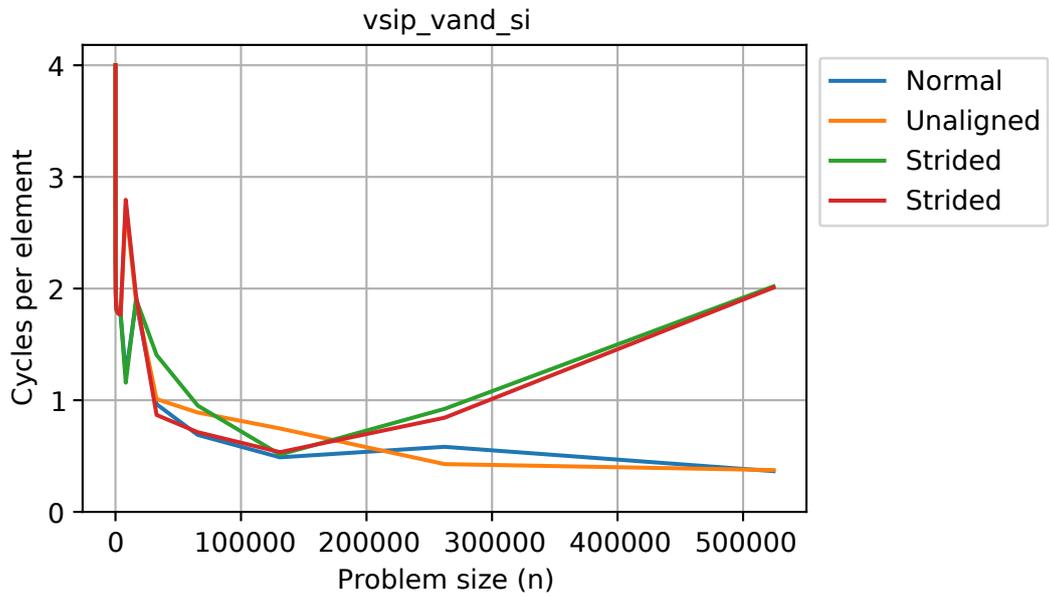
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2.7 Bitwise and Boolean Logical Operators

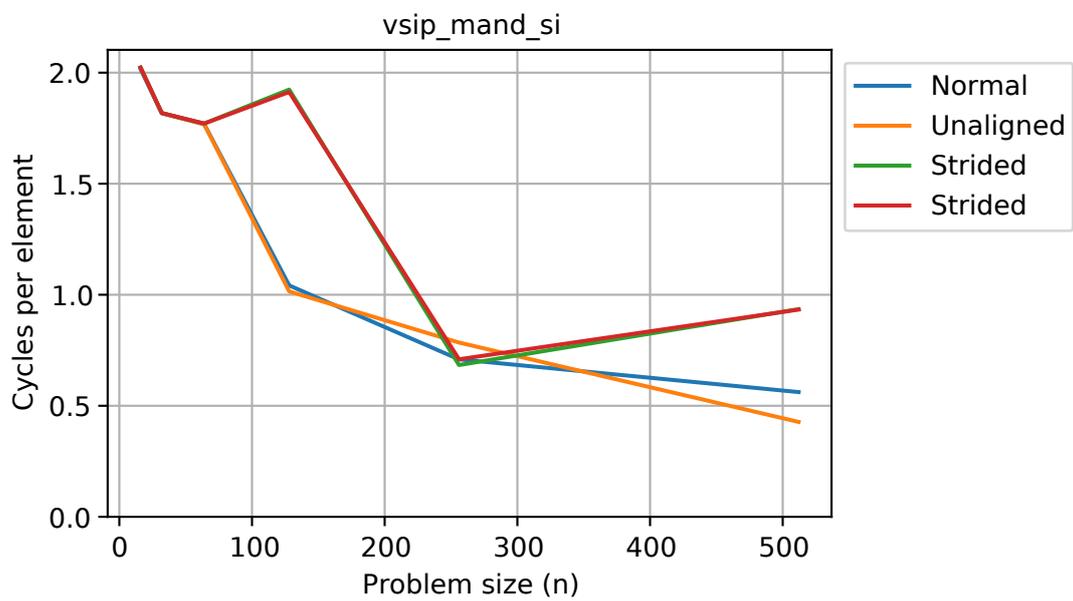
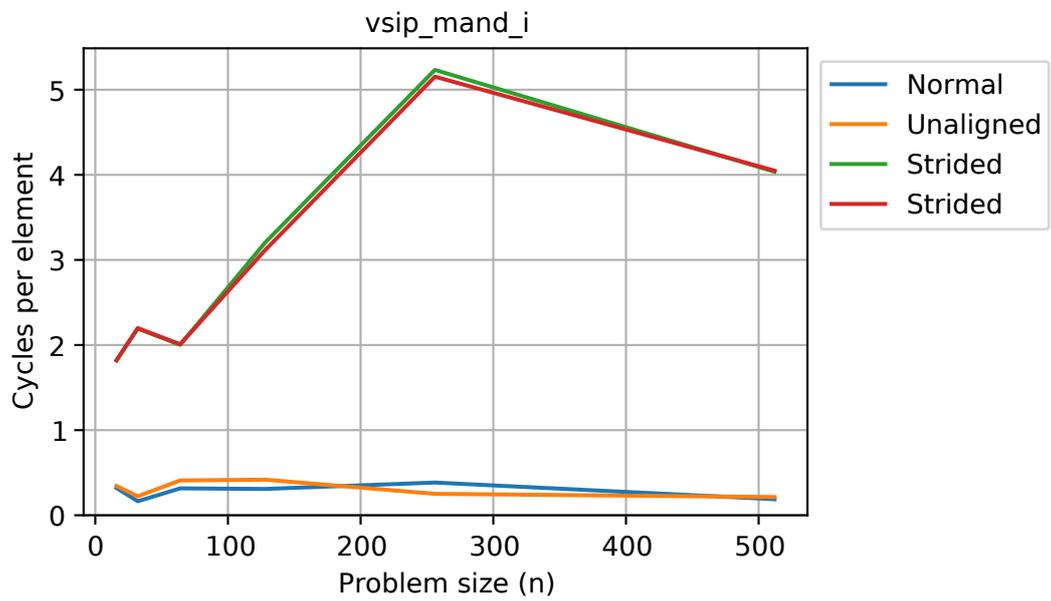
- `vsip_vand_P`
- `vsip_mand_P`
- `vsip_vnot_P`
- `vsip_mnot_P`
- `vsip_vor_P`
- `vsip_mor_P`
- `vsip_vxor_P`
- `vsip_mxor_P`

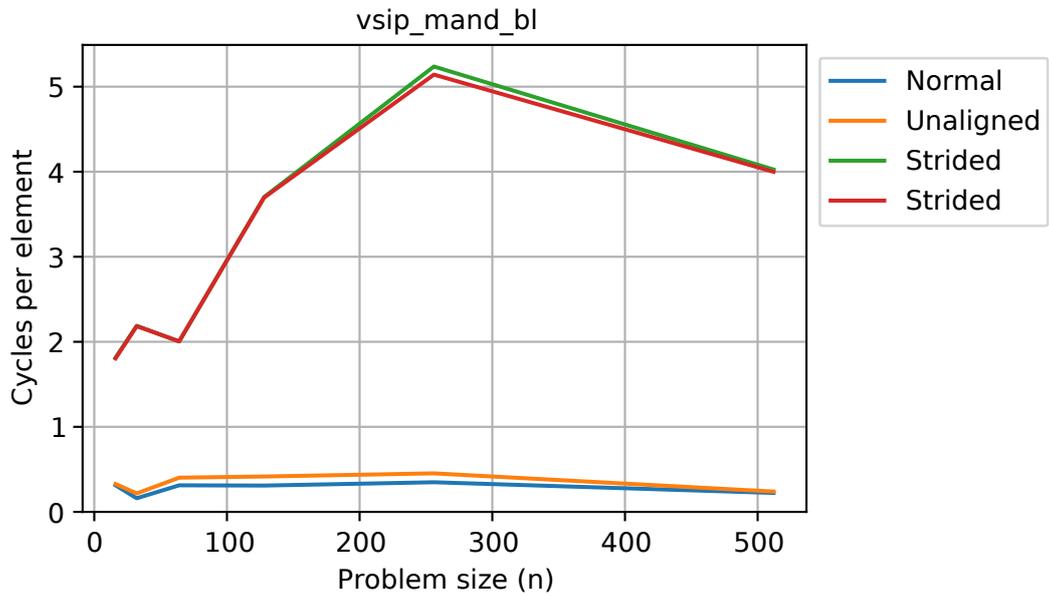
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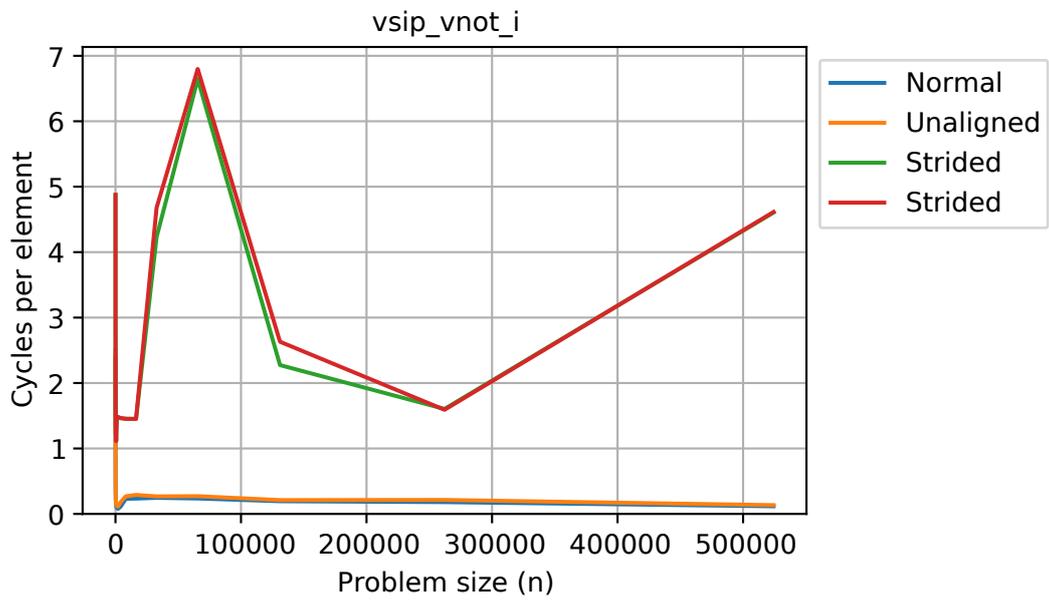


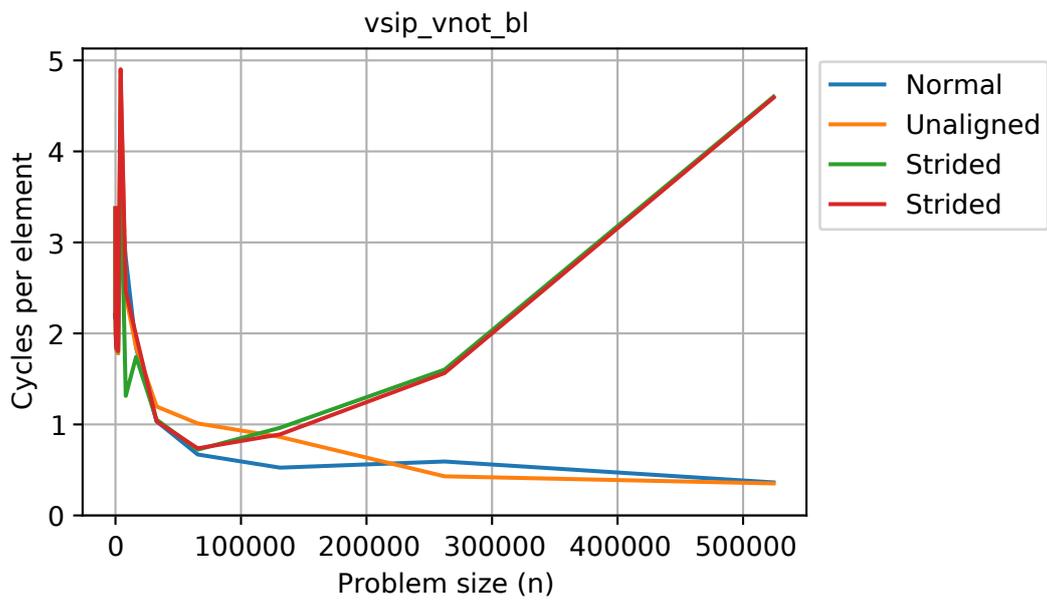
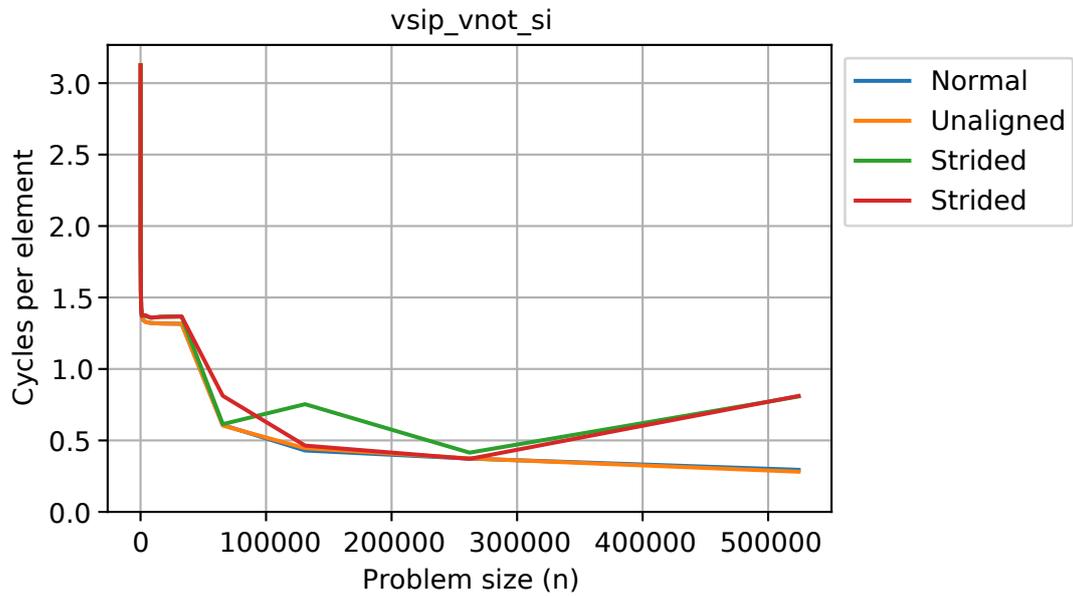
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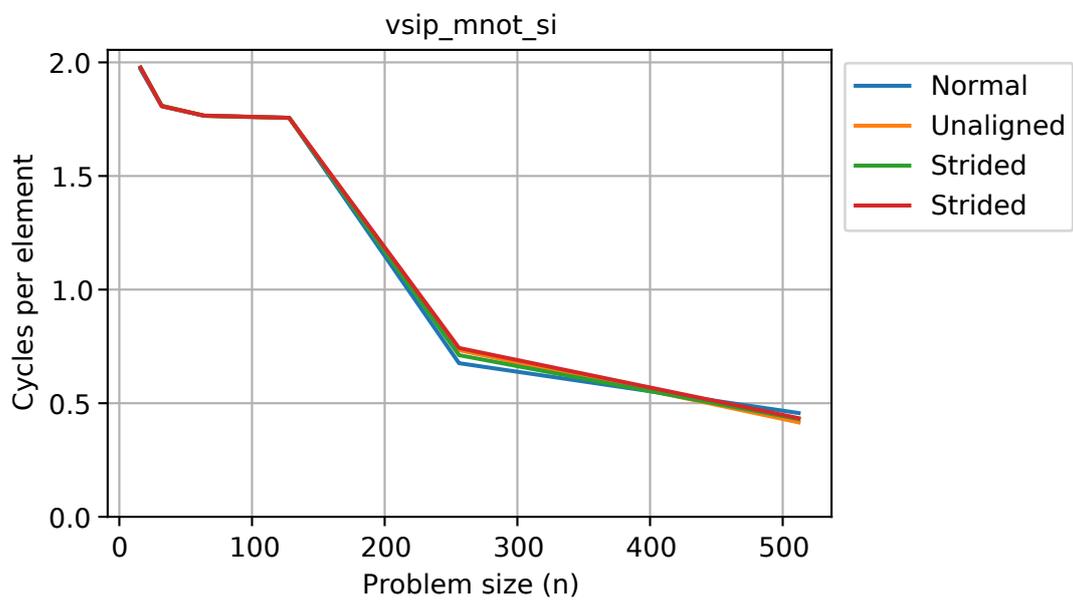
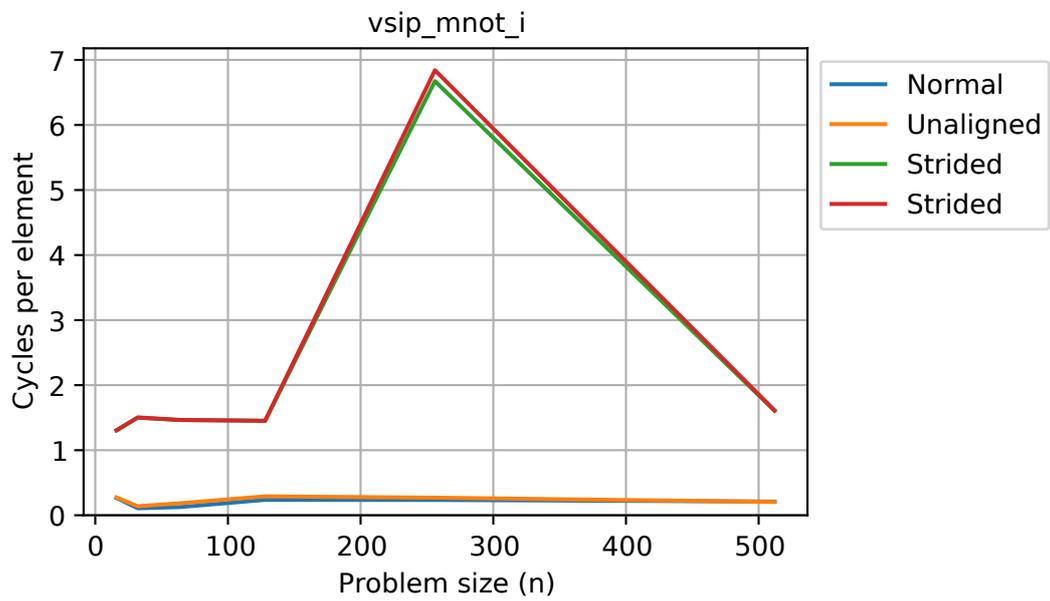


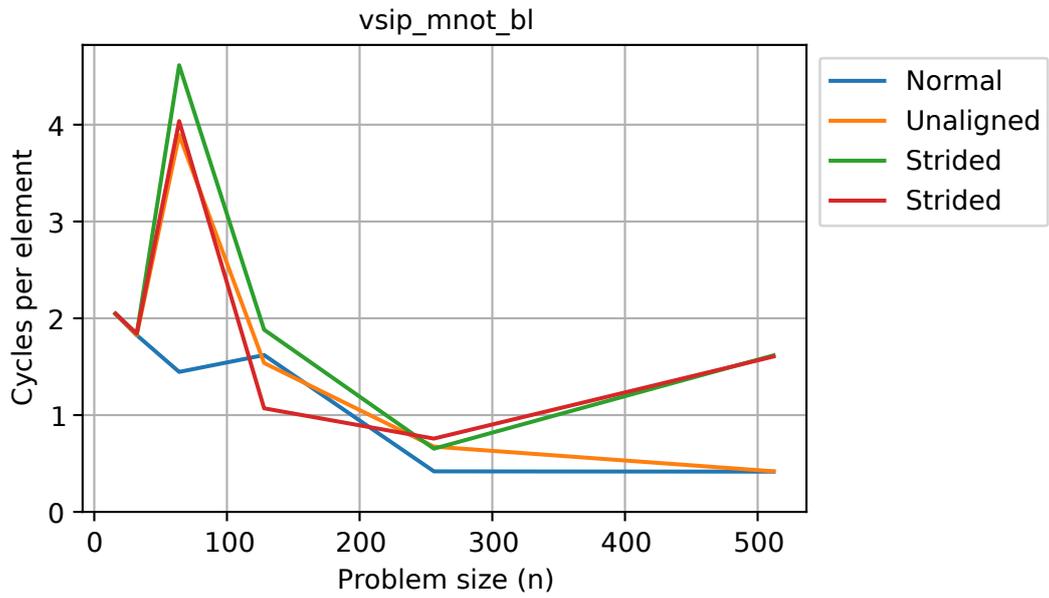
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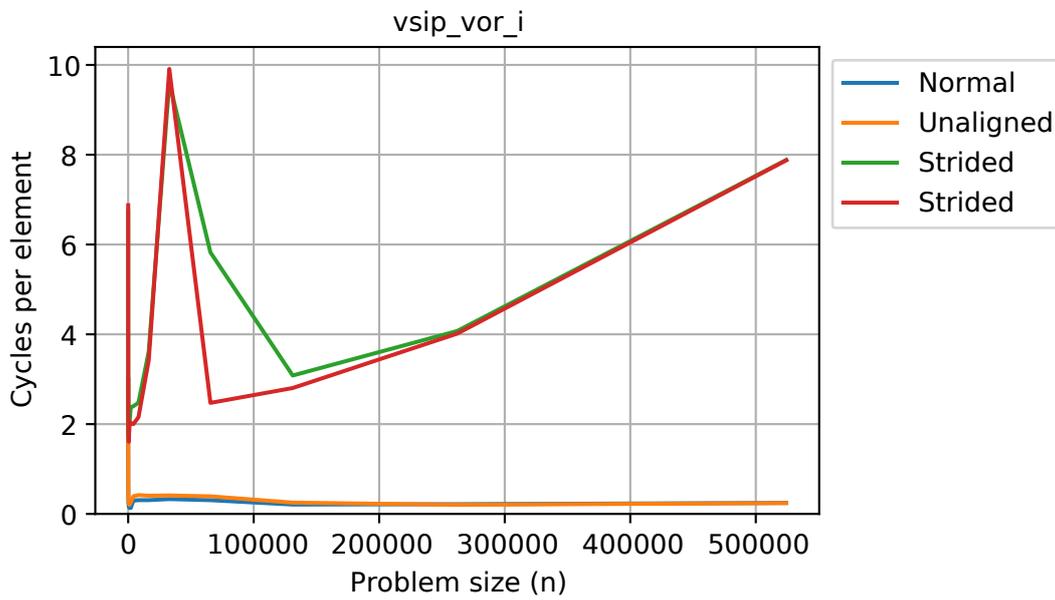


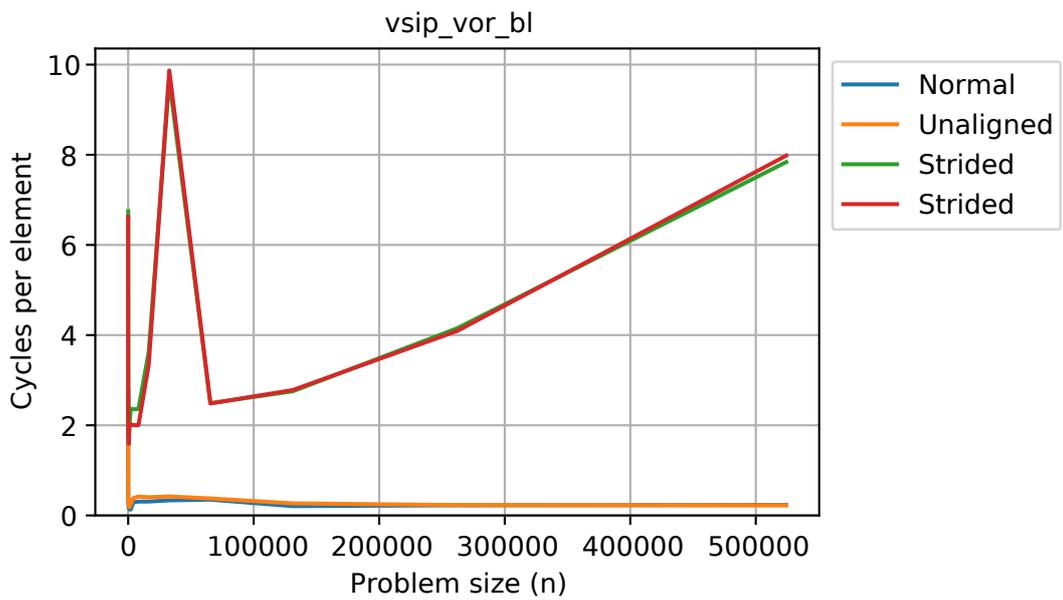
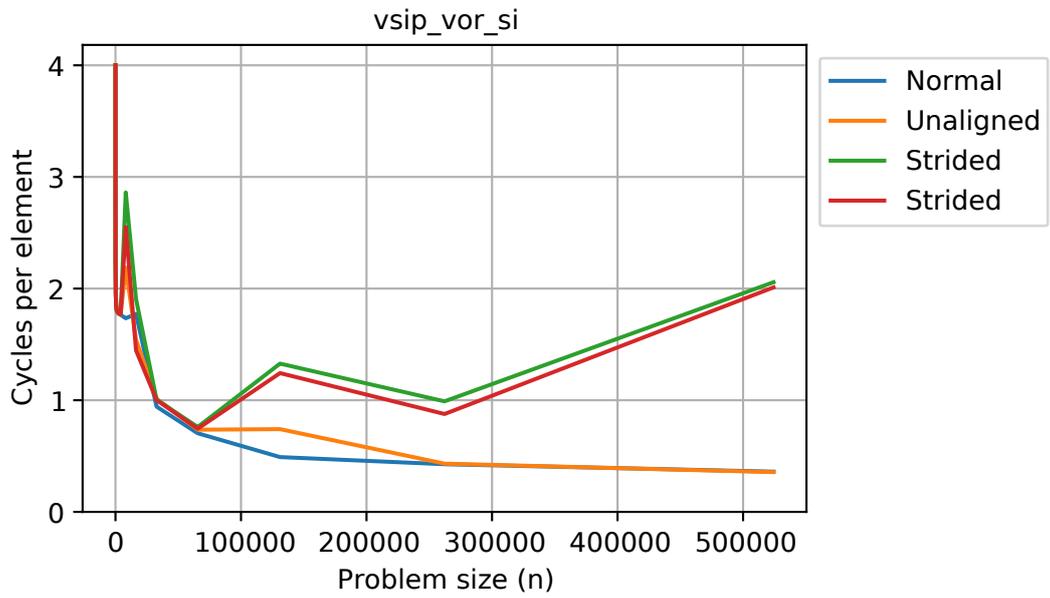
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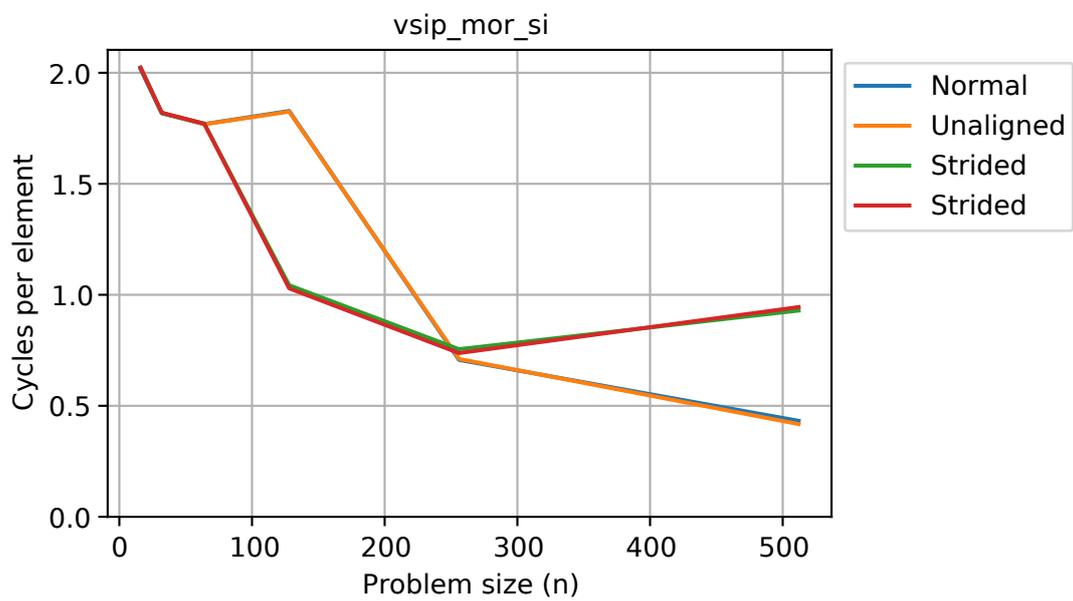
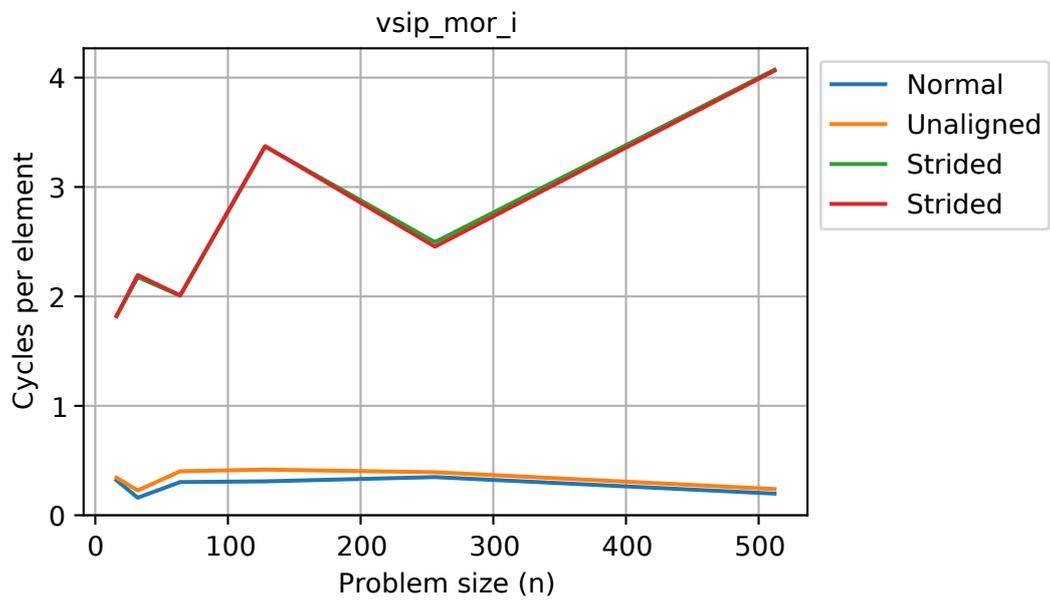


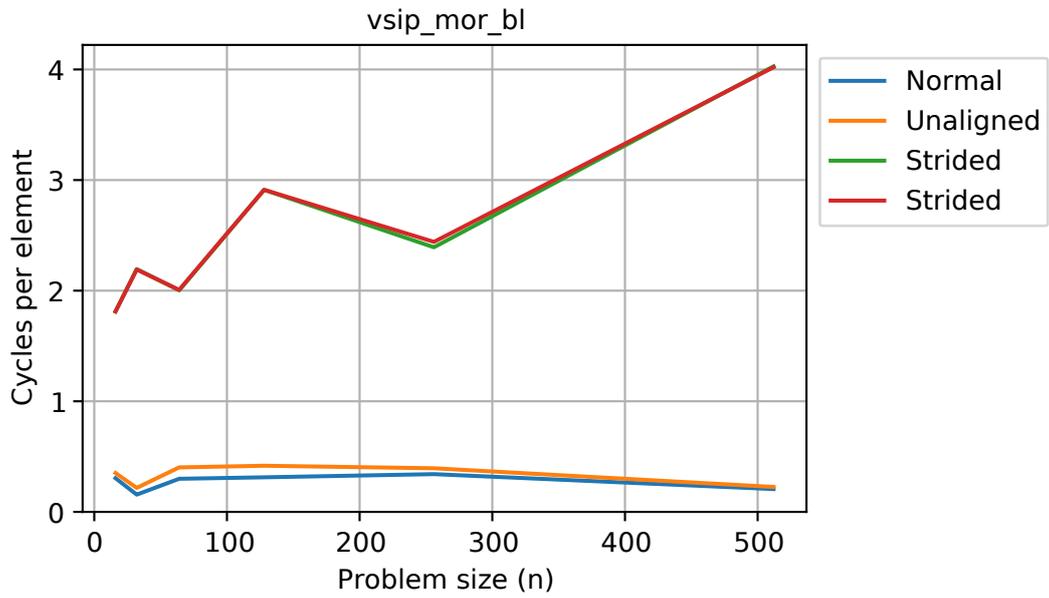
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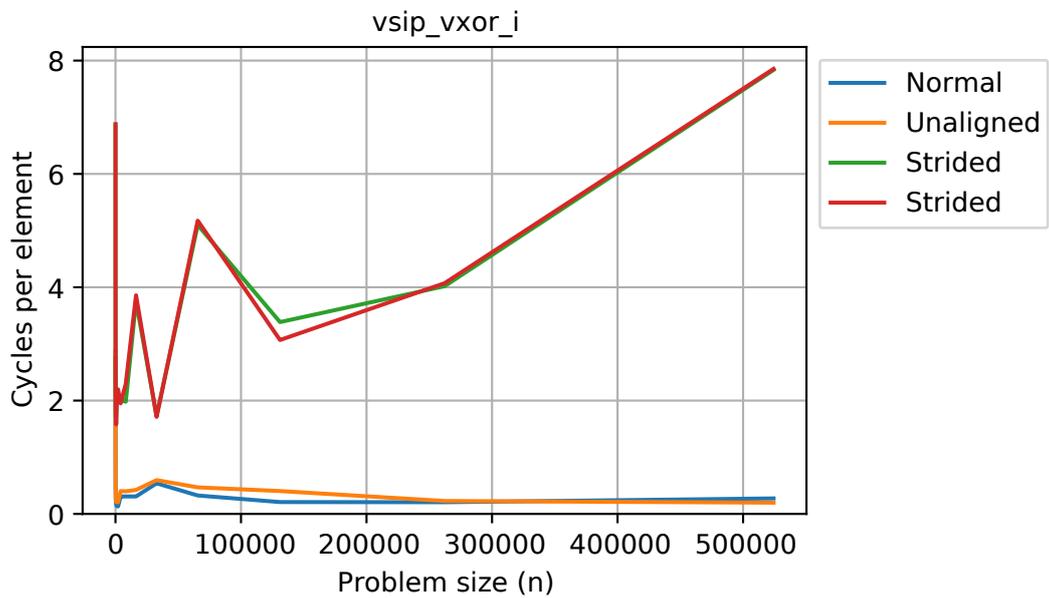


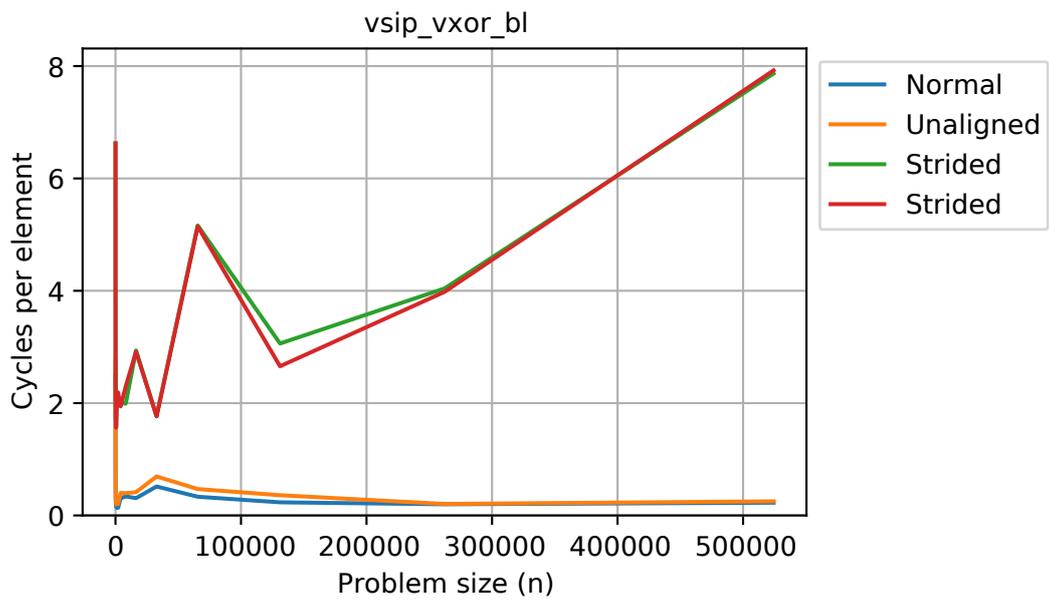
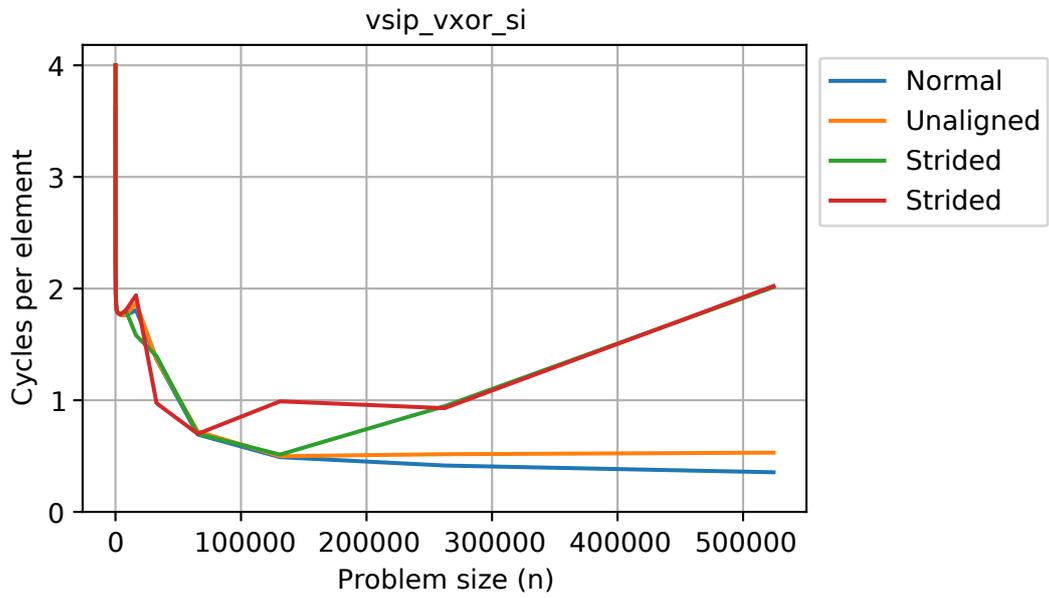
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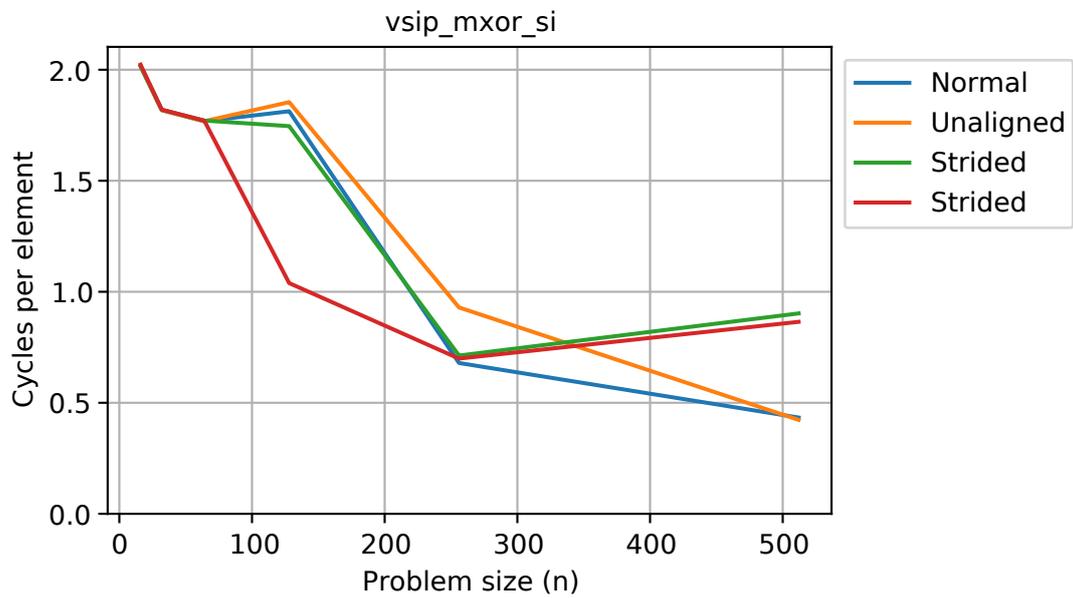
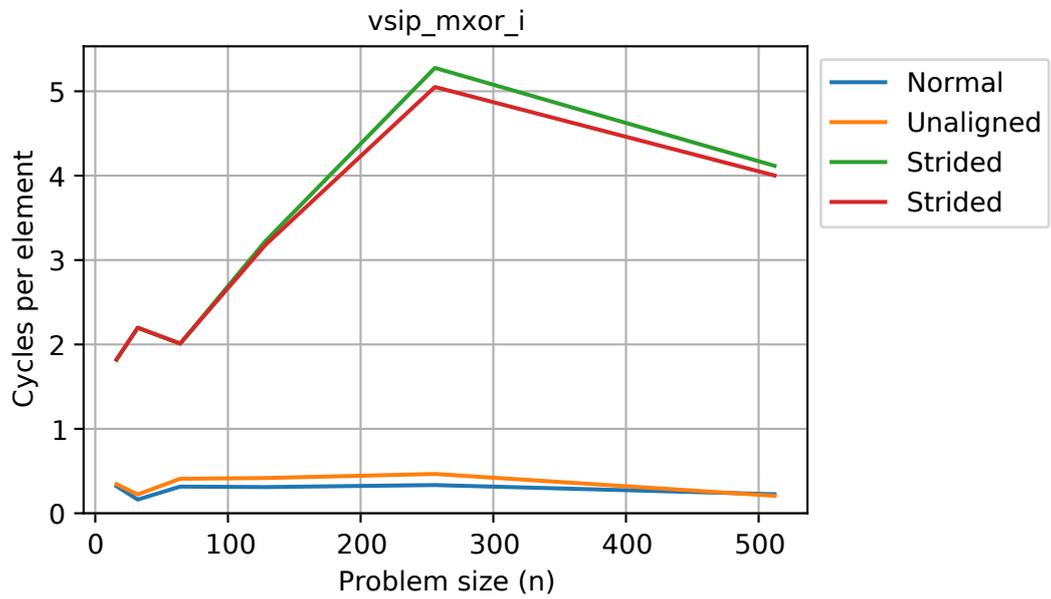


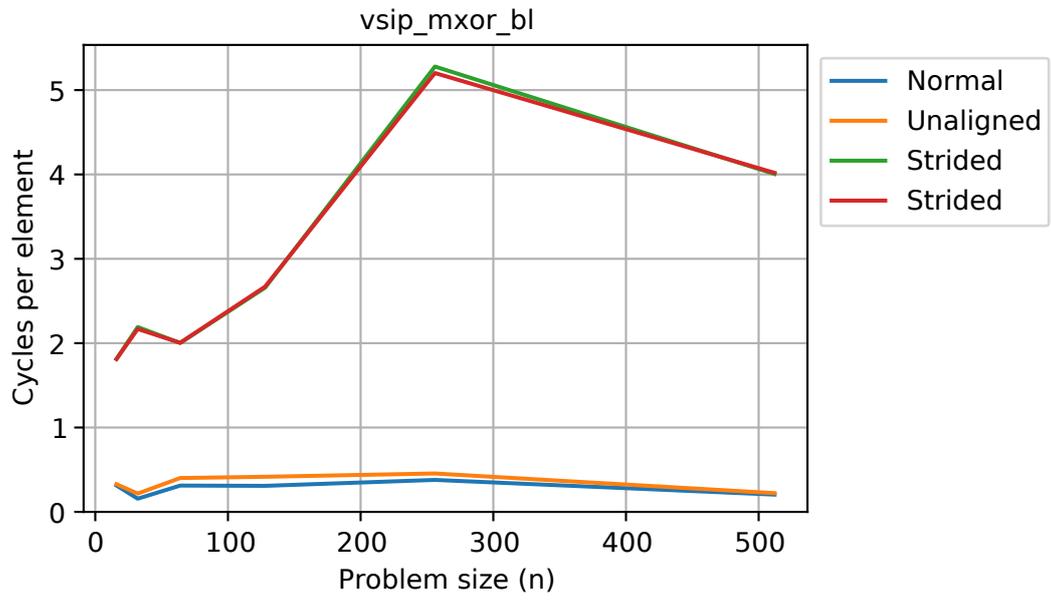
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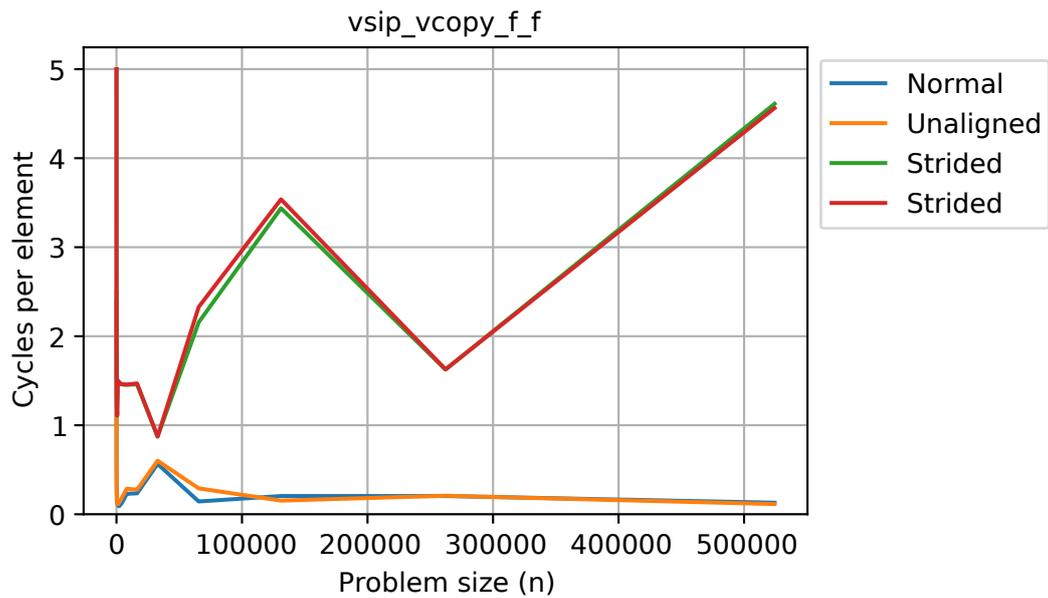


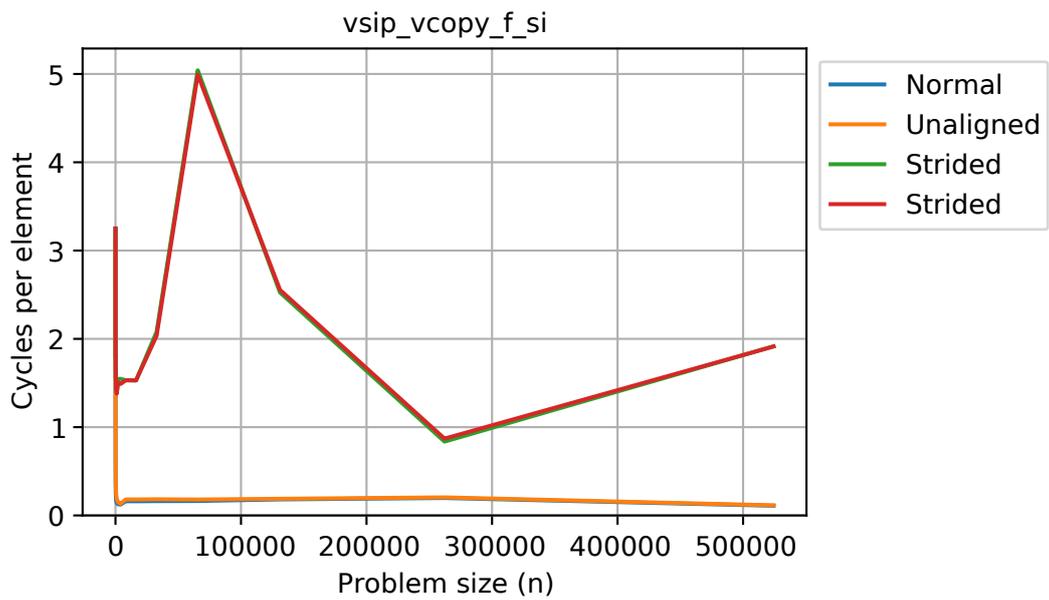
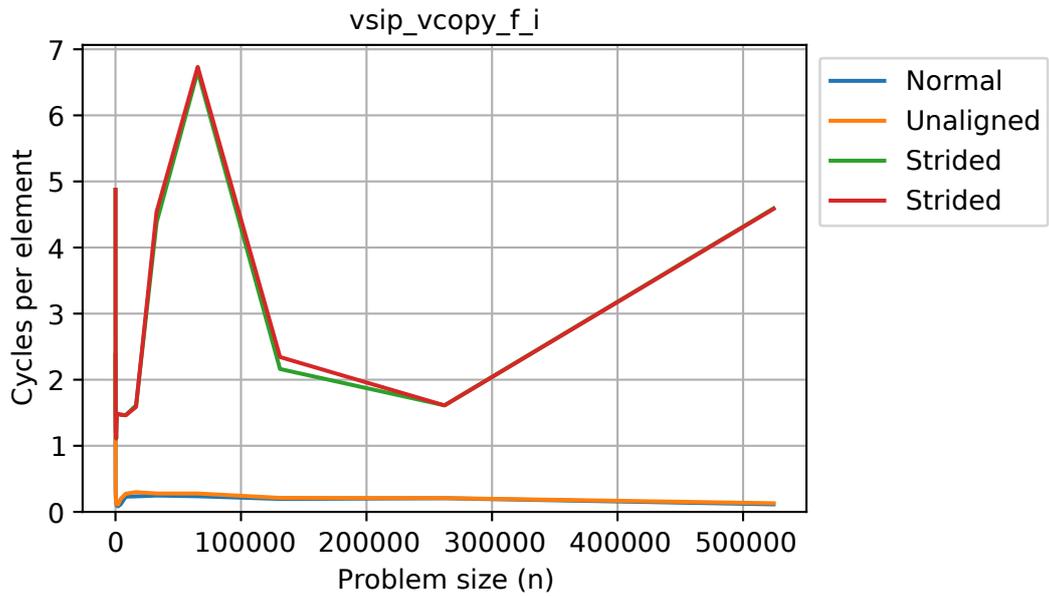


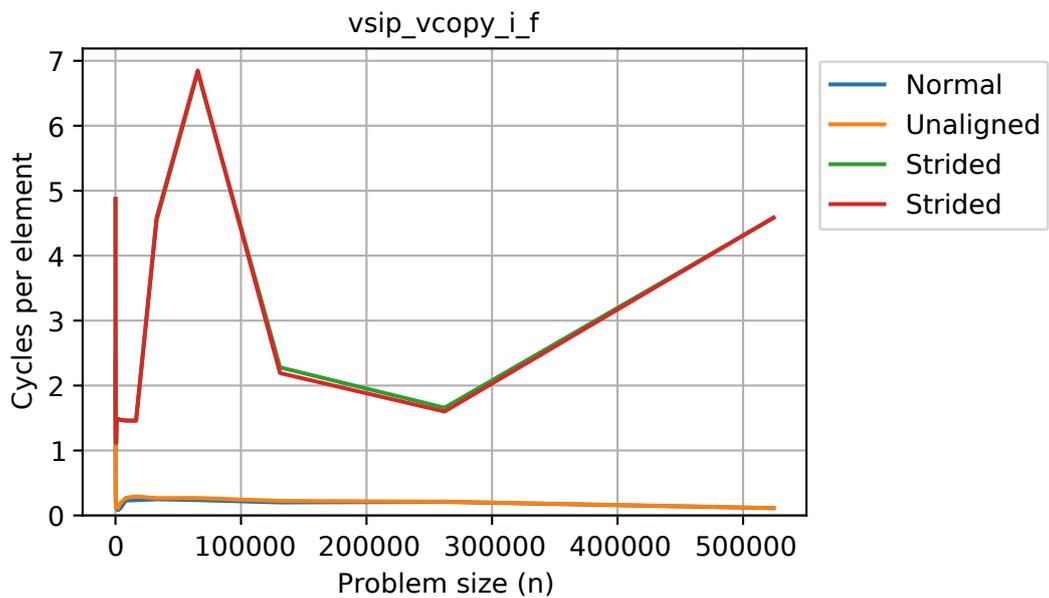
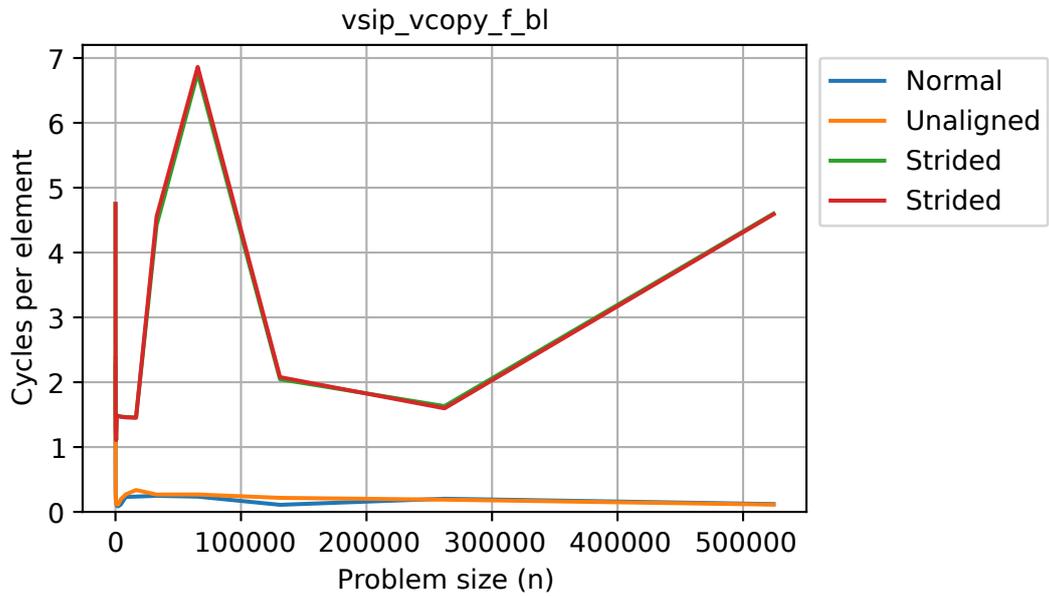
2.8 Element Generation and Copy

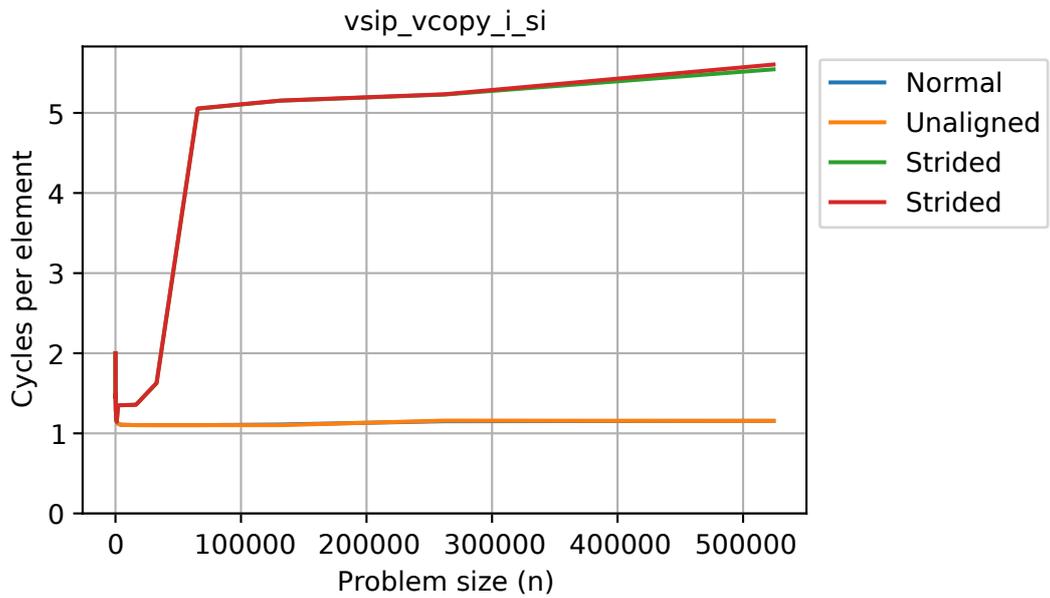
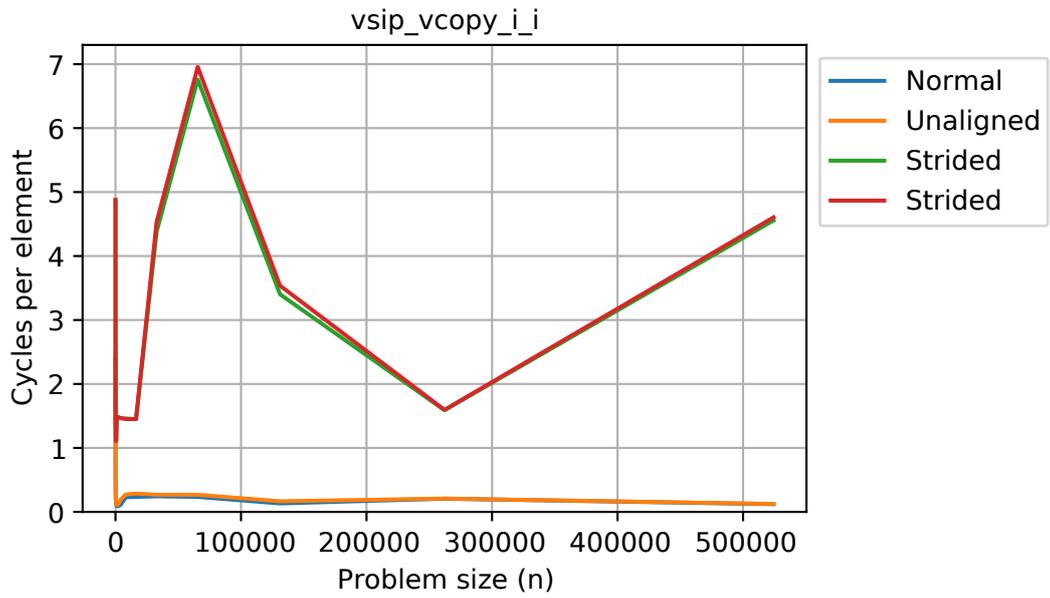
- `vsip_Dvcopy_P_P`
- `vsip_Dvfill_P`
- `vsip_Dmfill_P`
- `vsip_vramp_P`

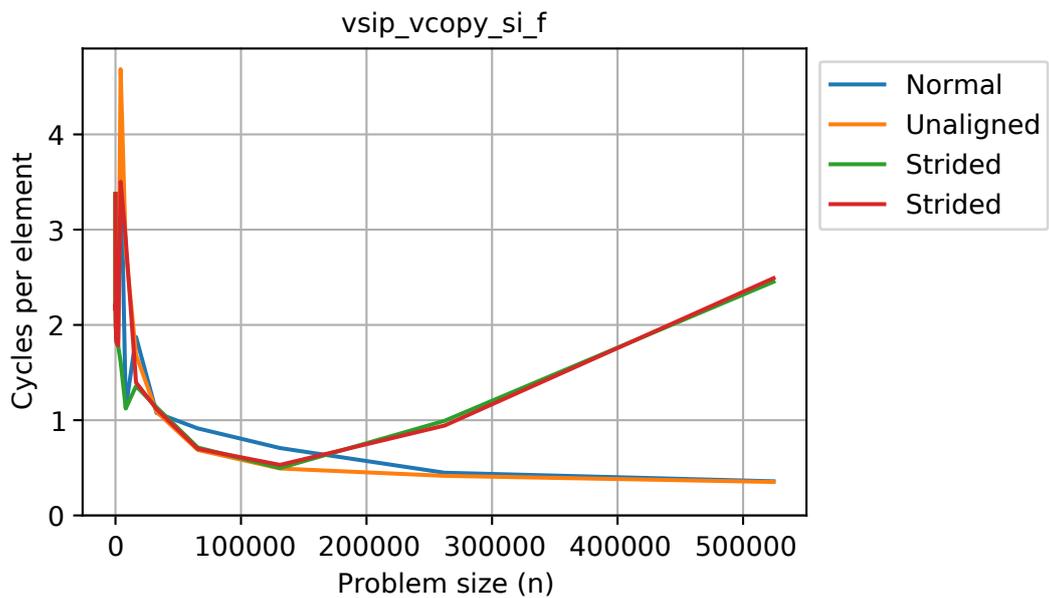
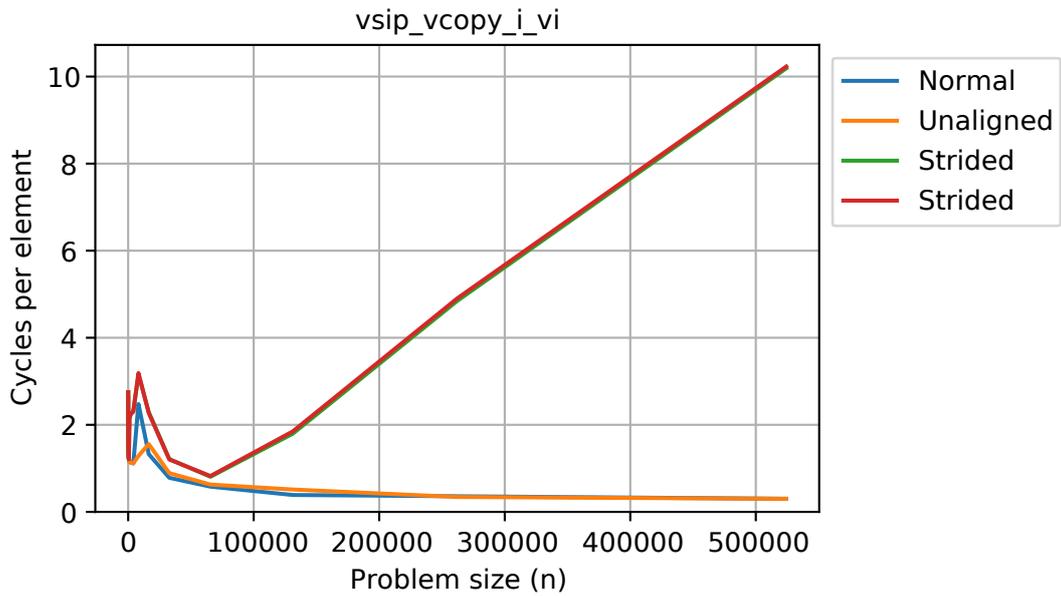
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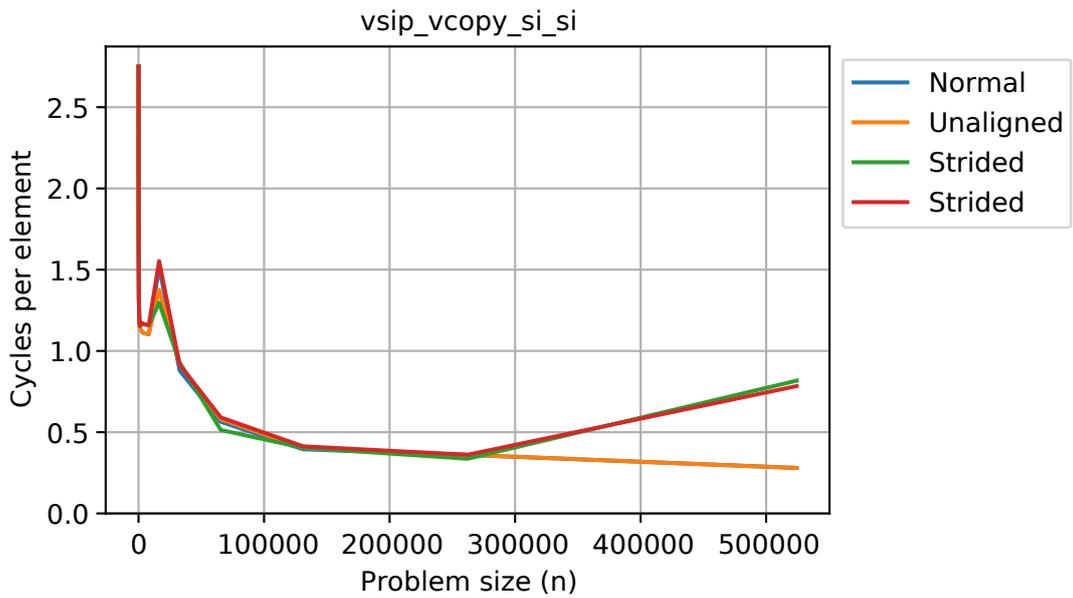
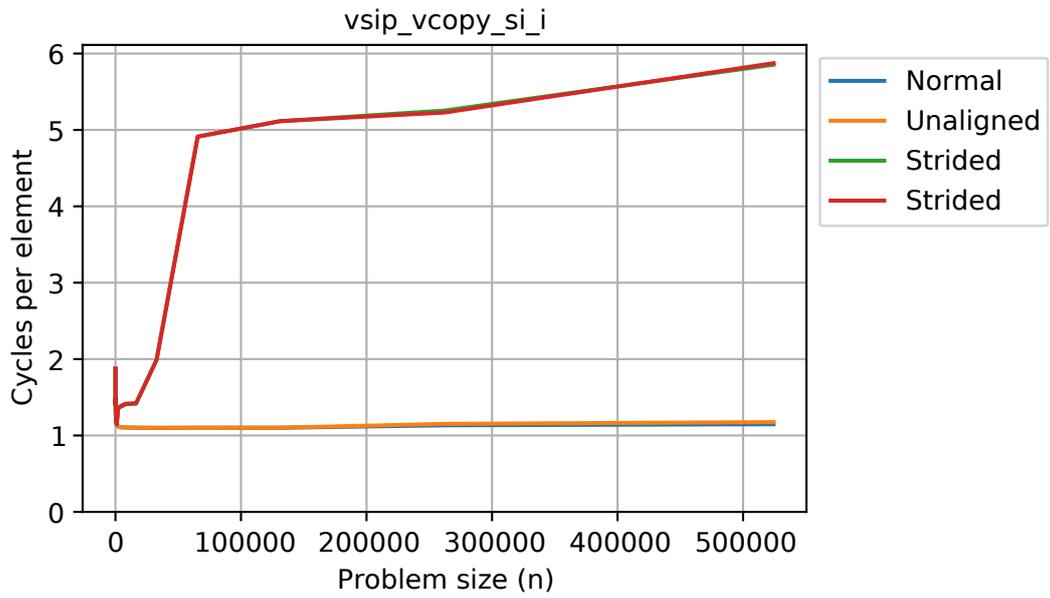


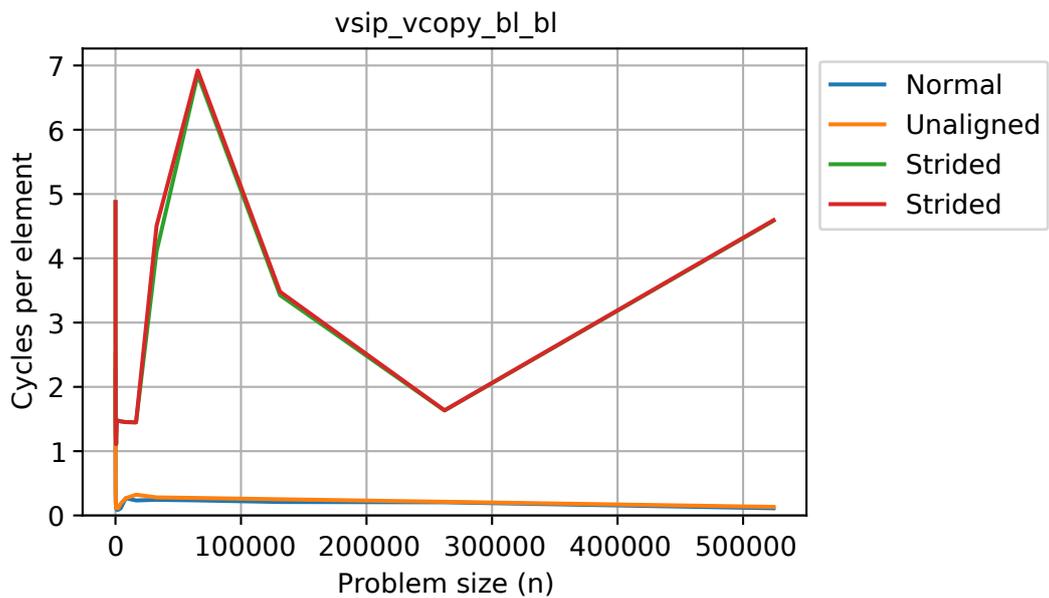
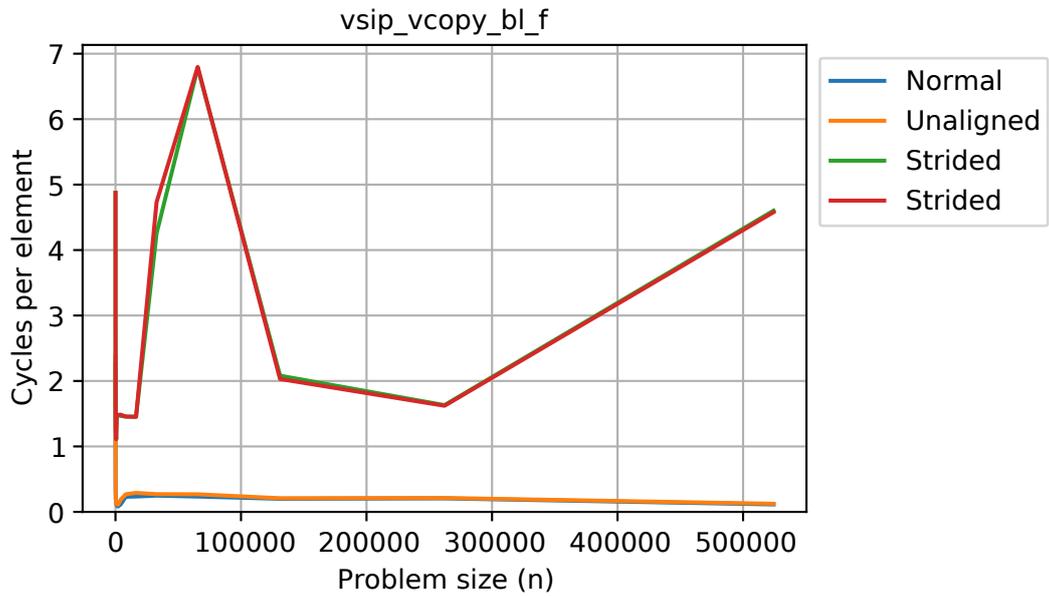


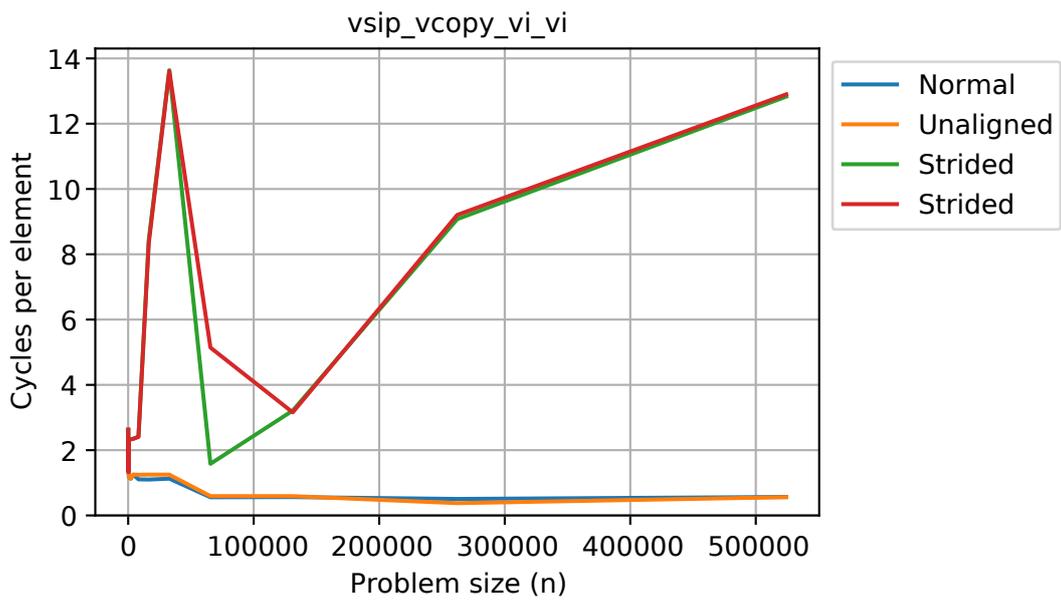
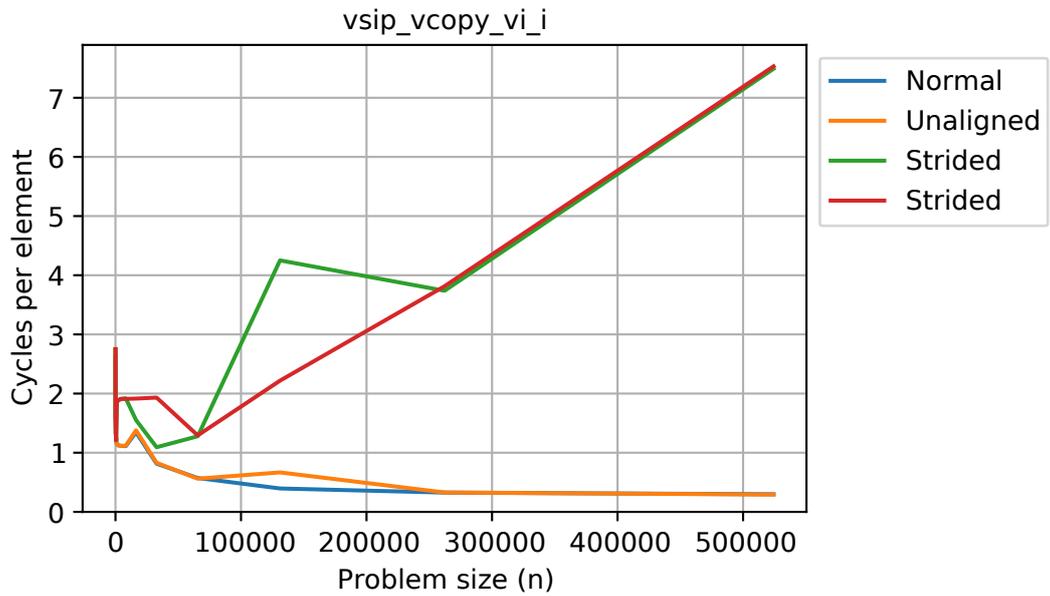


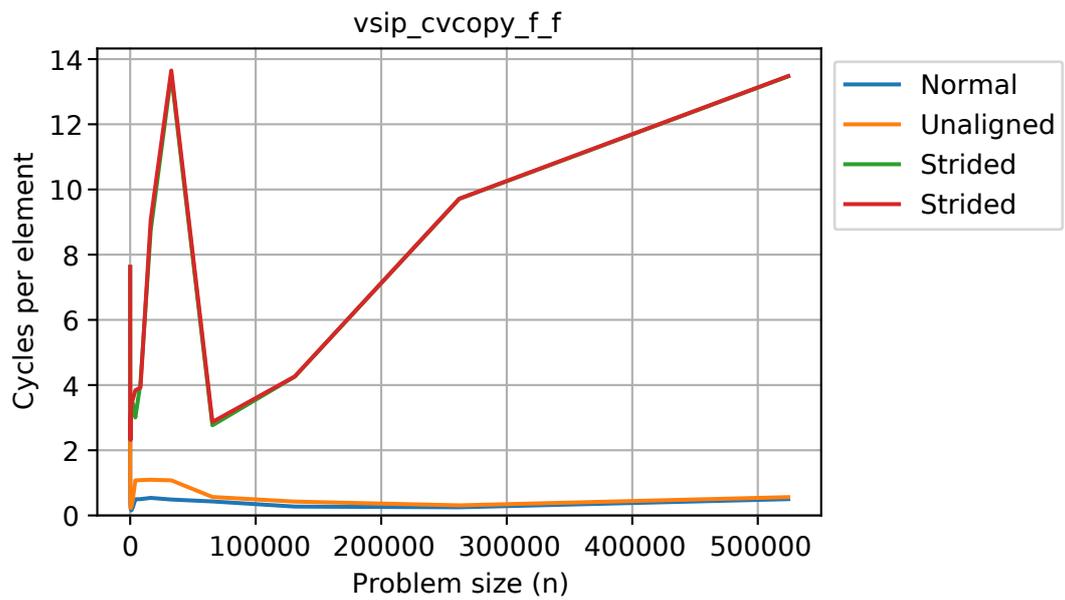
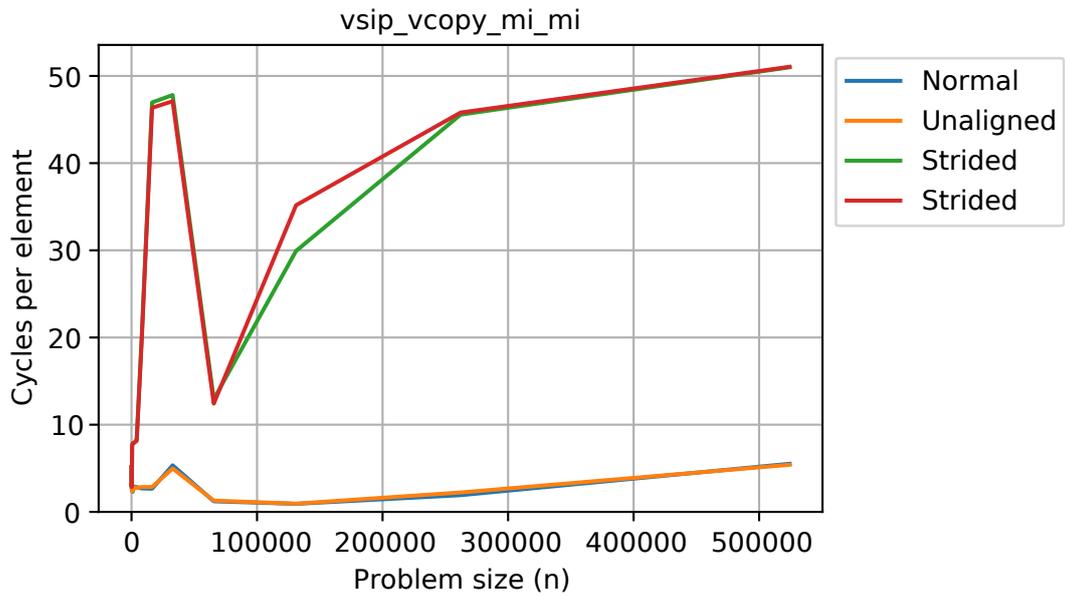


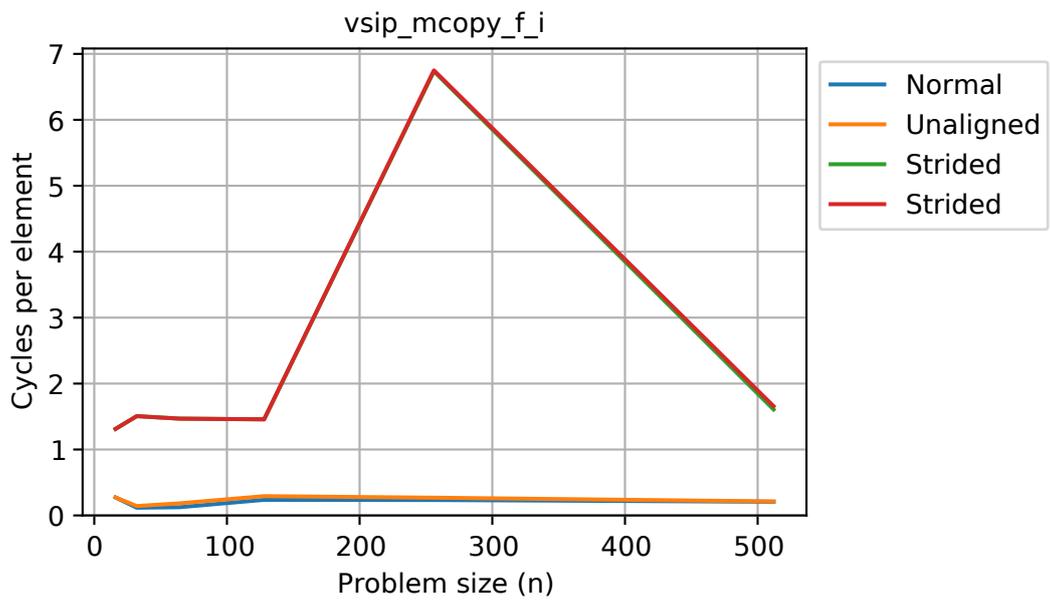
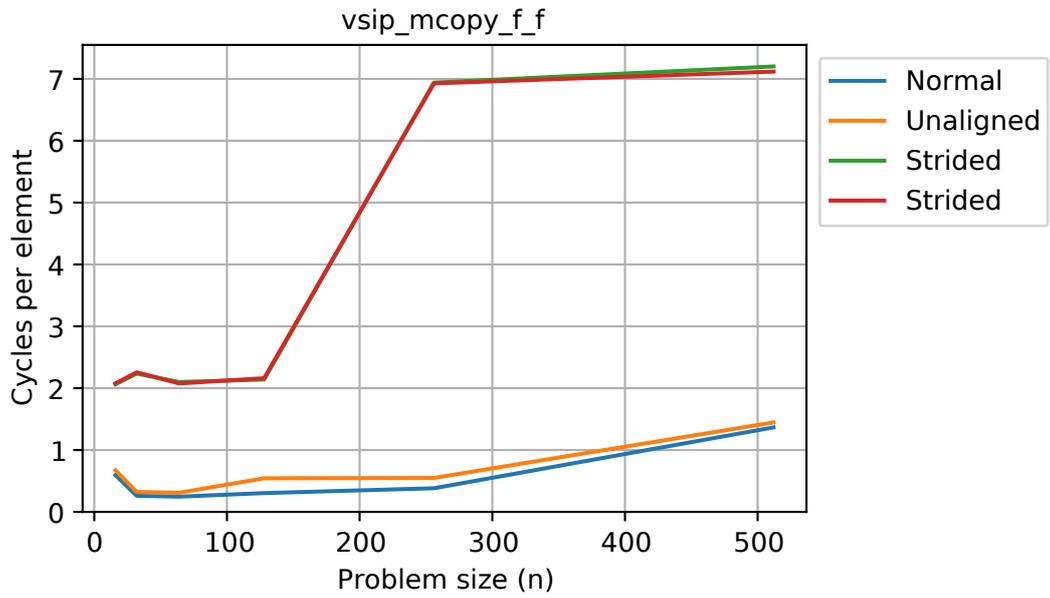


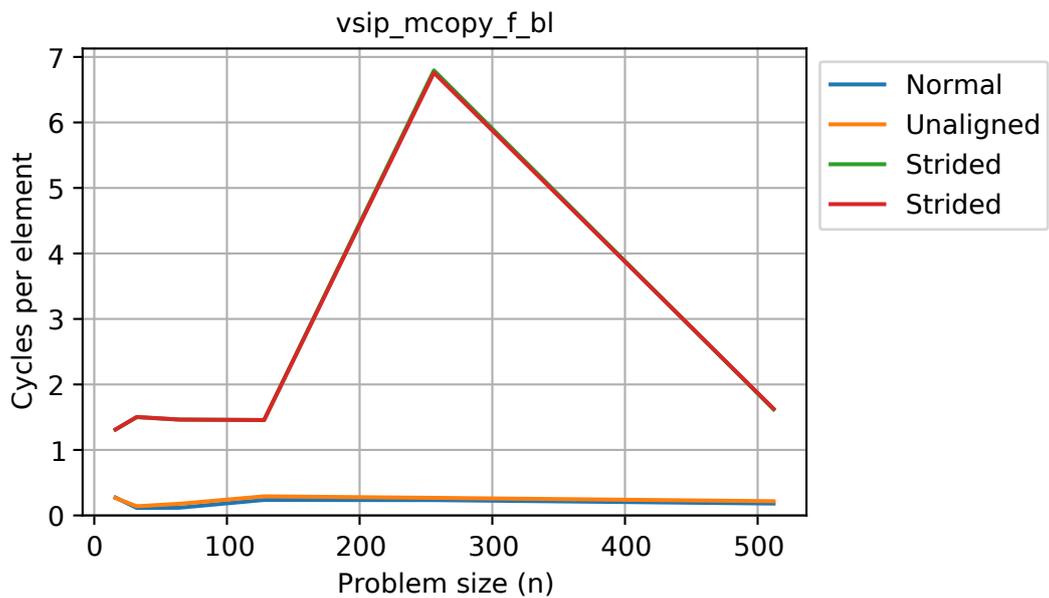
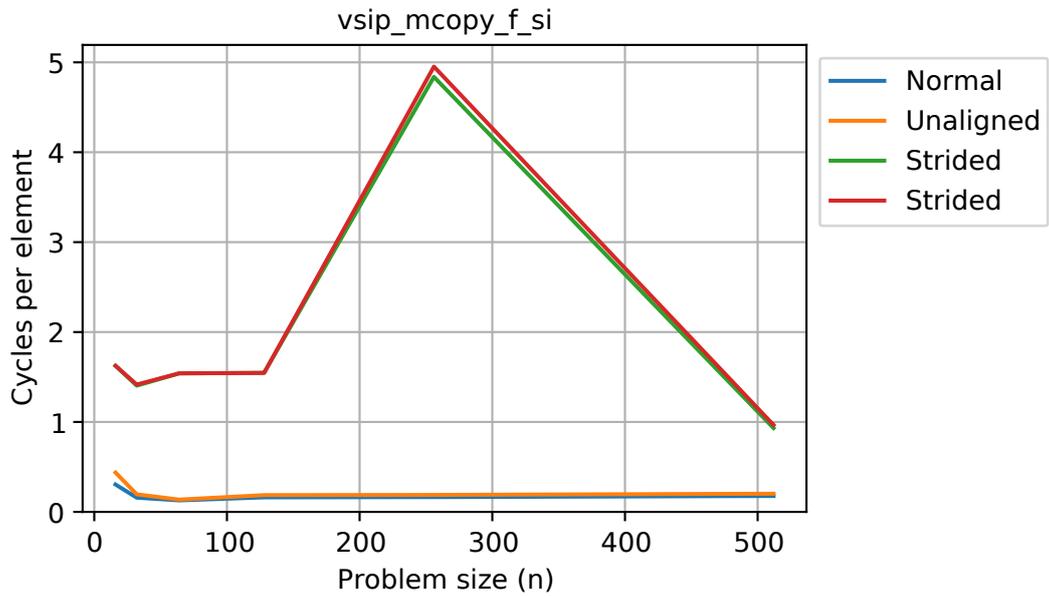


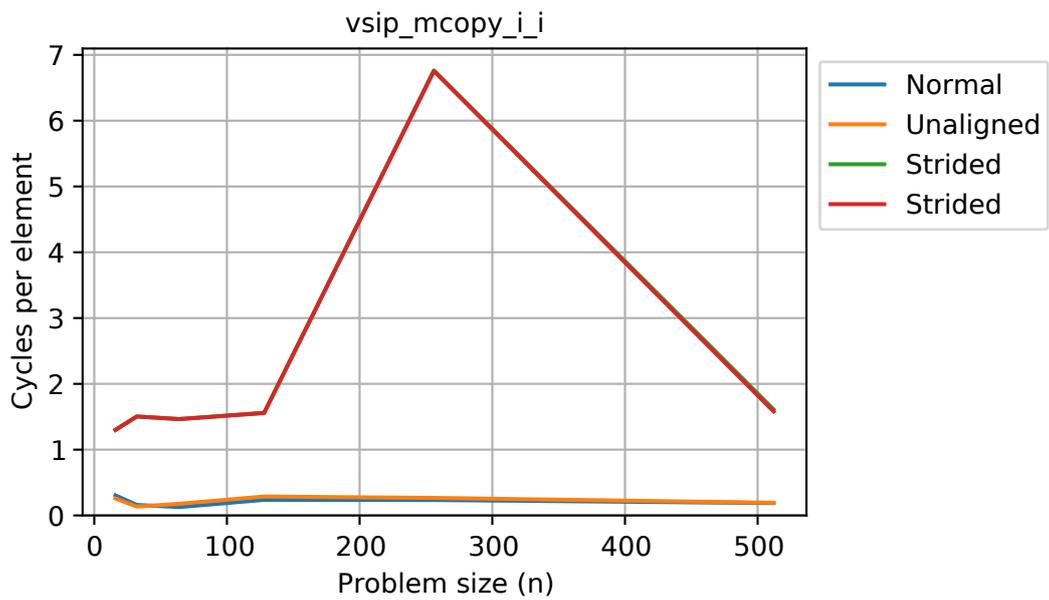
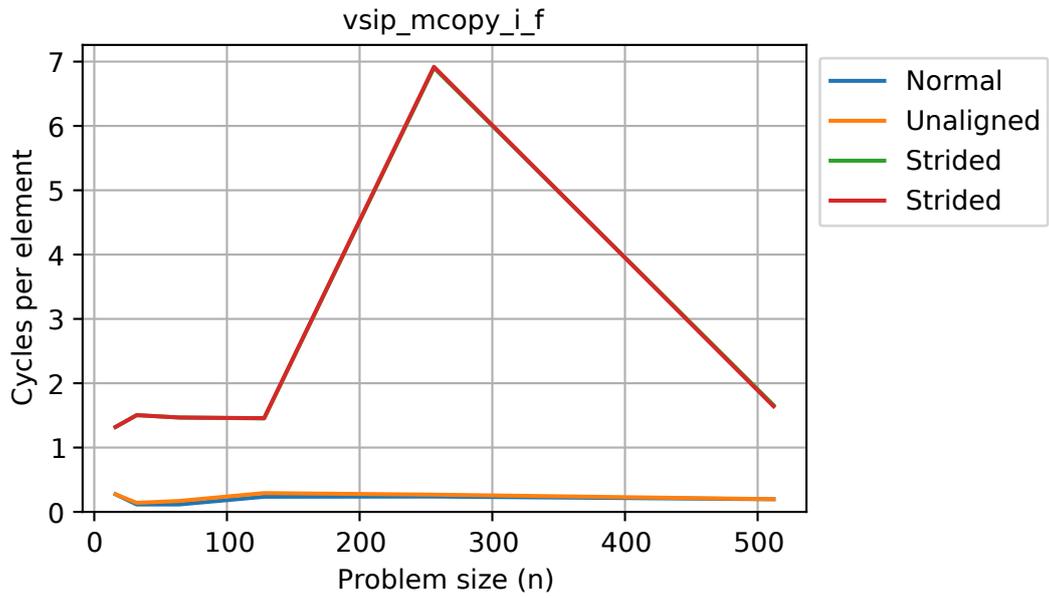


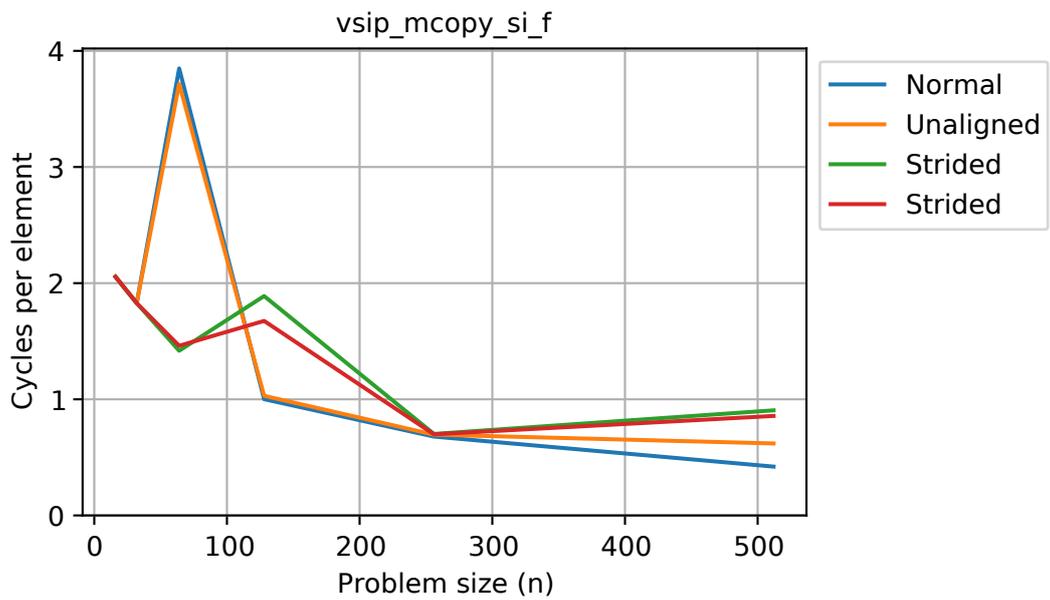
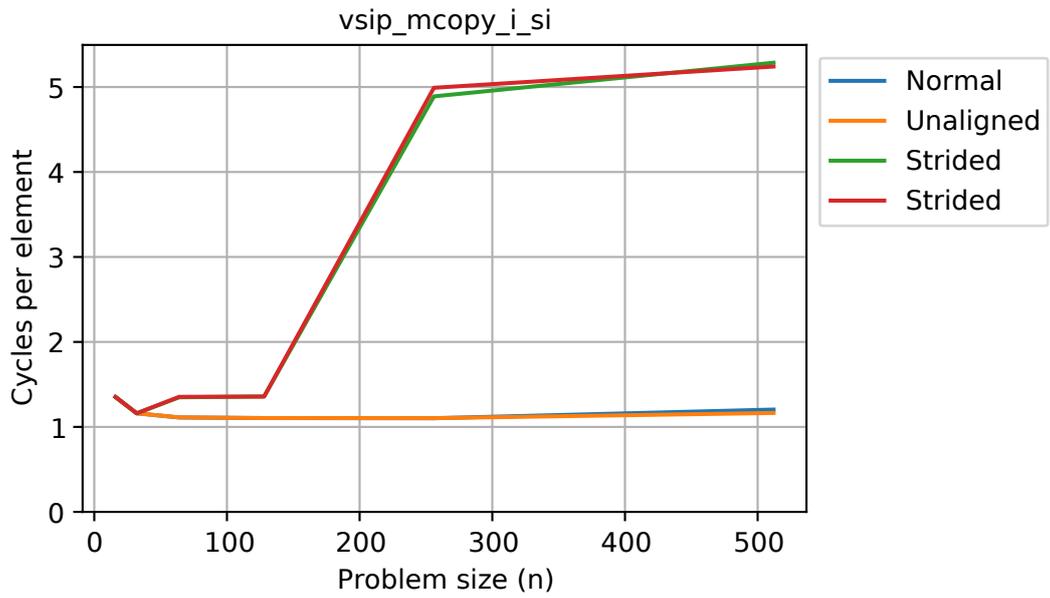


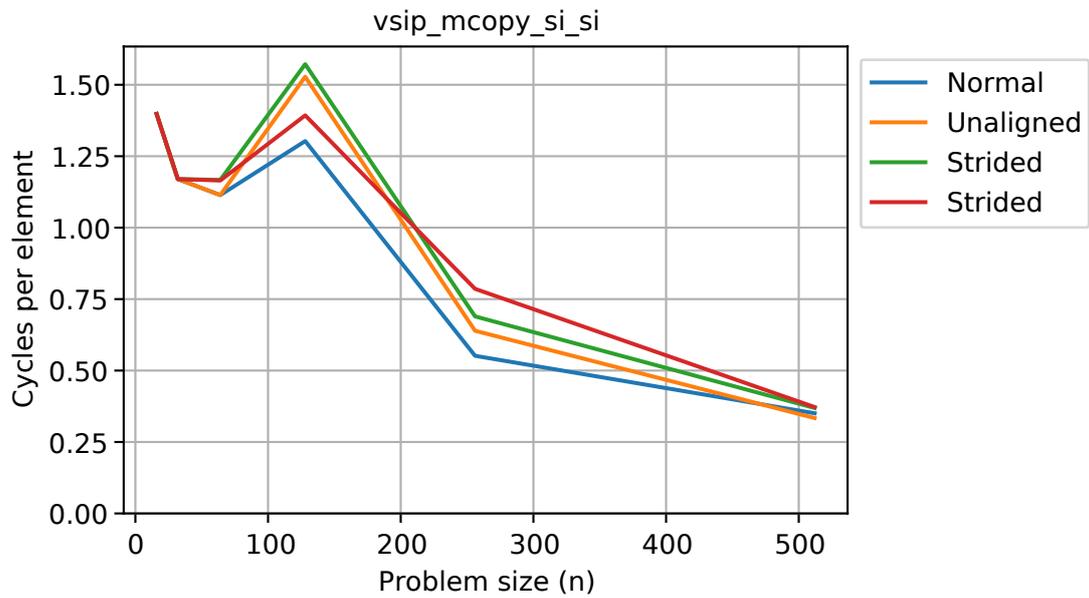
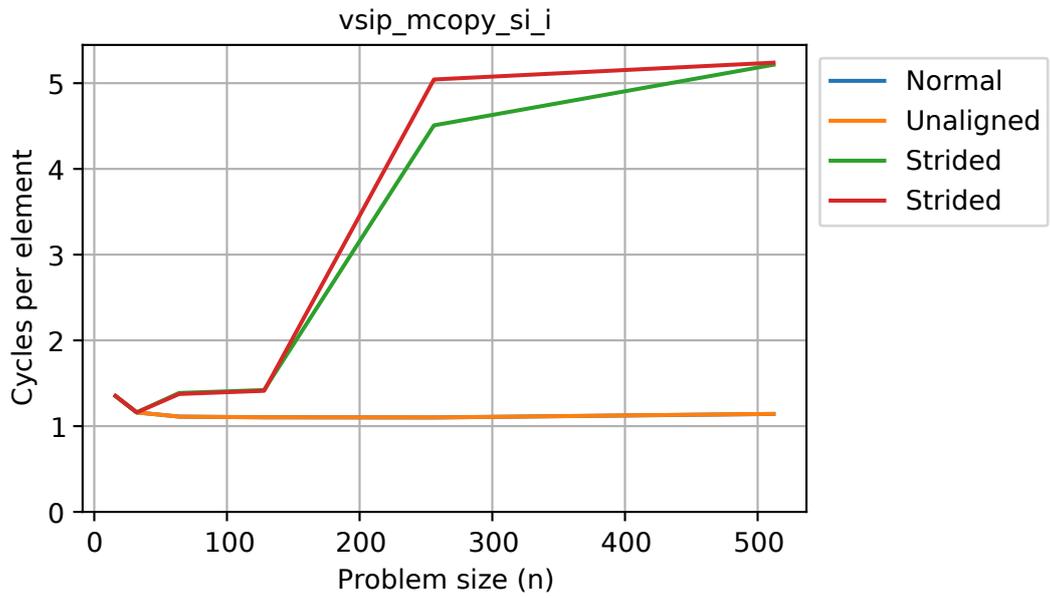


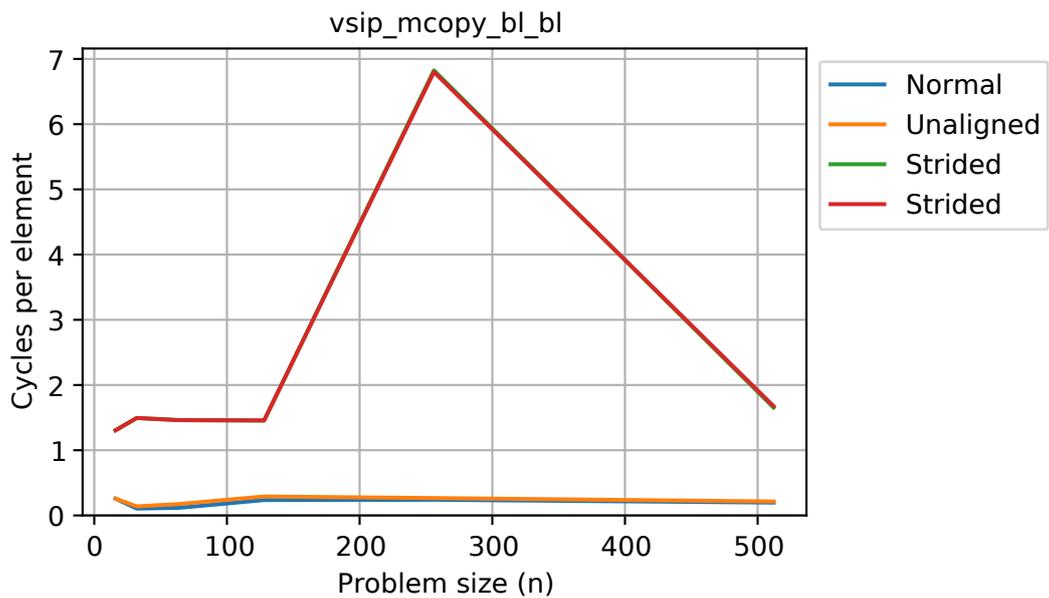
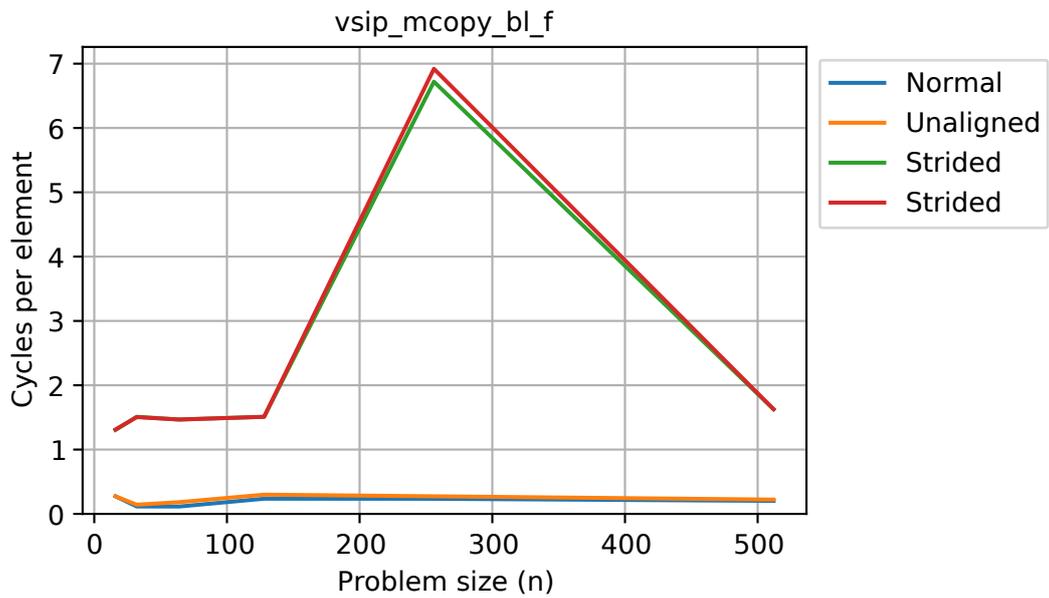


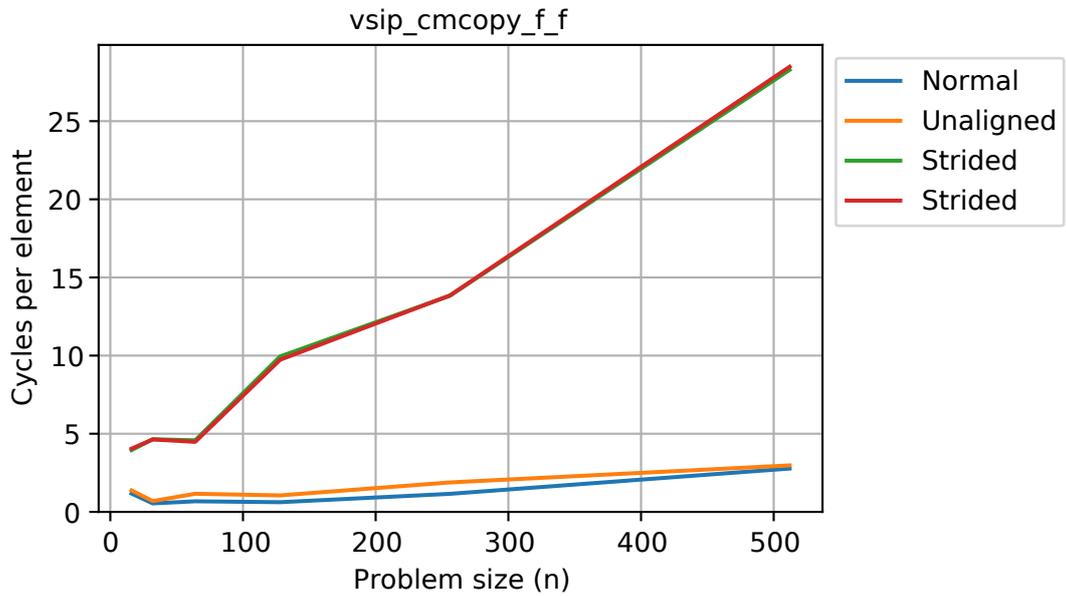




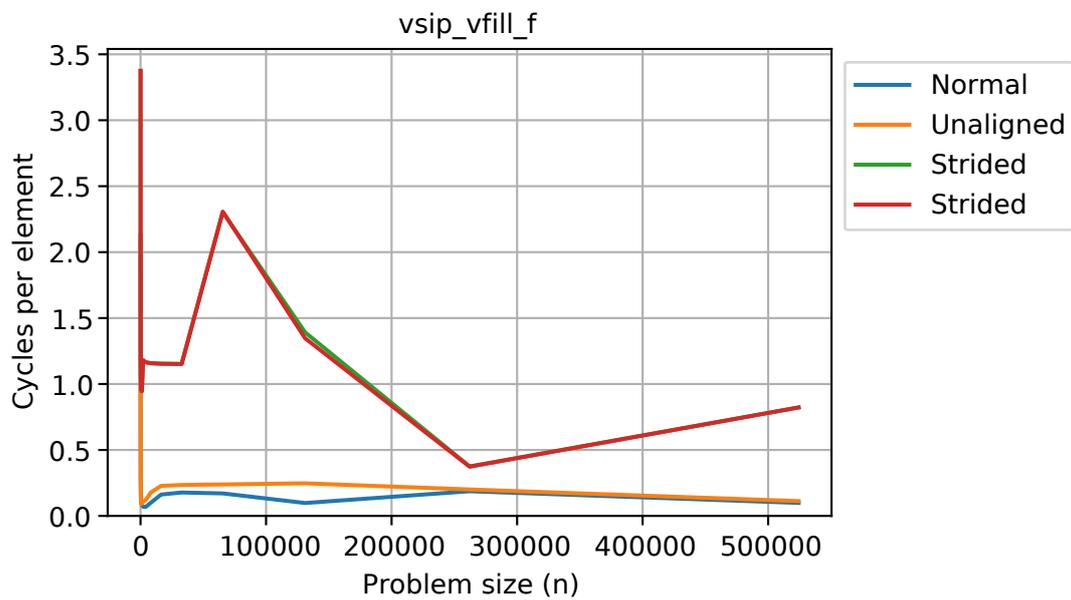


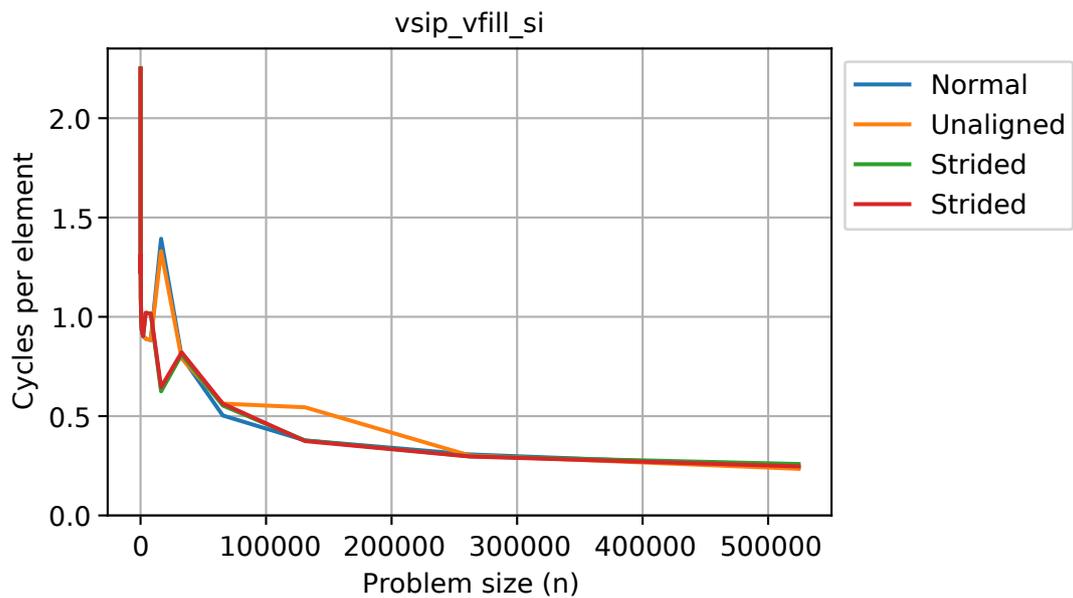
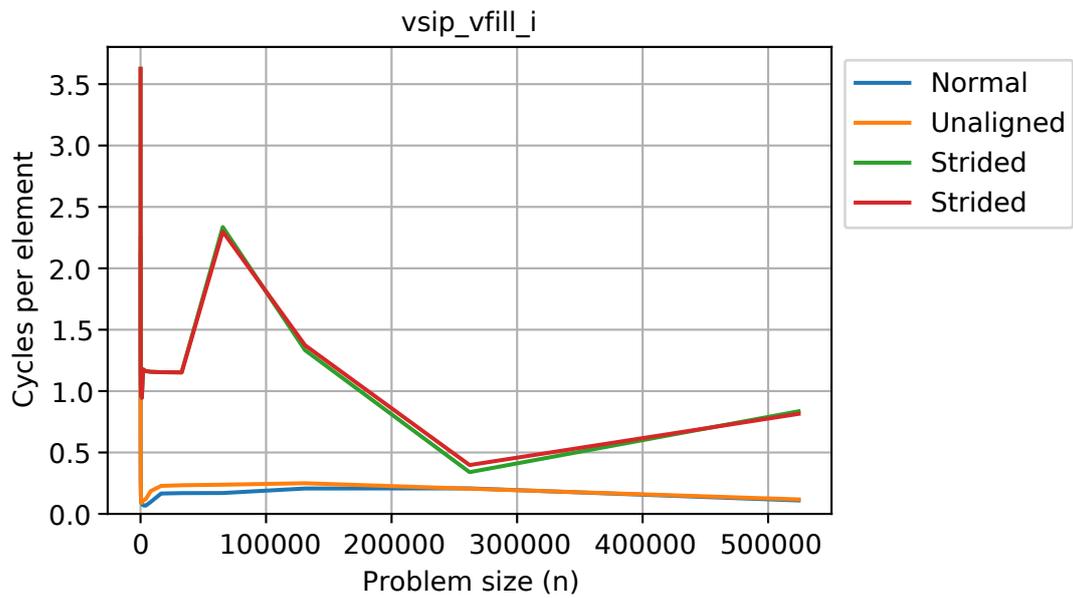


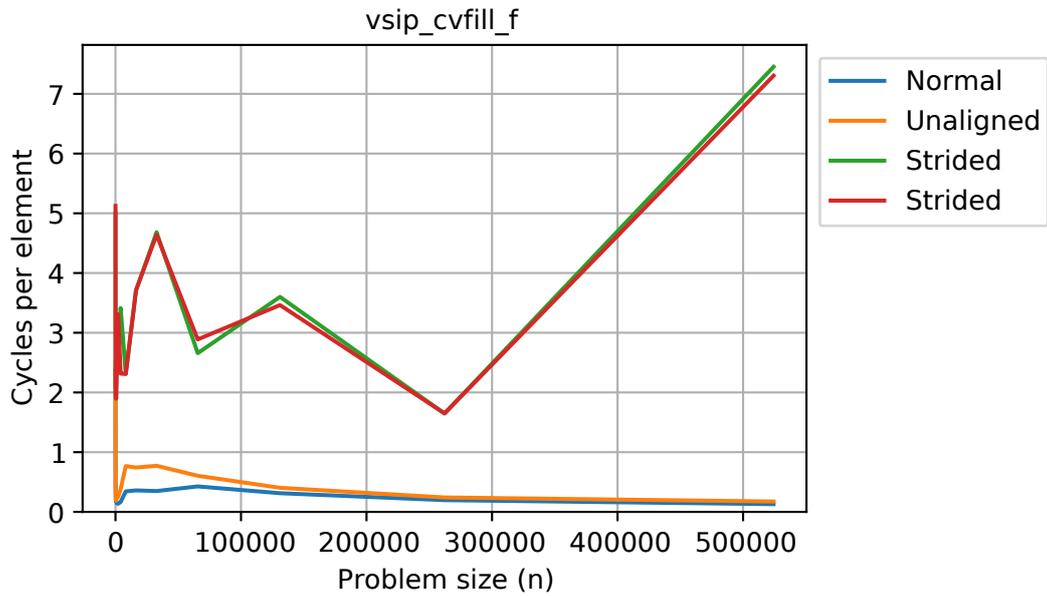




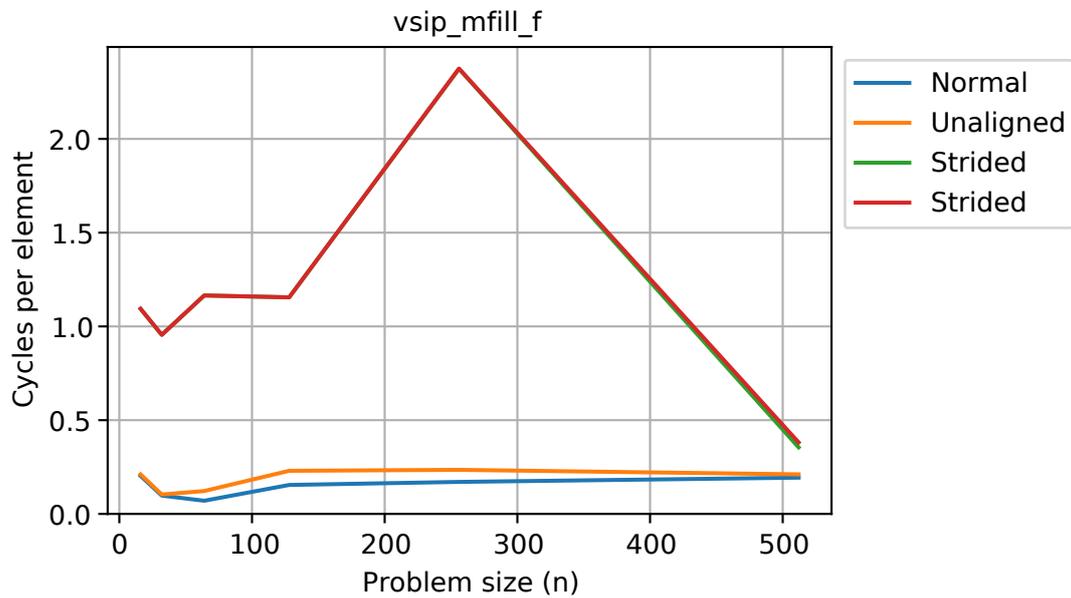
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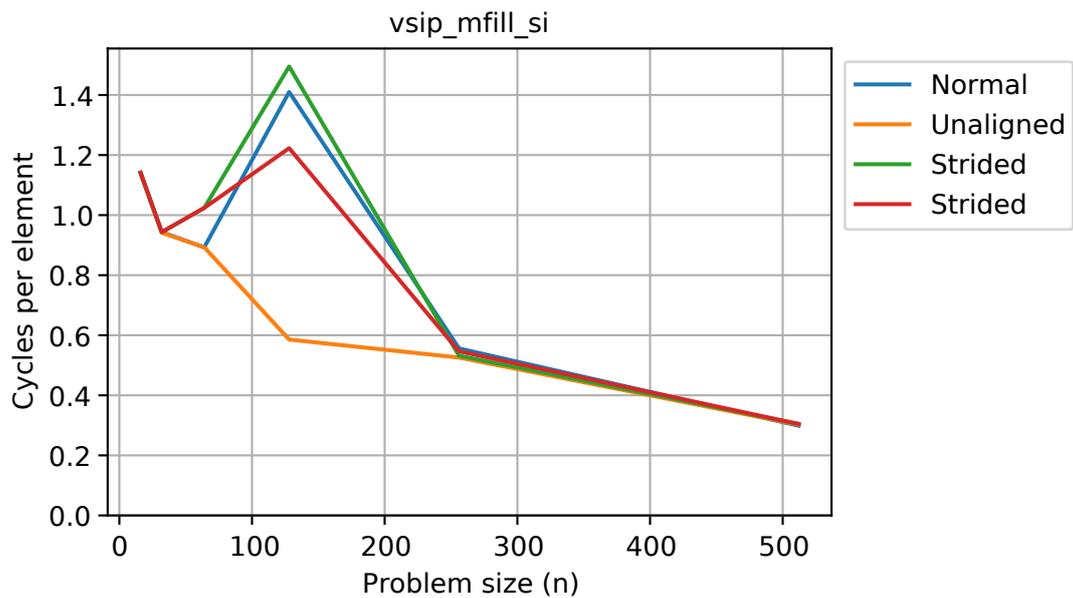
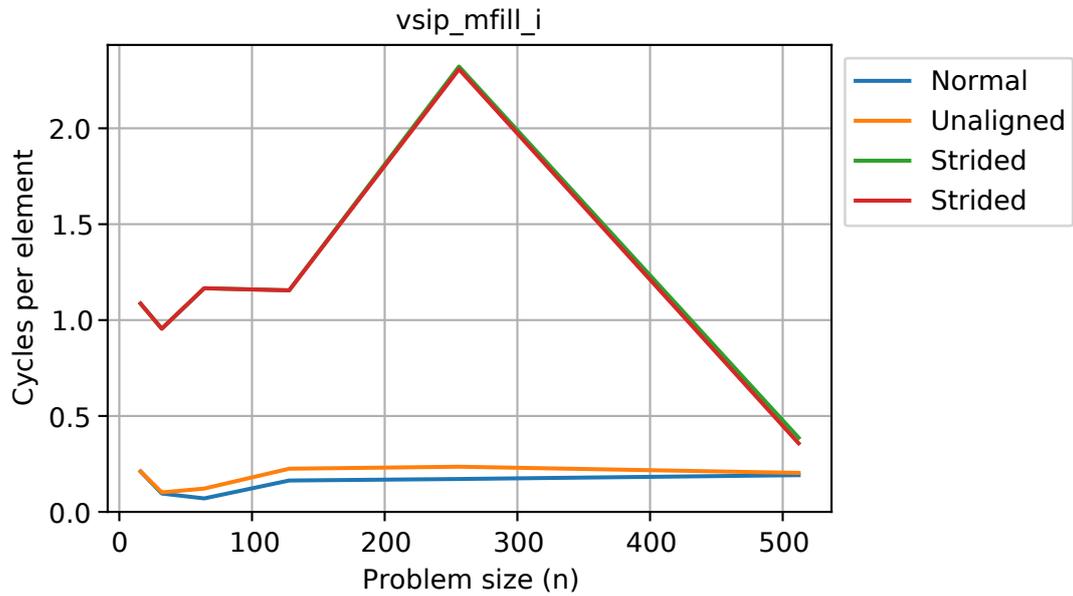


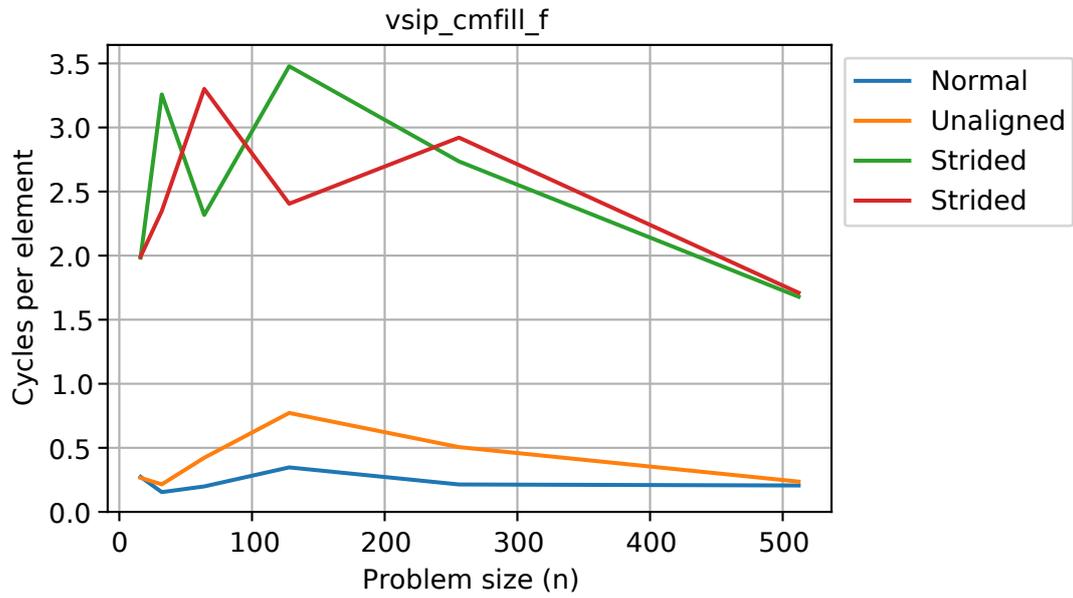




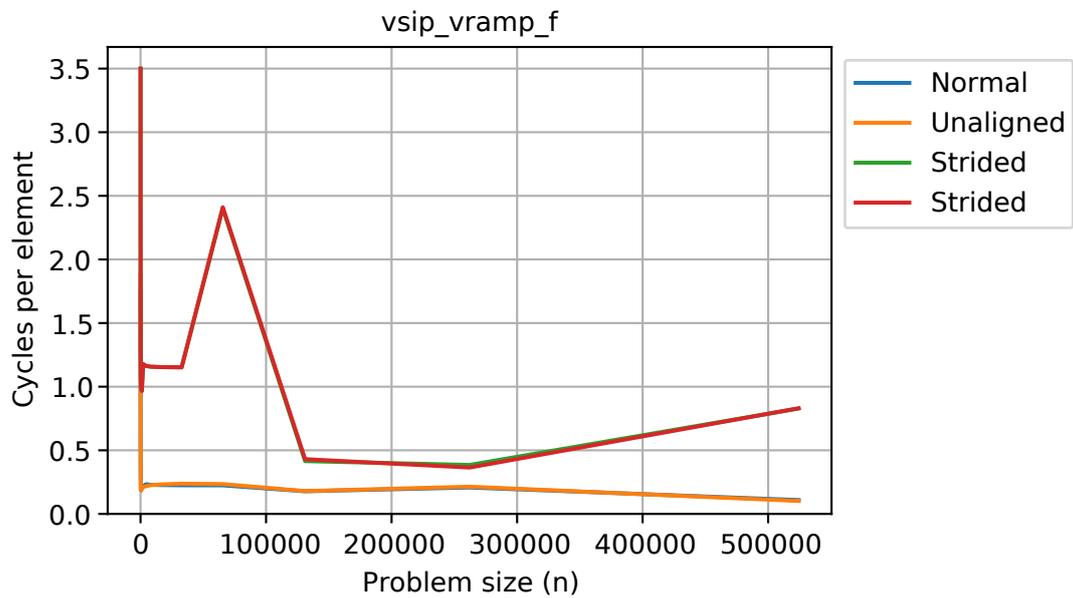
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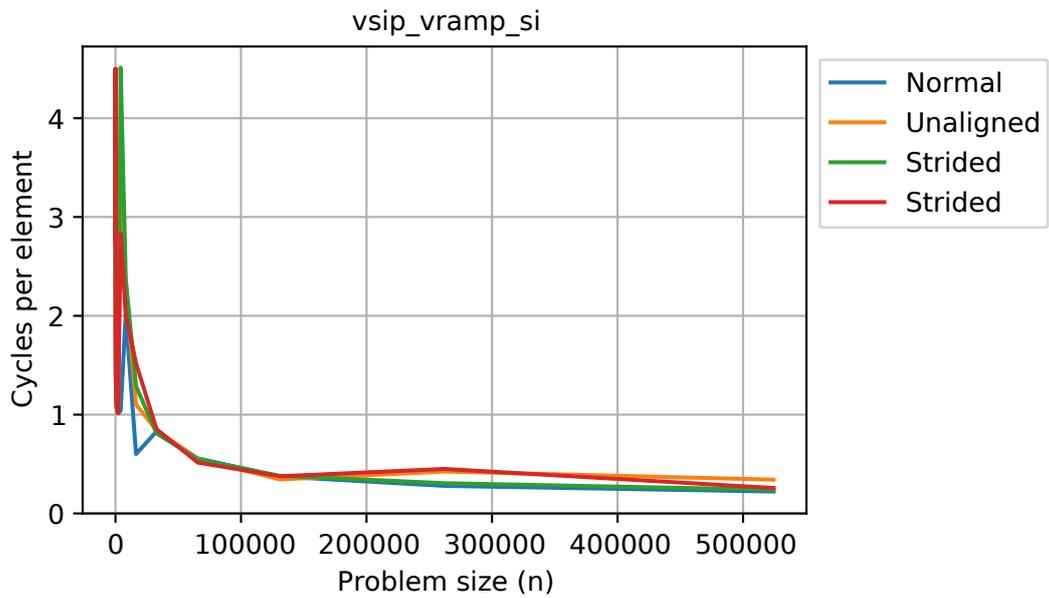
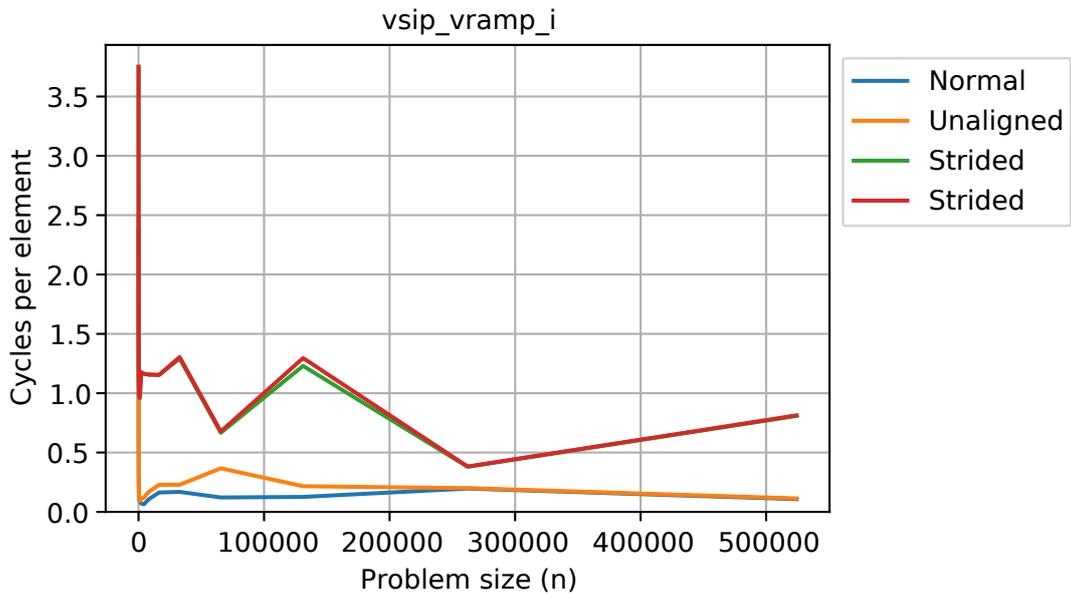






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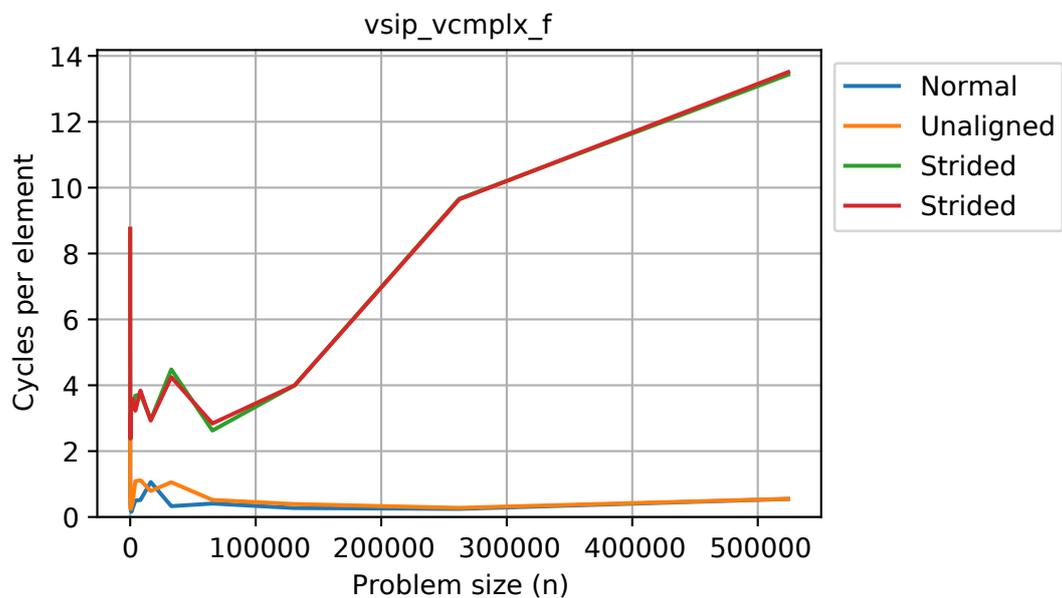


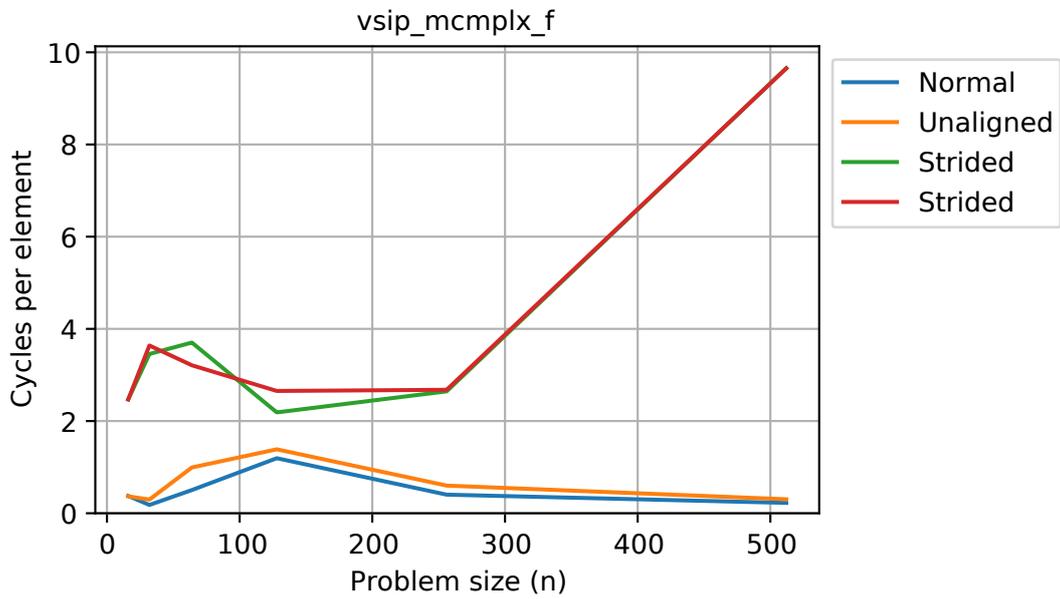
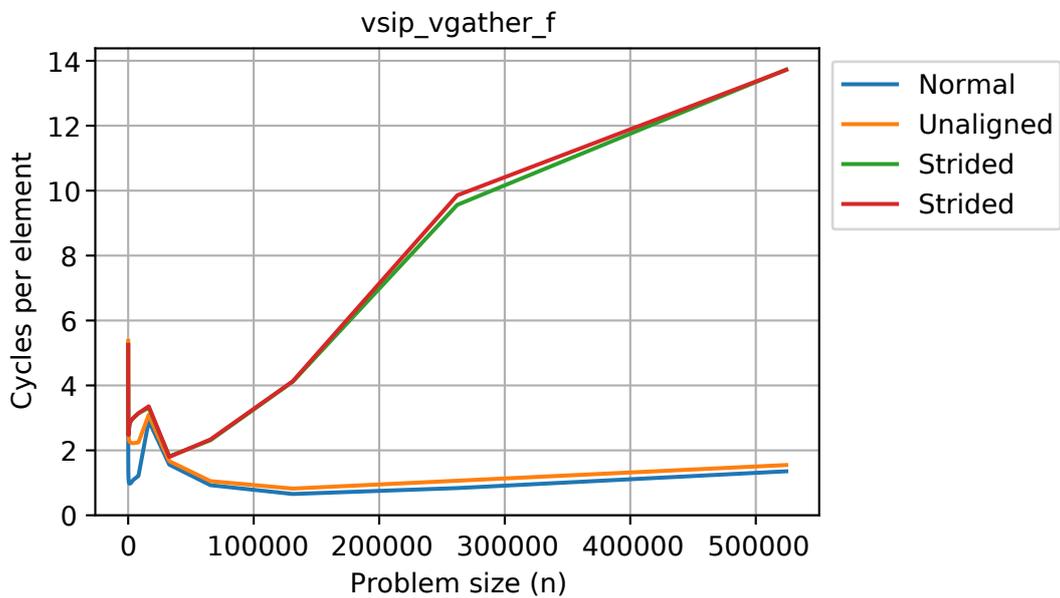


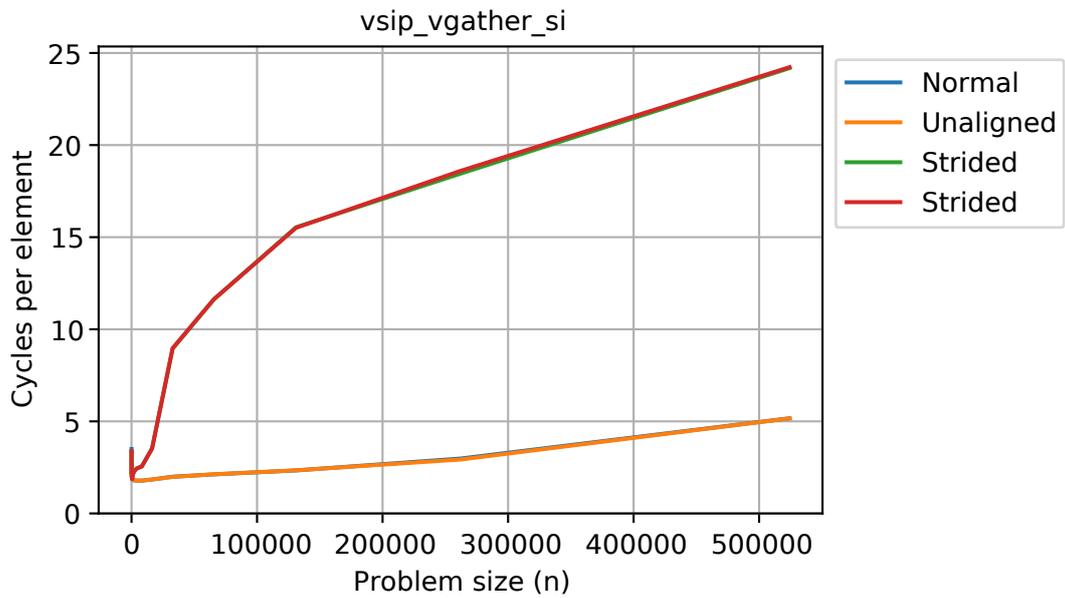
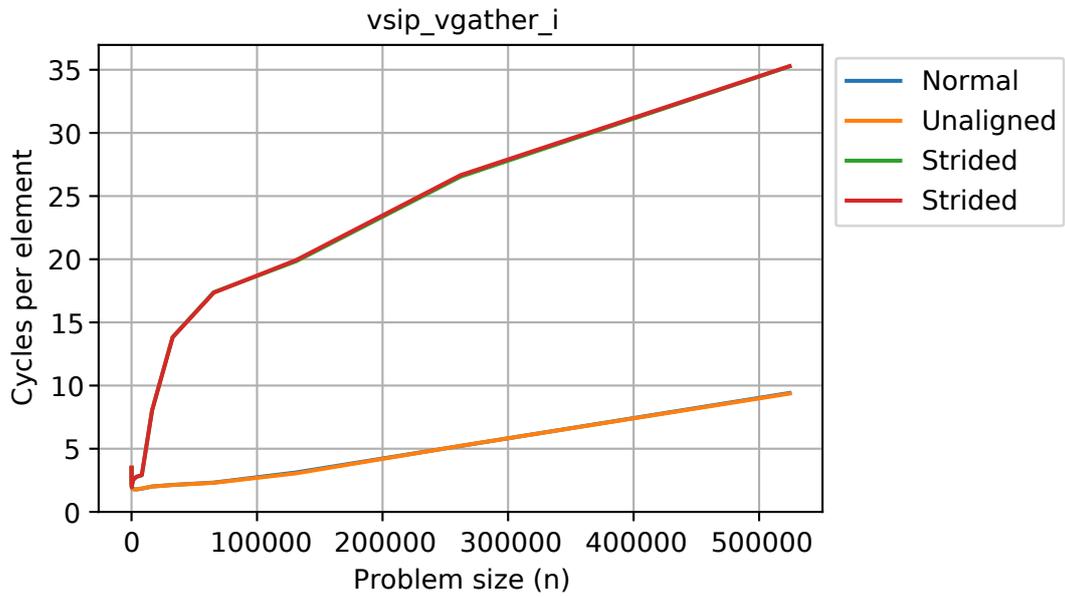
2.9 Manipulation Operations

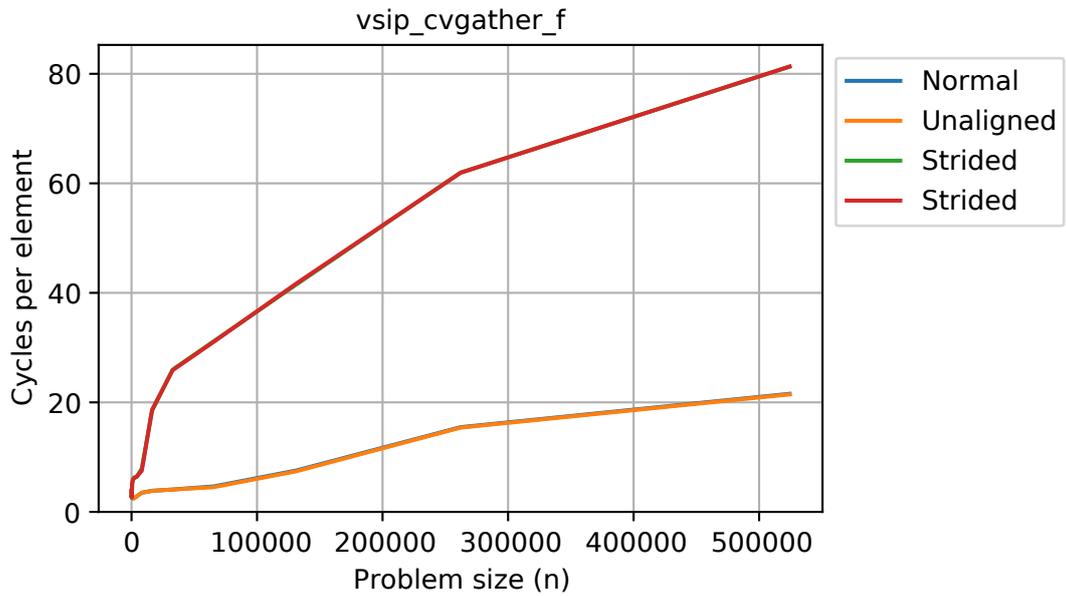
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- `vsip_mcplx_f`
- `vsip_Dvgather_P`
- `vsip_Dmgather_P`
- `vsip_vimag_f`
- `vsip_mimag_f`
- `vsip_vpolar_f`
- `vsip_mpolar_f`
- `vsip_vreal_f`
- `vsip_mreal_f`
- `vsip_vrect_f`
- `vsip_mrect_f`
- `vsip_Dvscatter_P`
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- `vsip_Dvswap_P`
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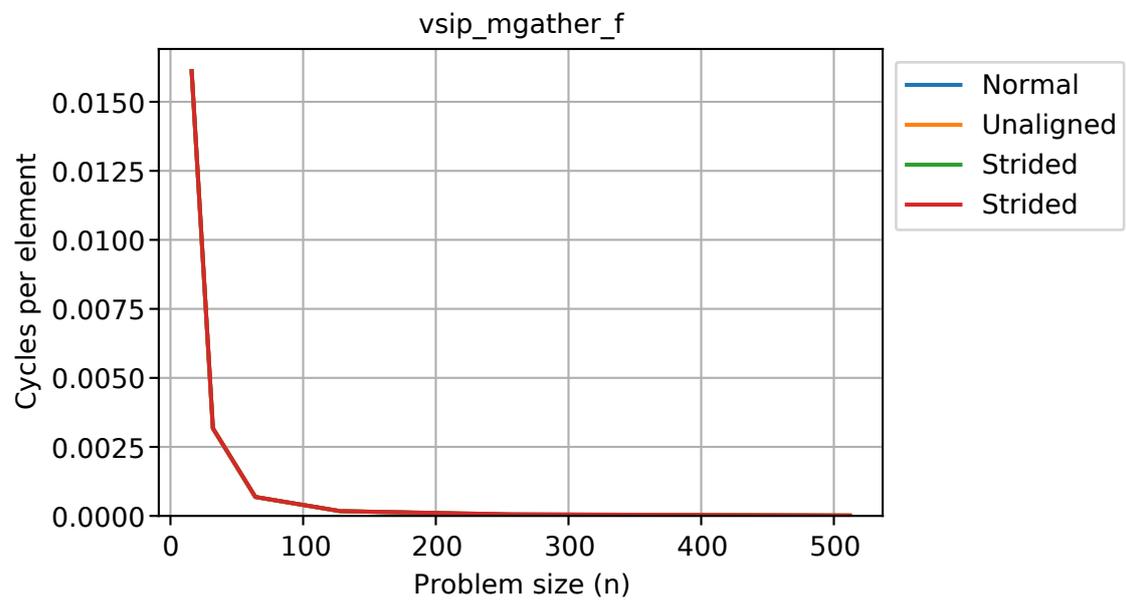


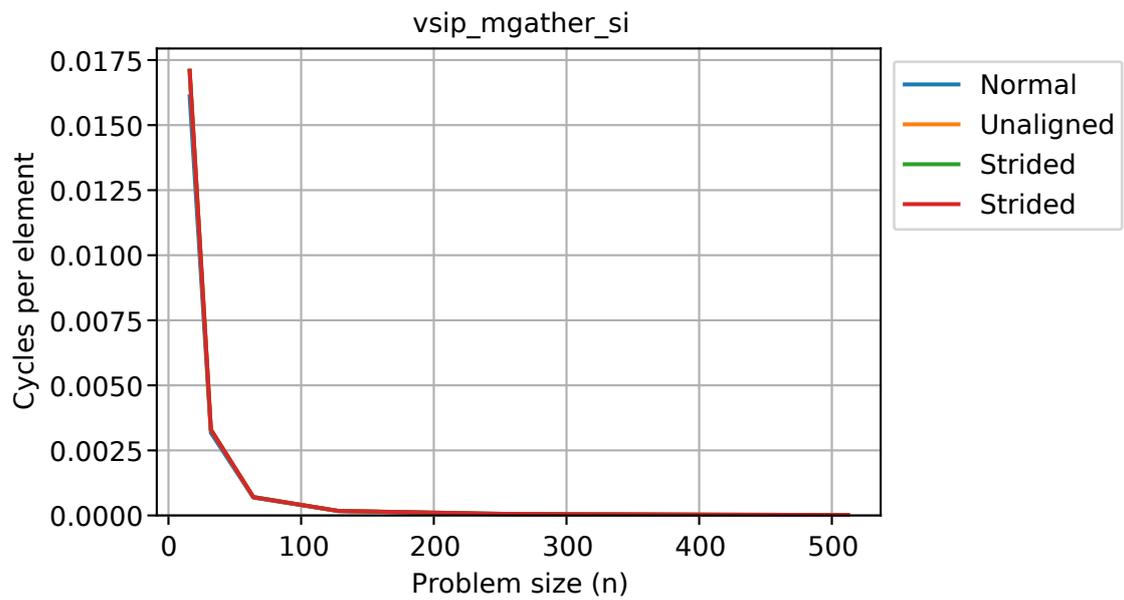
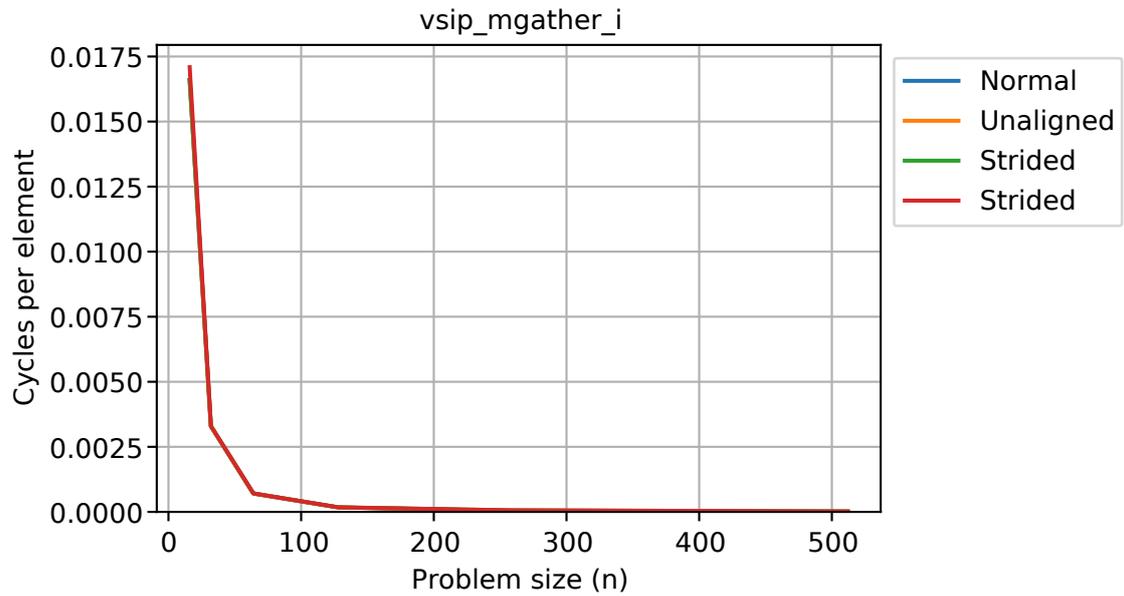
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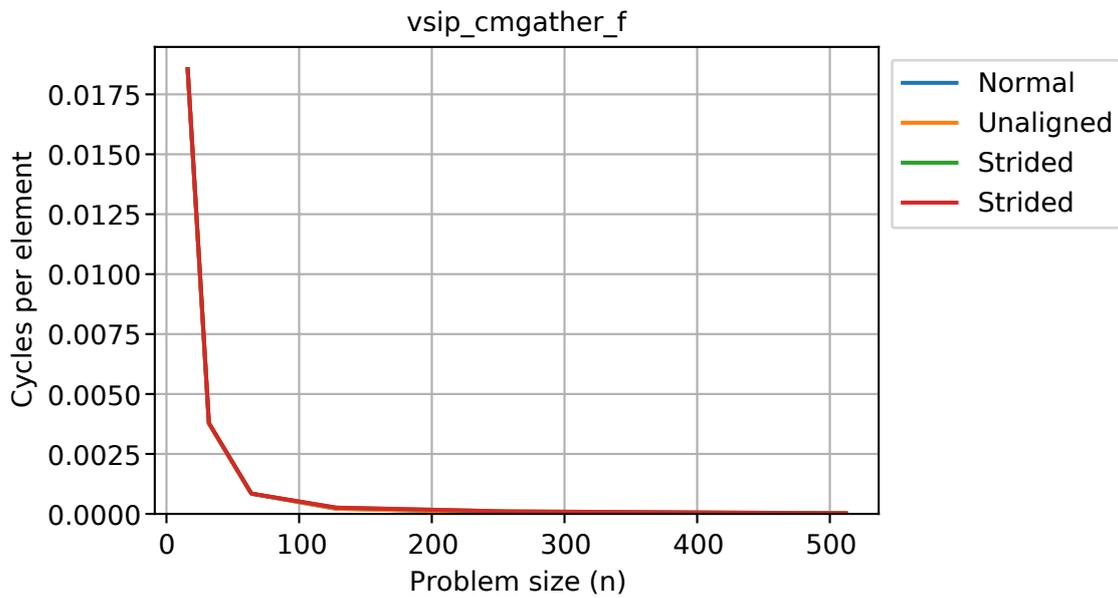




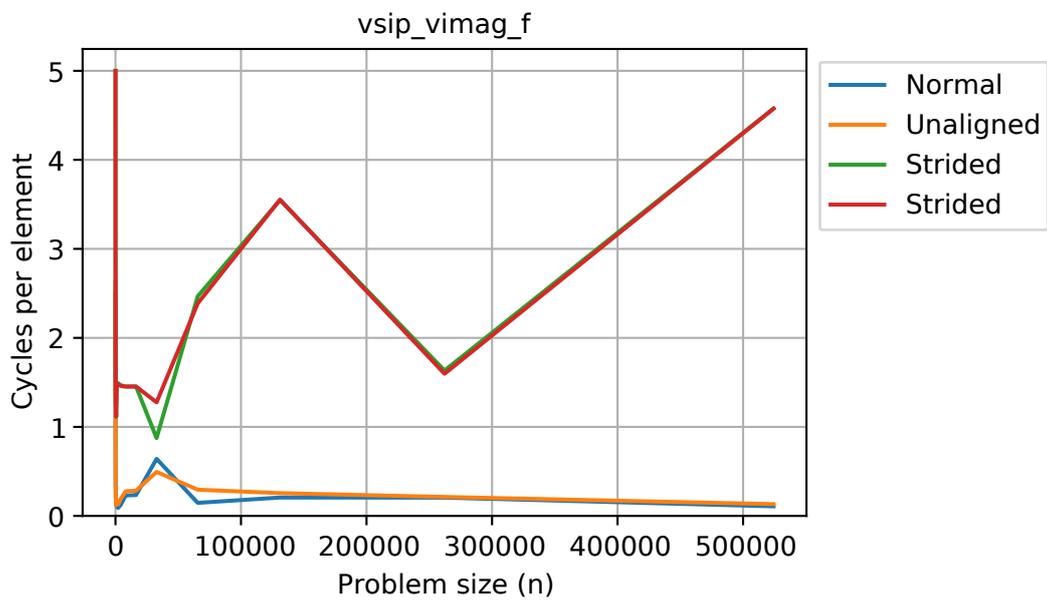
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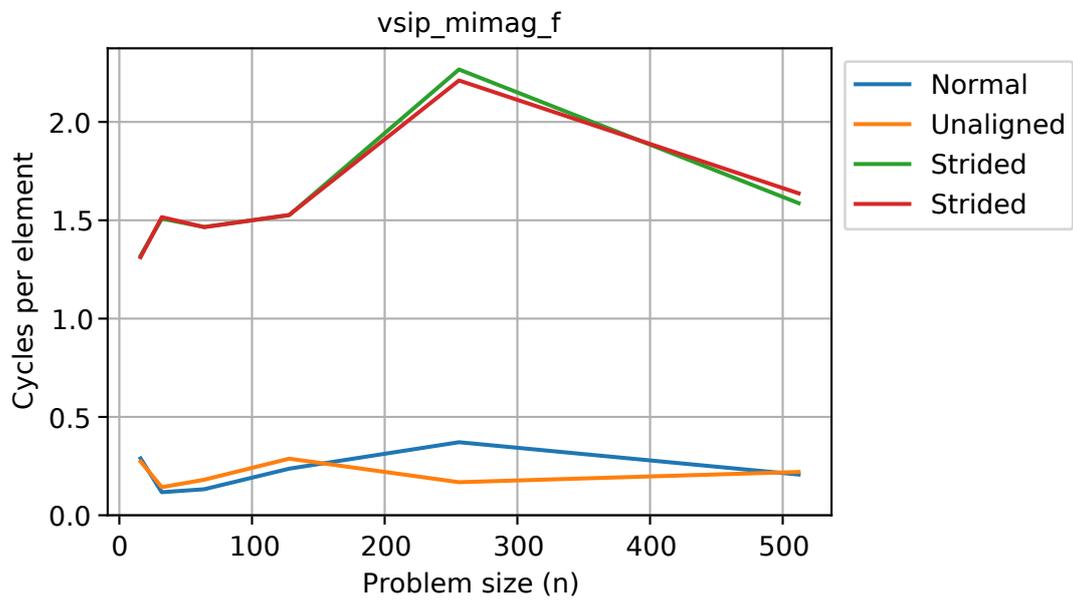
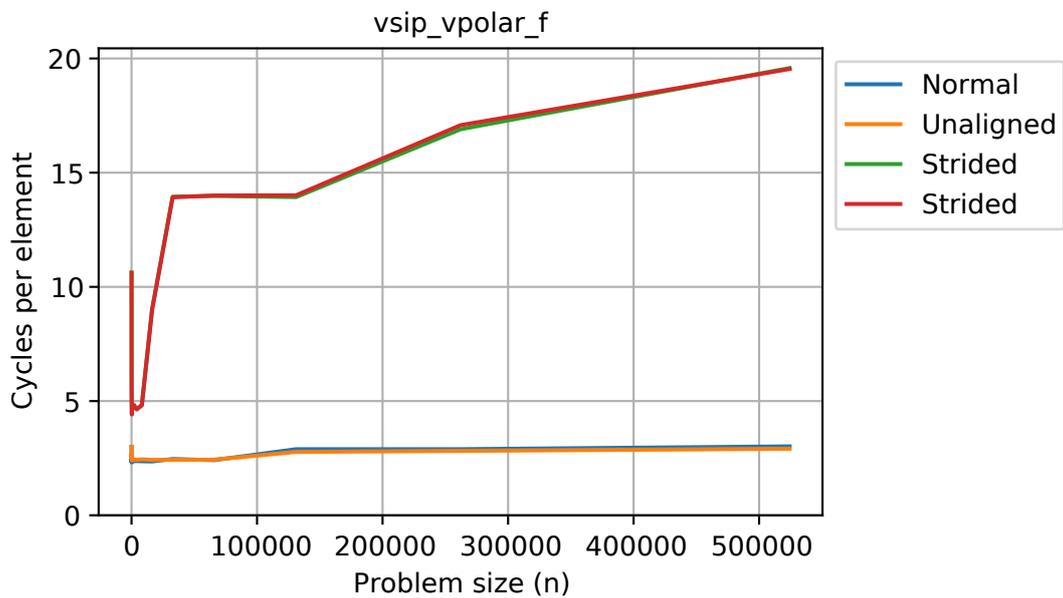


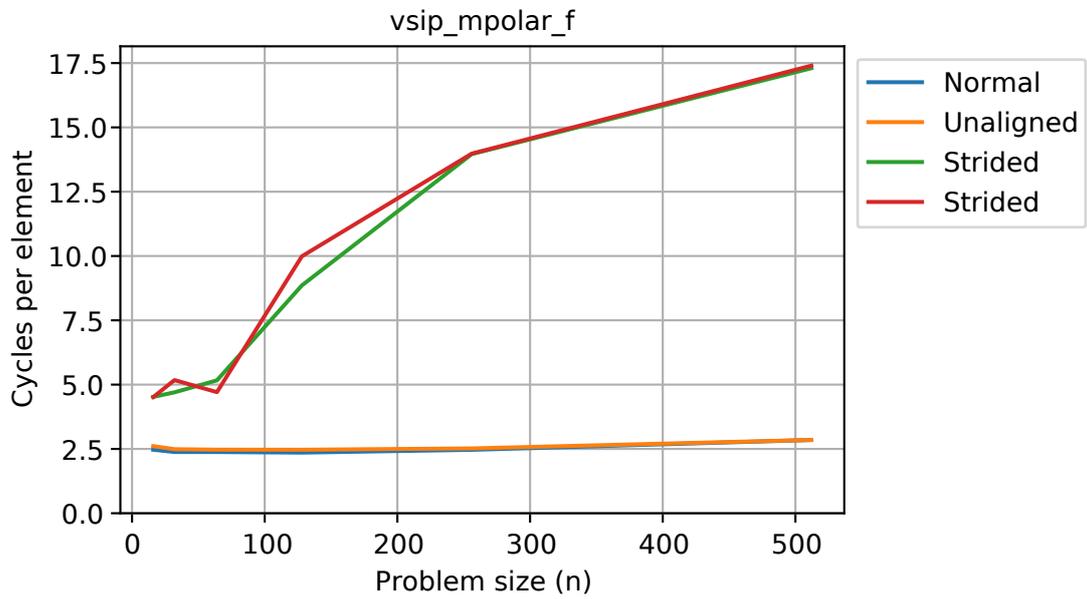
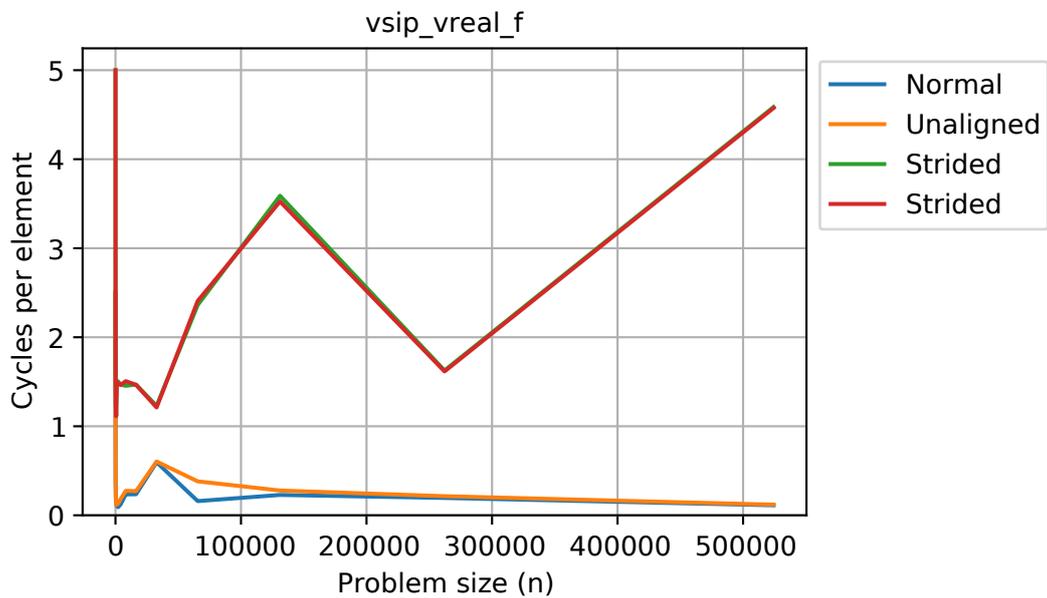


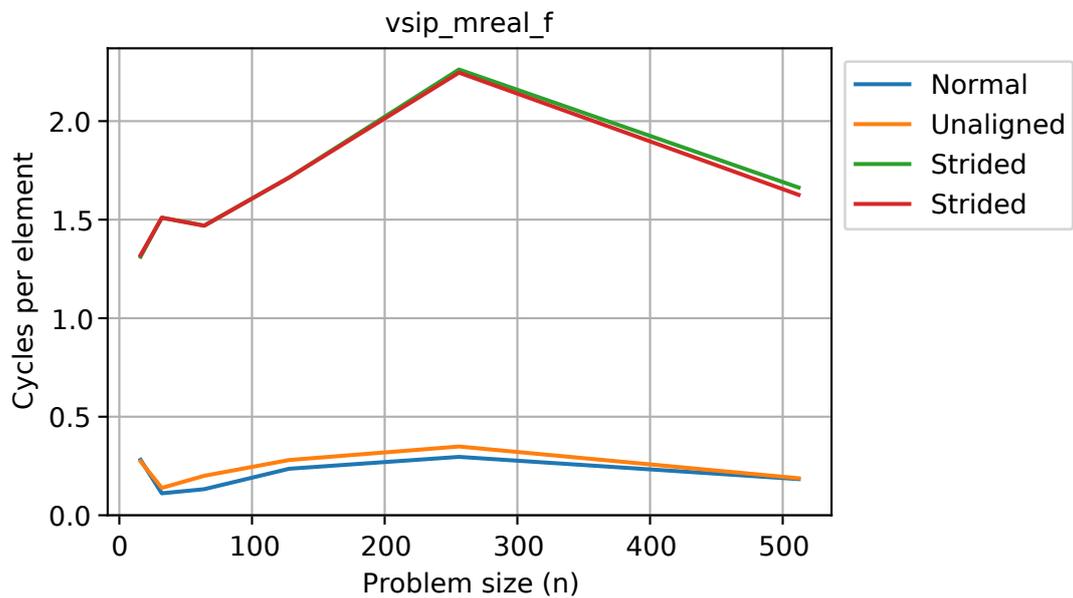
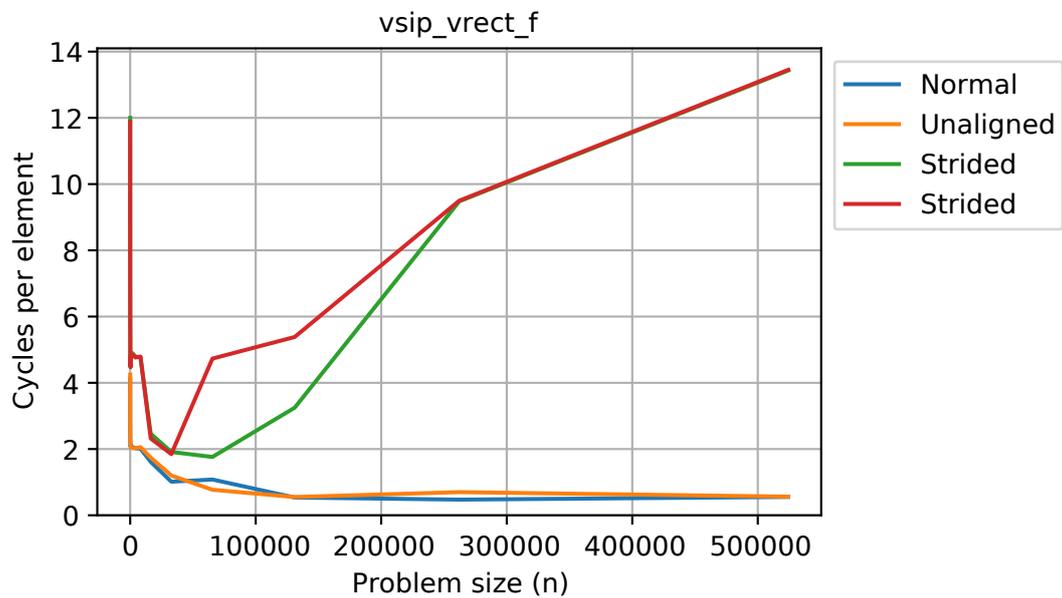


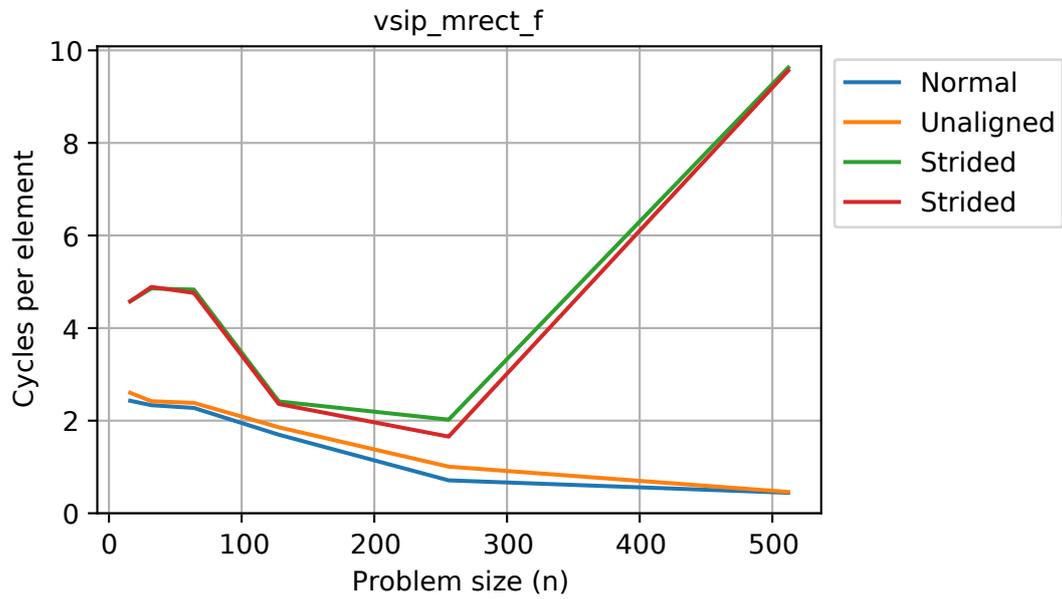
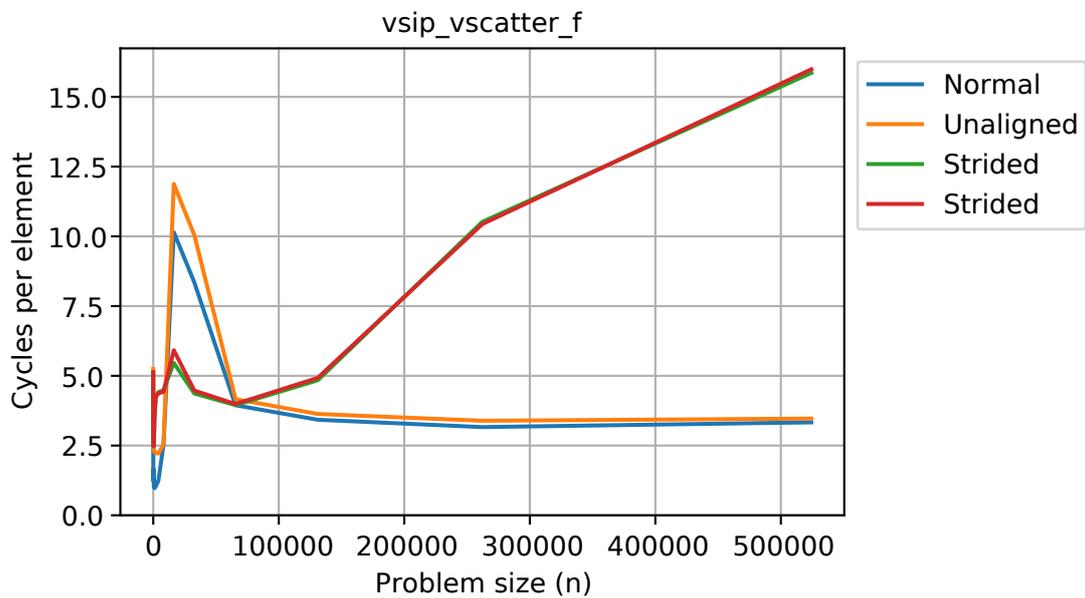
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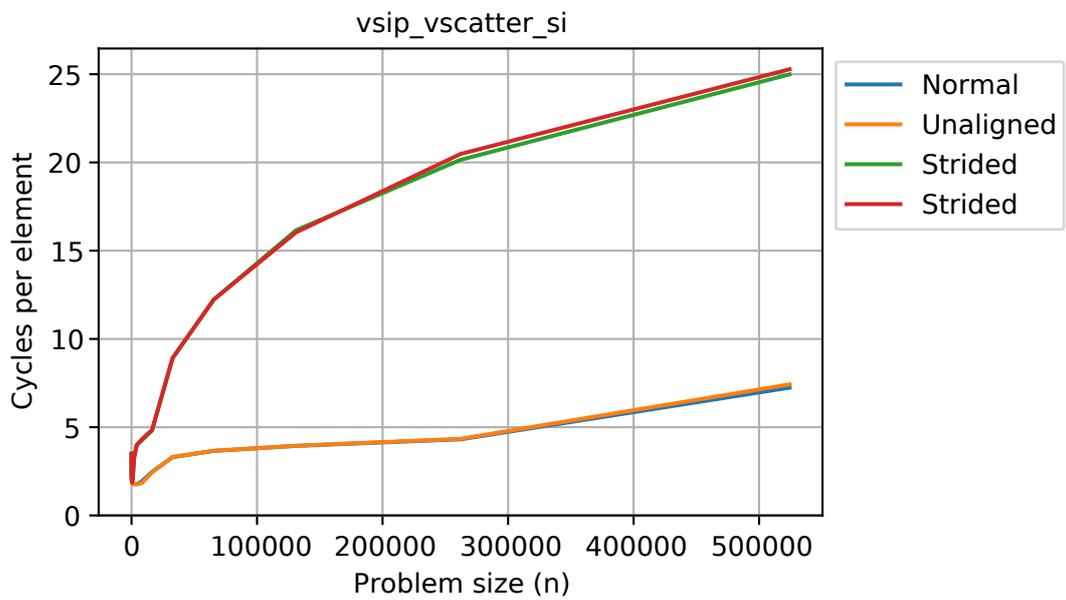
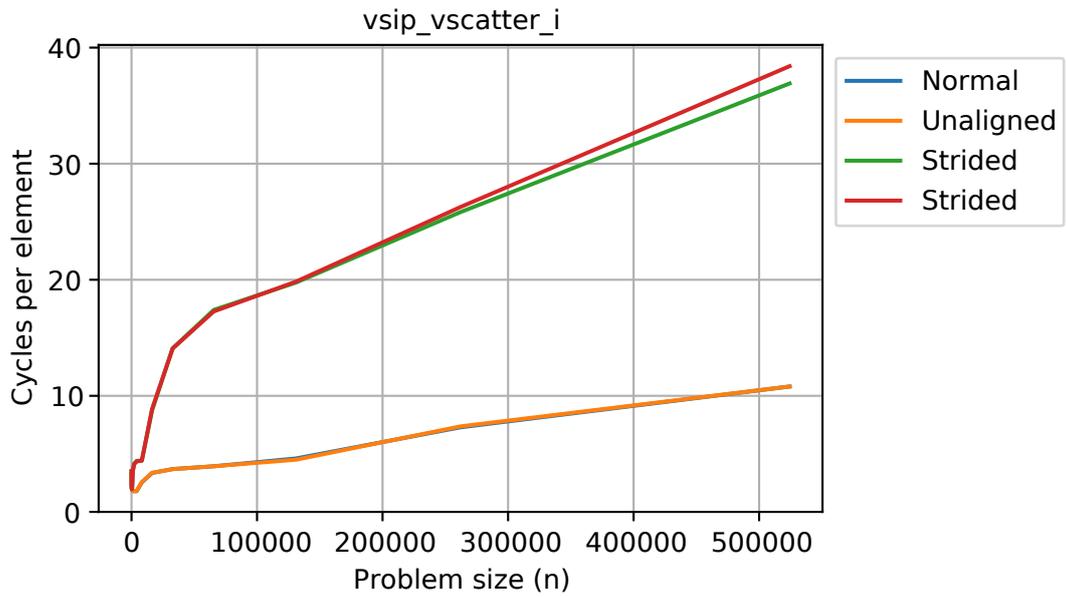


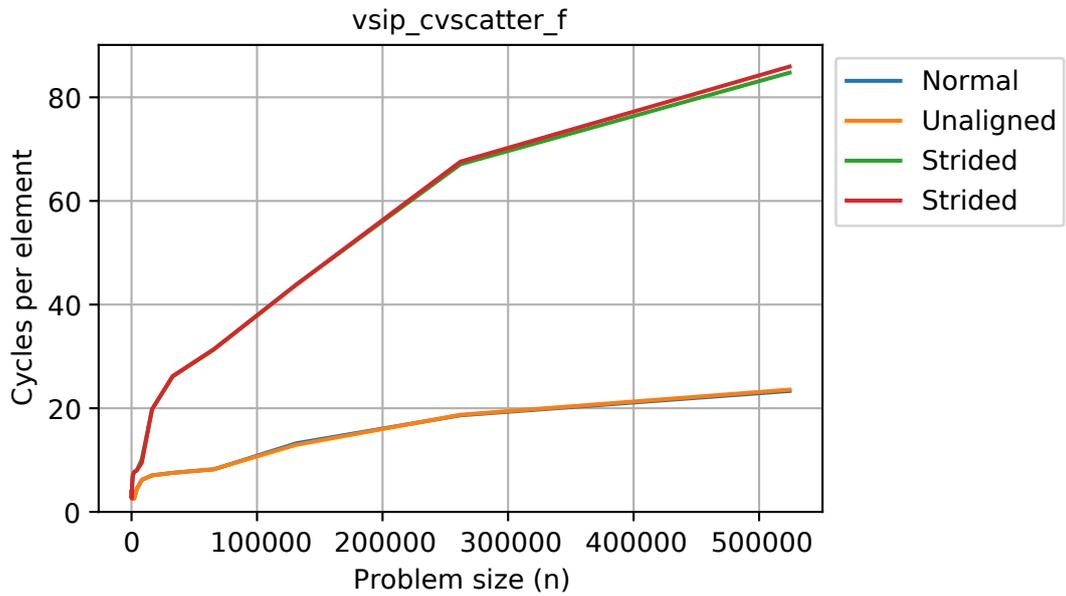
vsip_mimag_f**vsip_vpolar_f**

vsip_mpolar_f**vsip_vreal_f**

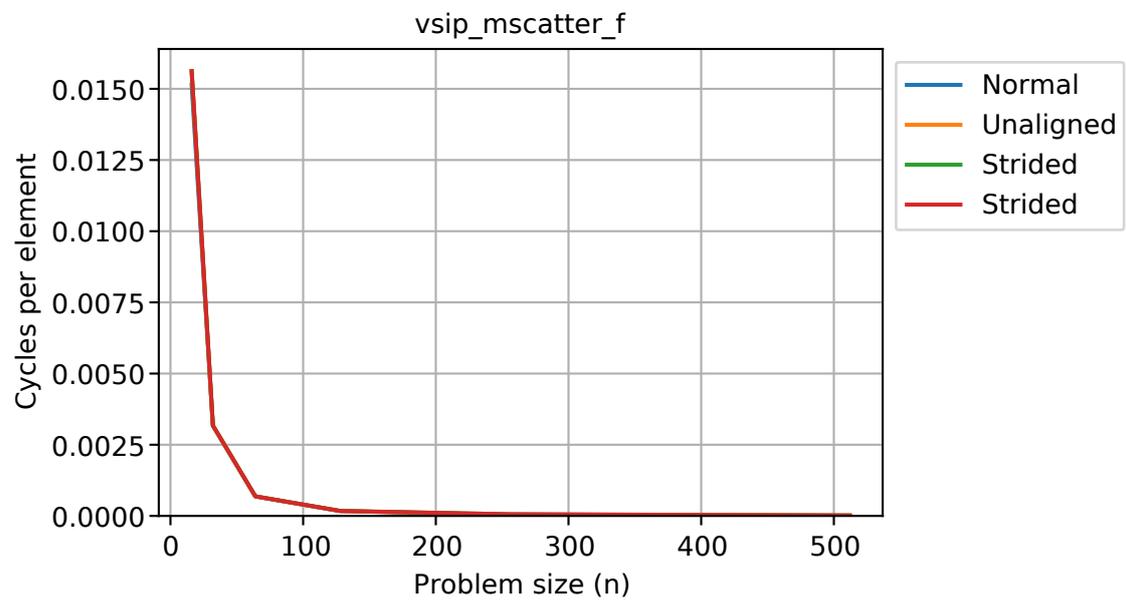
vsip_mreal_f**vsip_vrect_f**

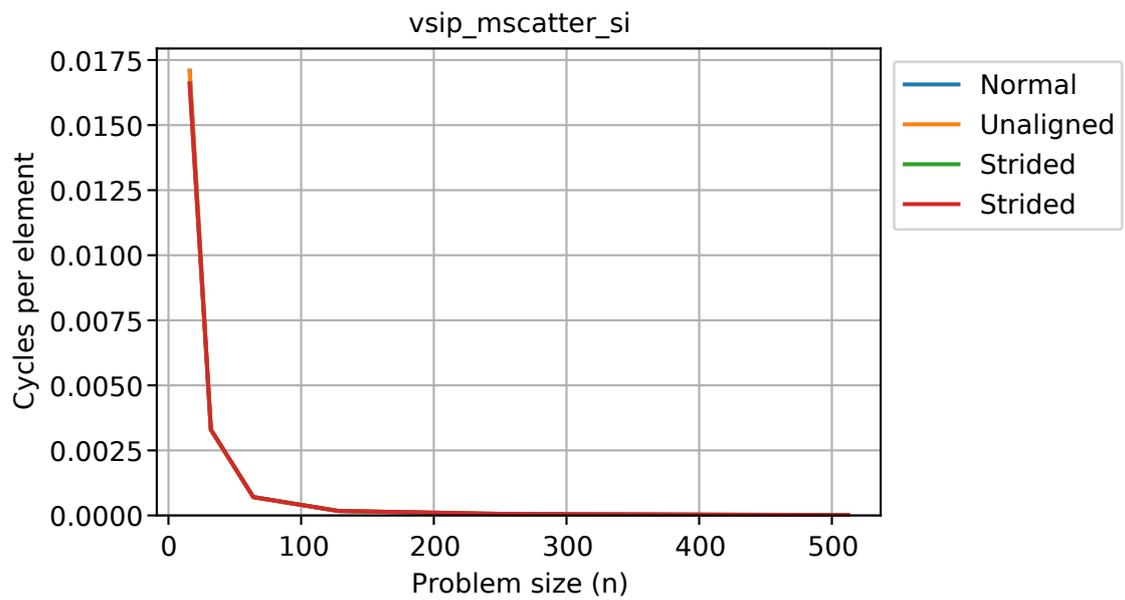
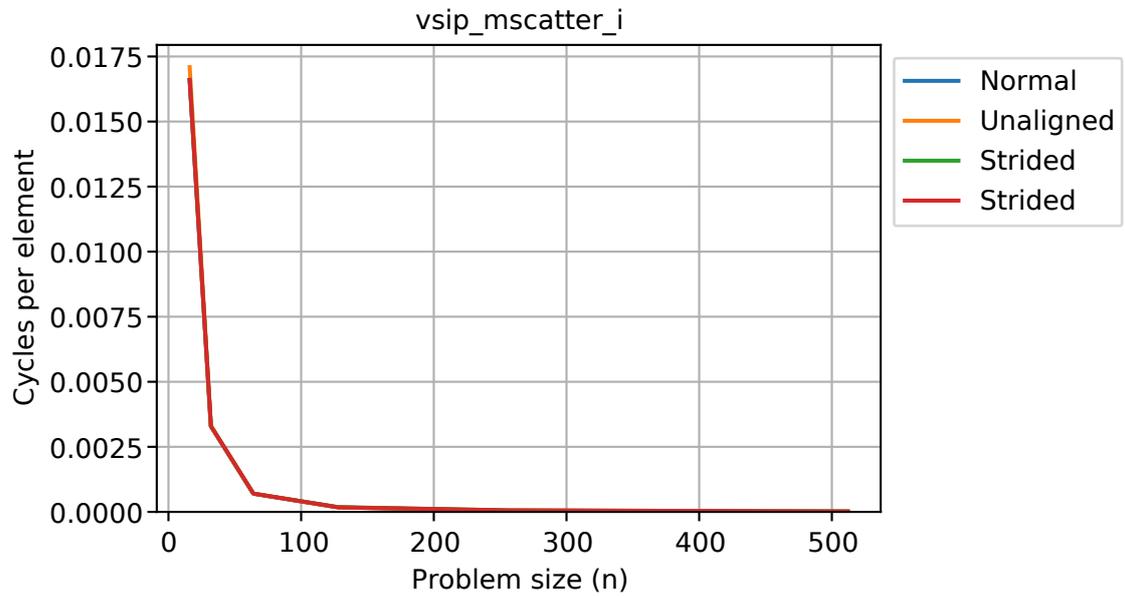
vsip_mrect_f**vsip_Dvscatter_P**

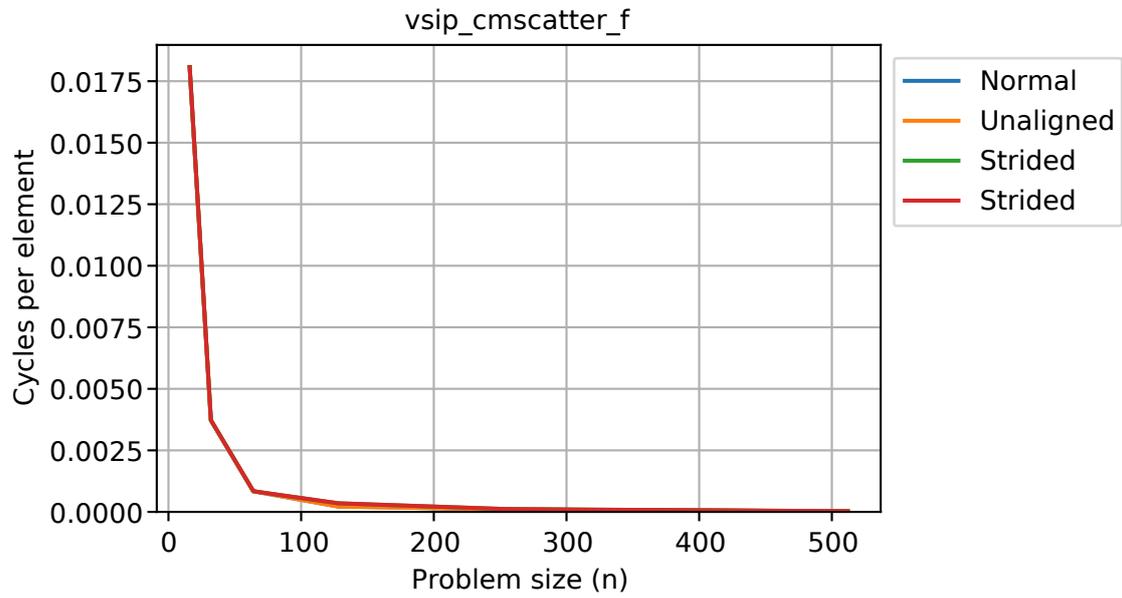




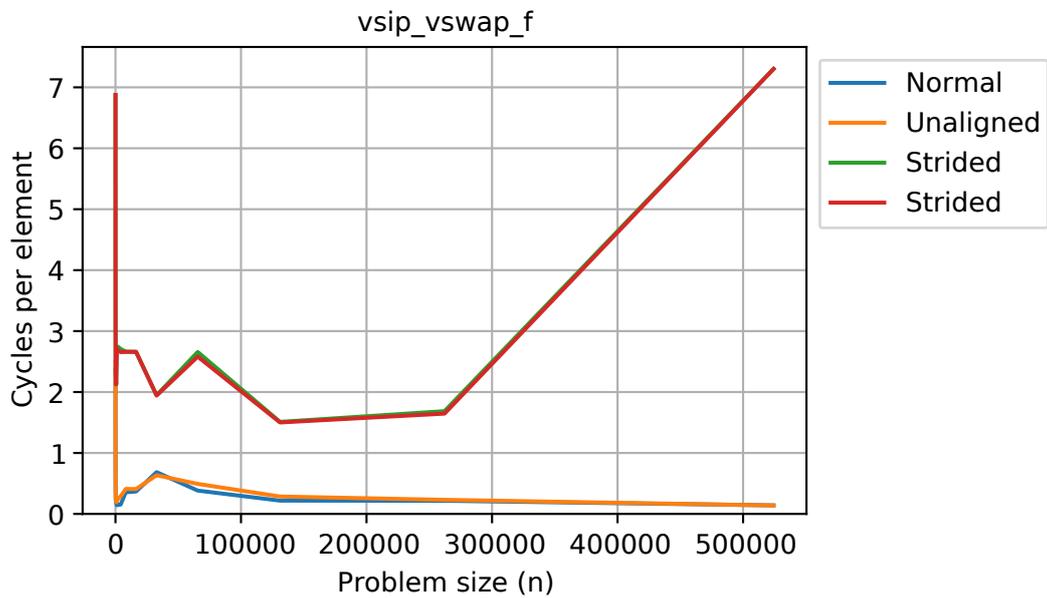
vsip_Dmscatter_P

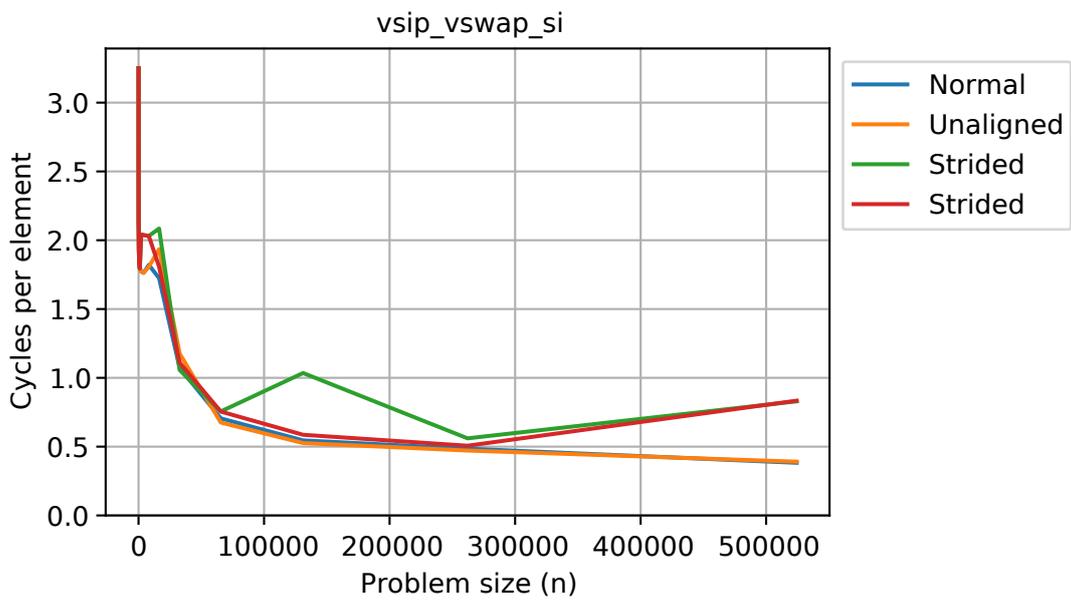
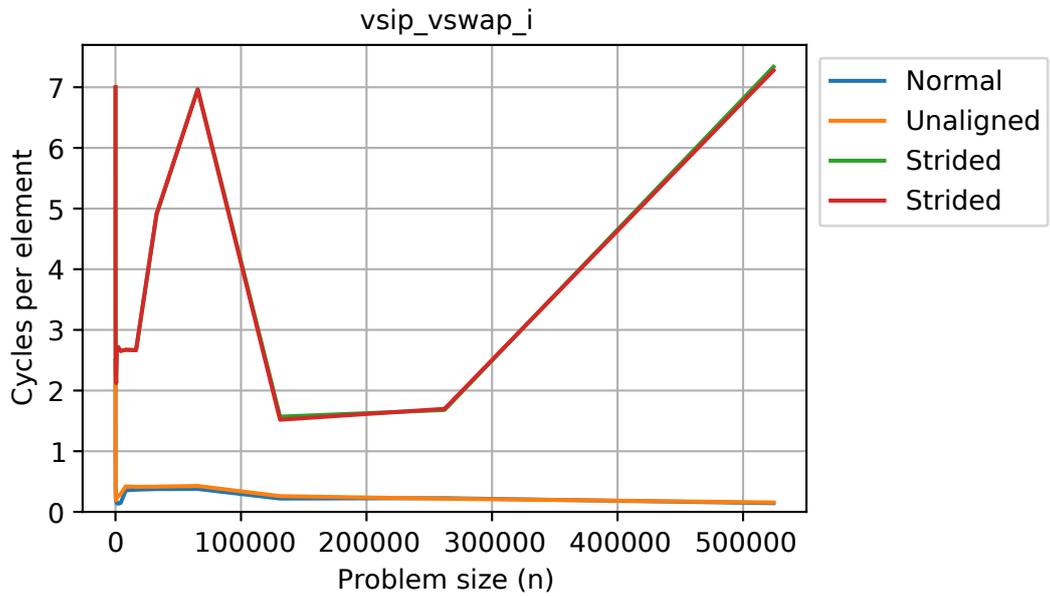


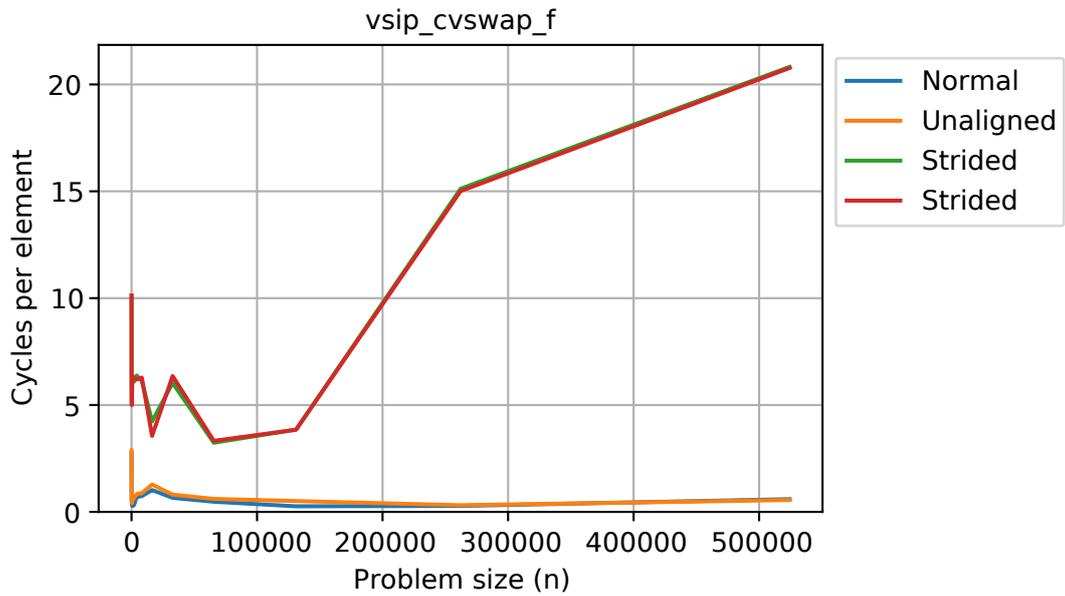




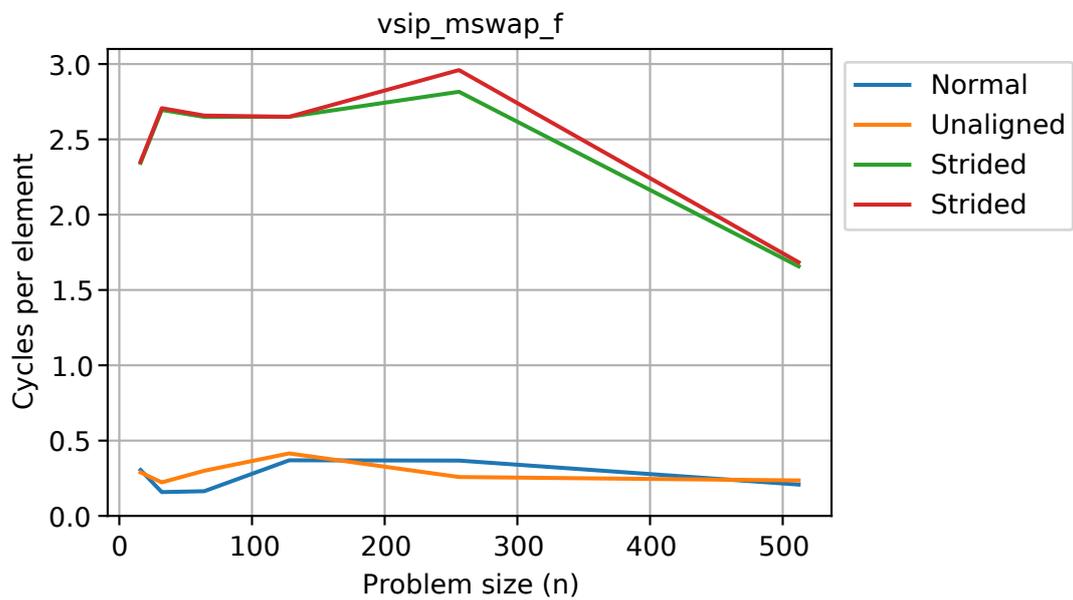
vsip_Dvswap_P

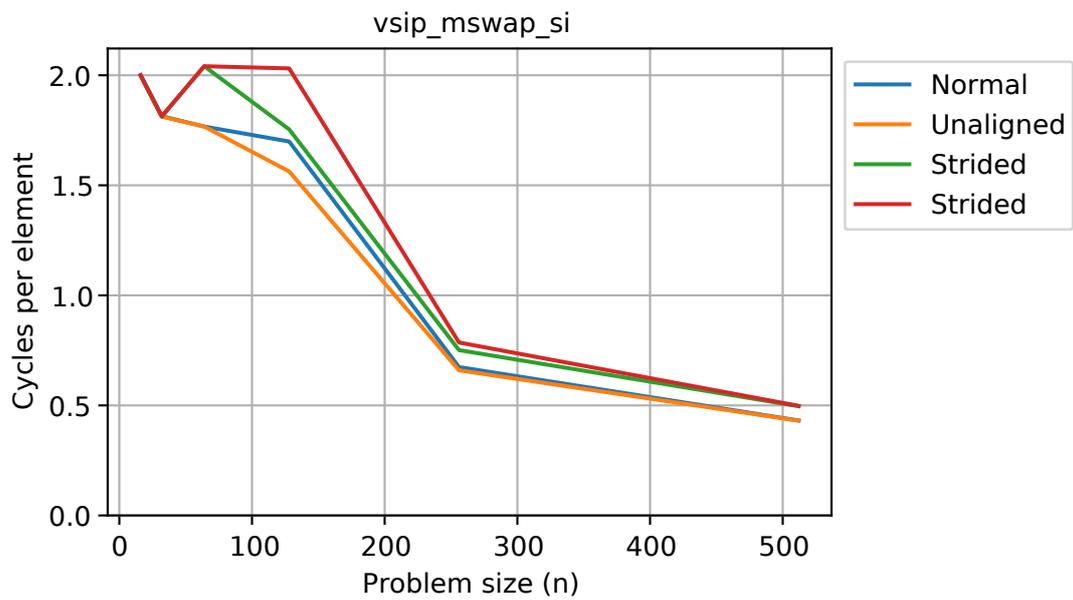
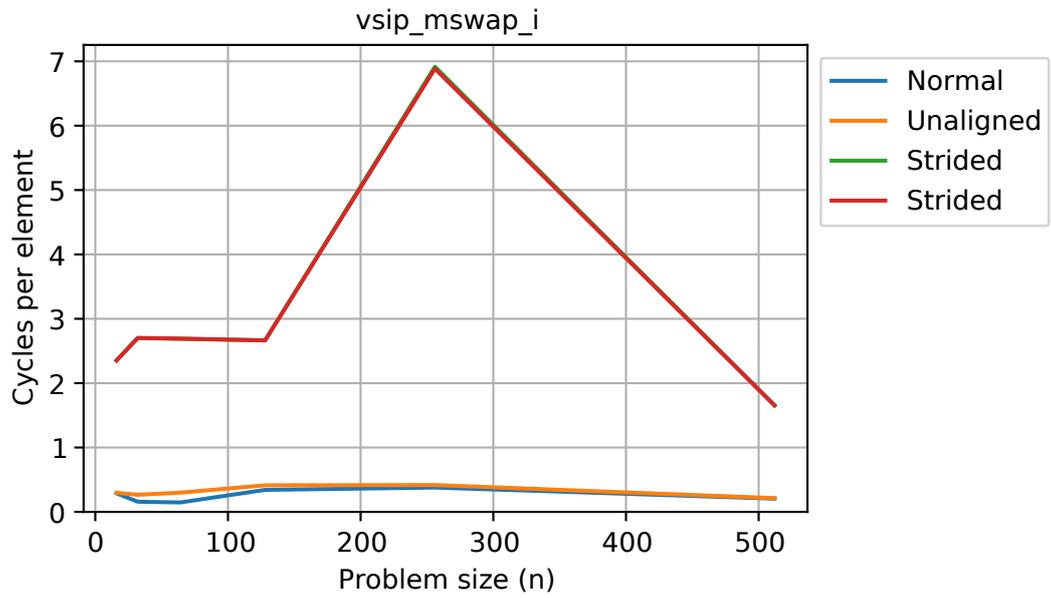


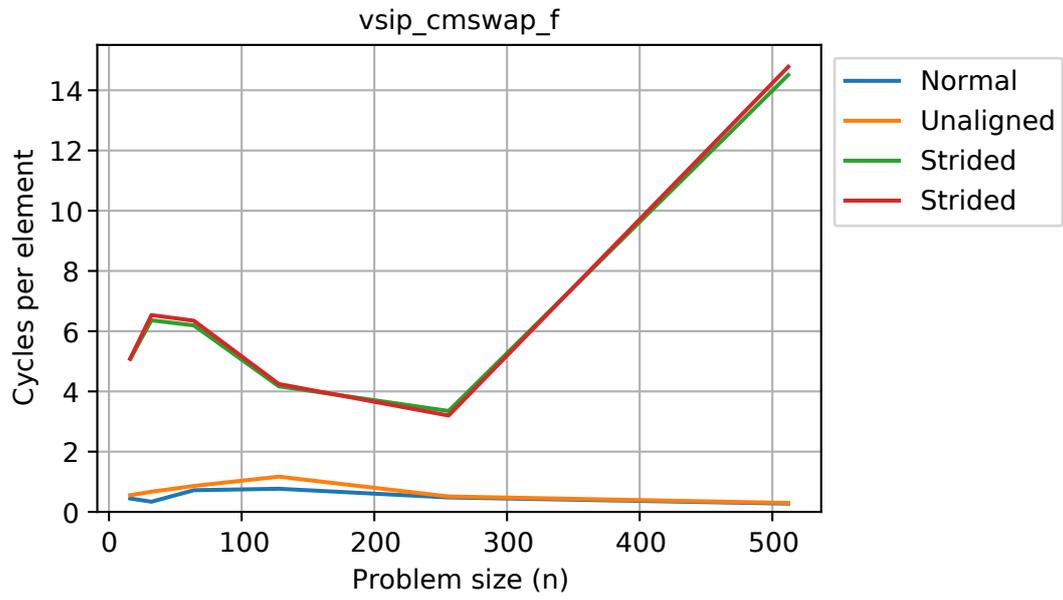




vsip_Dmswap_P



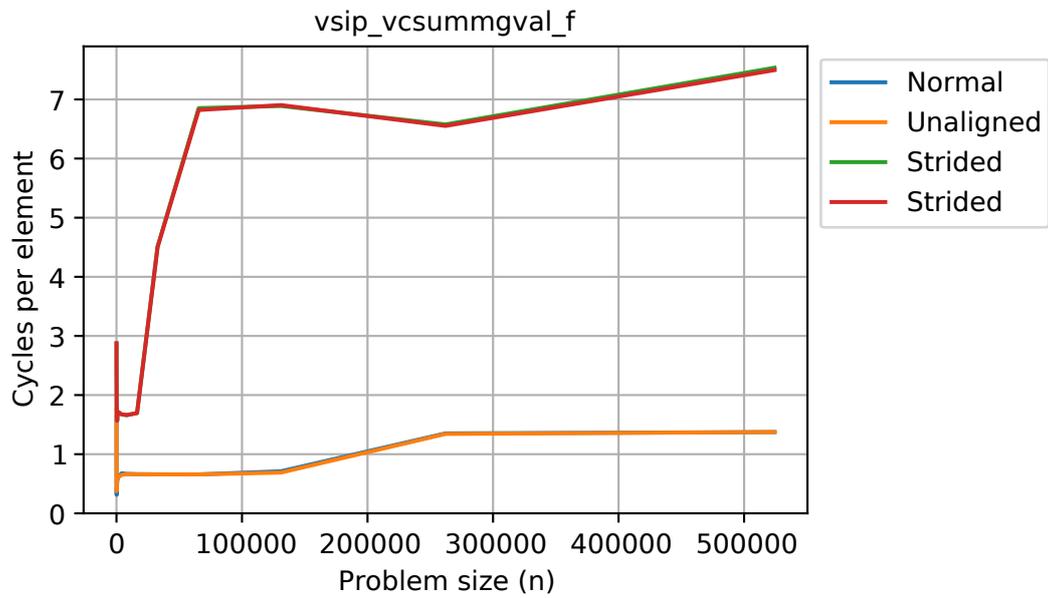




2.10 Extensions

- `vsip_vcsummgval_f`

`vsip_vcsummgval_f`

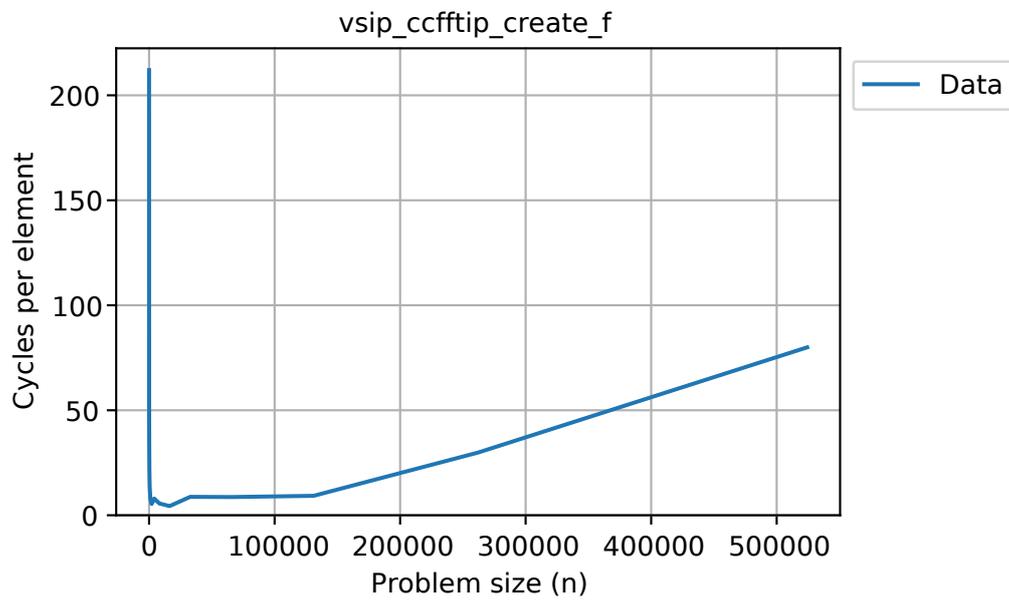


Chapter 3. Signal Processing Functions

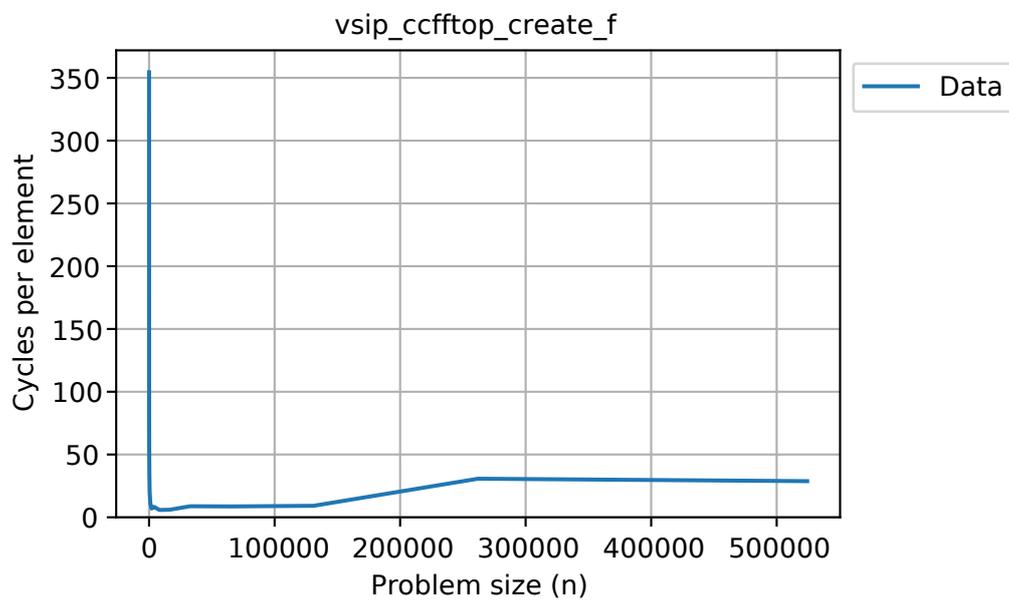
3.1 FFT Functions

- `vsip_ccffftip_create_f`
- `vsip_ccffftop_create_f`
- `vsip_crffftop_create_f`
- `vsip_rcffftop_create_f`
- `vsip_fft_destroy_f`
- `vsip_ccffftip_f`
- `vsip_ccffftop_f`
- `vsip_crffftop_f`
- `vsip_rcffftop_f`
- `vsip_ccfftmip_create_f`
- `vsip_ccfftmop_create_f`
- `vsip_crfftmop_create_f`
- `vsip_rcfftmop_create_f`
- `vsip_fftm_destroy_f`
- `vsip_ccfftmip_f`
- `vsip_ccfftmop_f`
- `vsip_crfftmop_f`
- `vsip_rcfftmop_f`
- `vsip_ccfft2dip_create_f`
- `vsip_ccfft2dop_create_f`
- `vsip_crfft2dop_create_f`
- `vsip_rcfft2dop_create_f`
- `vsip_fft2d_destroy_f`
- `vsip_ccfft2dip_f`
- `vsip_ccfft2dop_f`
- `vsip_crfft2dop_f`
- `vsip_rcfft2dop_f`

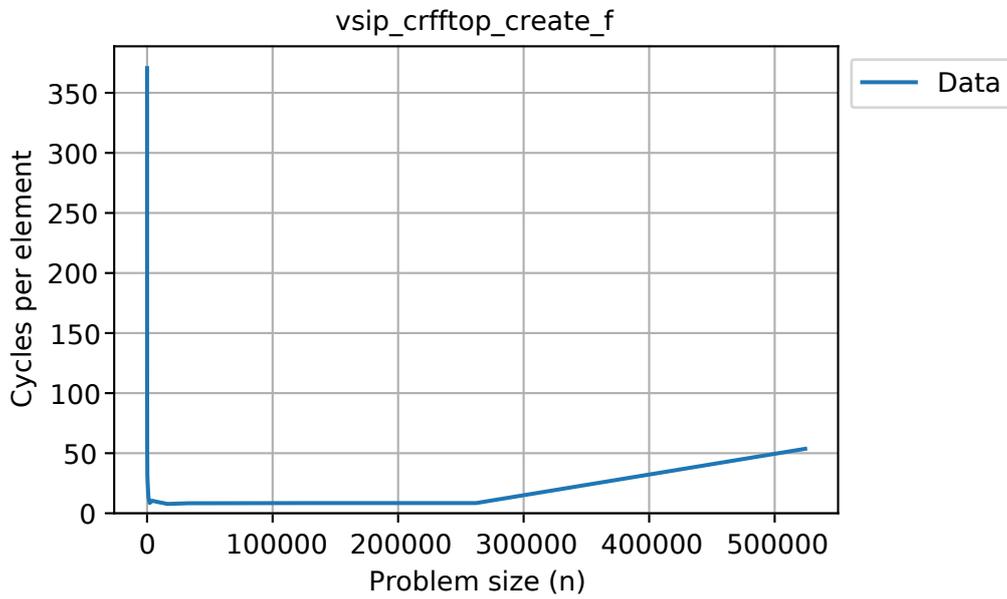
vsip_ccfftip_create_f



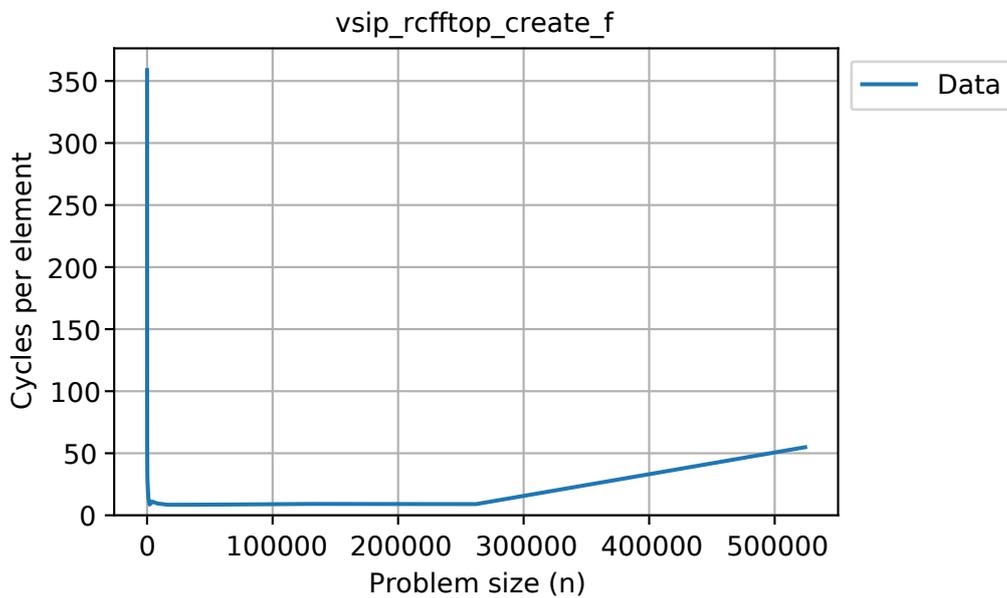
vsip_ccfftop_create_f



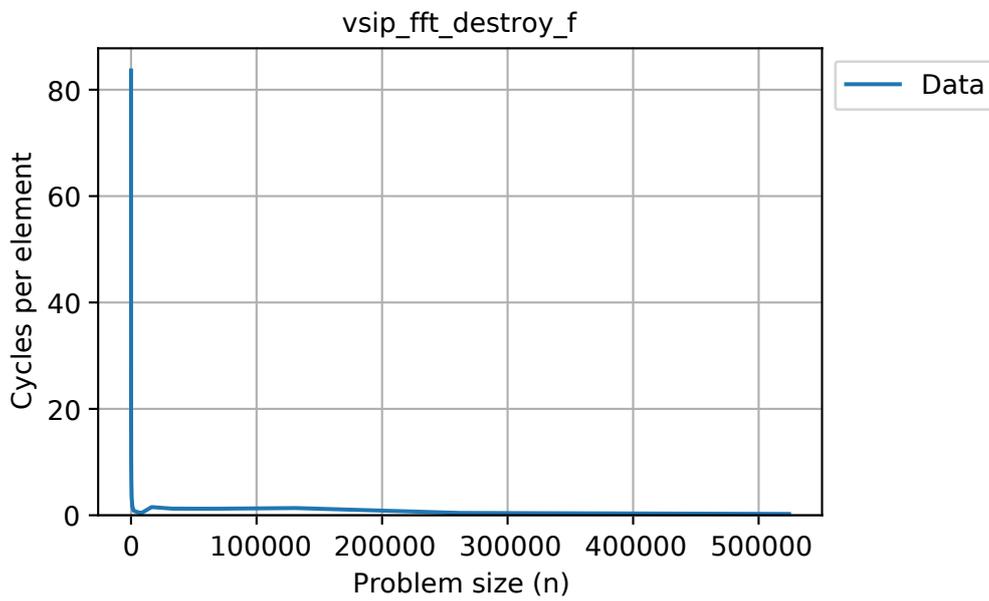
vsip_crfftop_create_f



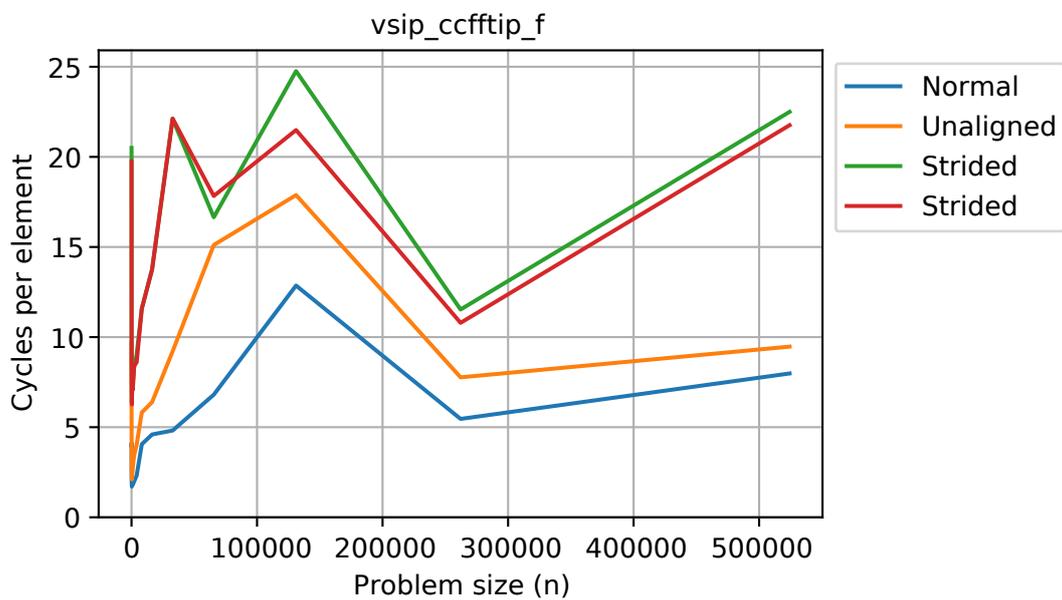
vsip_rcfftop_create_f



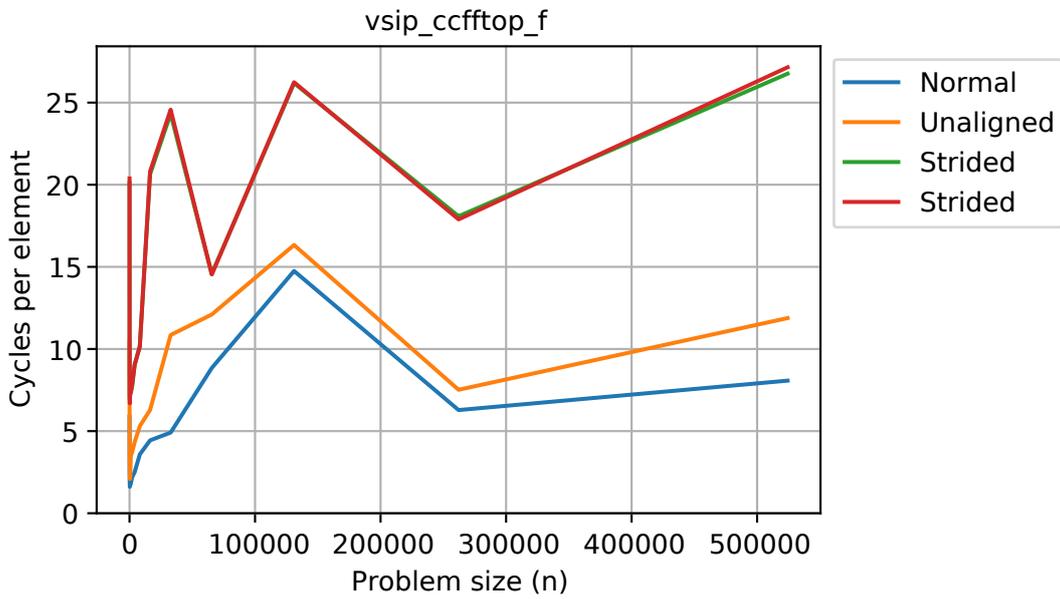
vsip_fft_destroy_f



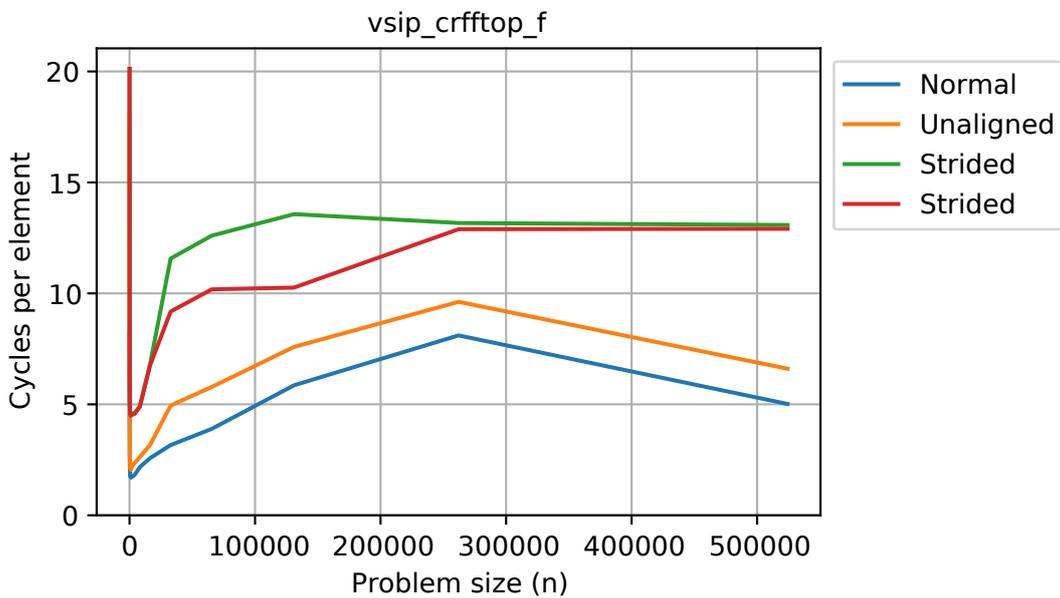
vsip_ccfftip_f



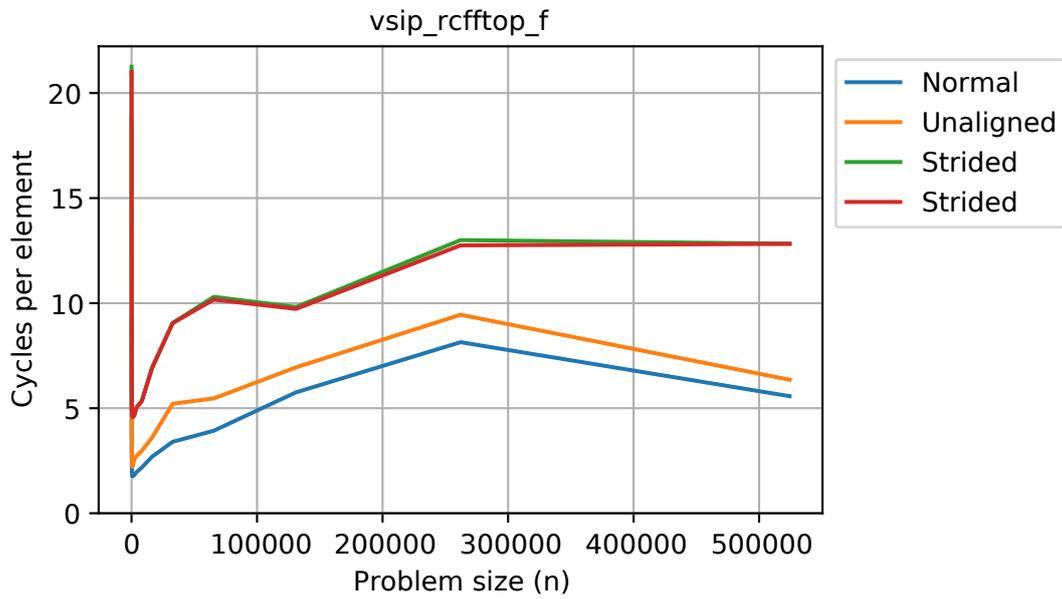
vsip_ccfftop_f



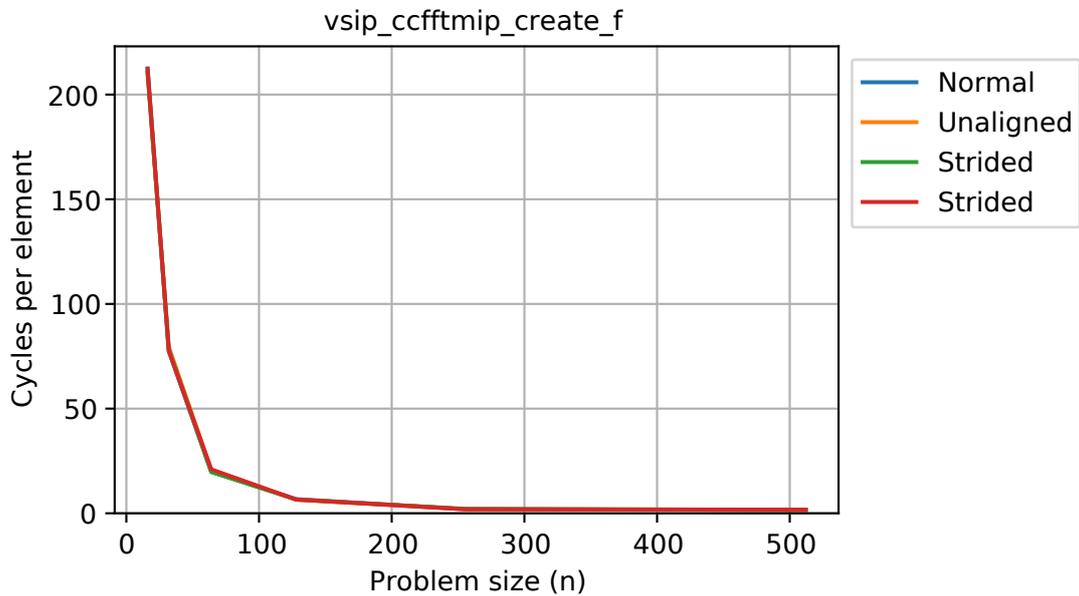
vsip_crfftop_f



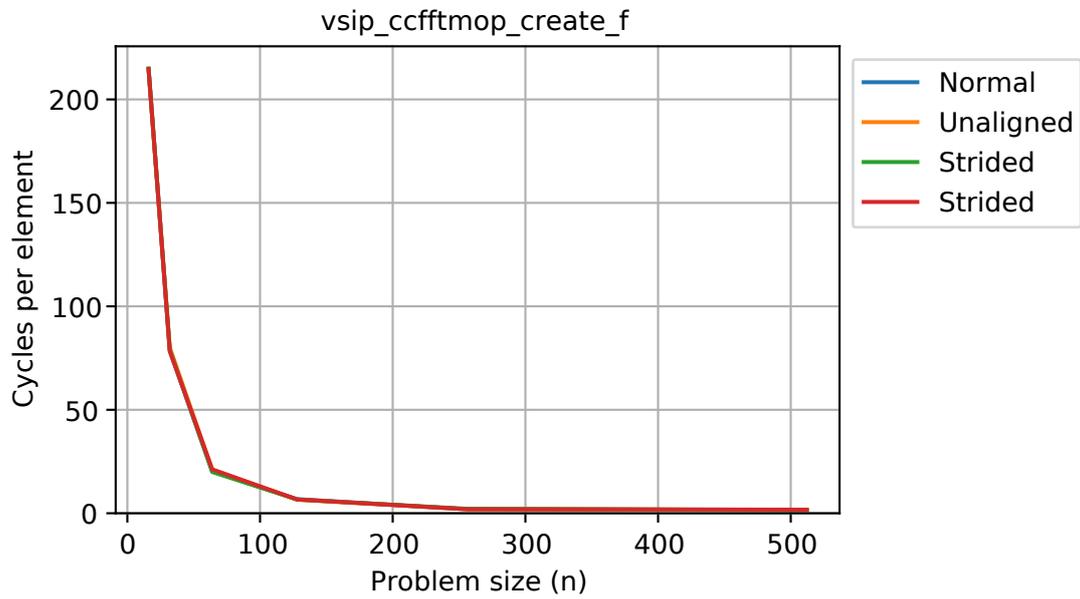
vsip_rcfftop_f



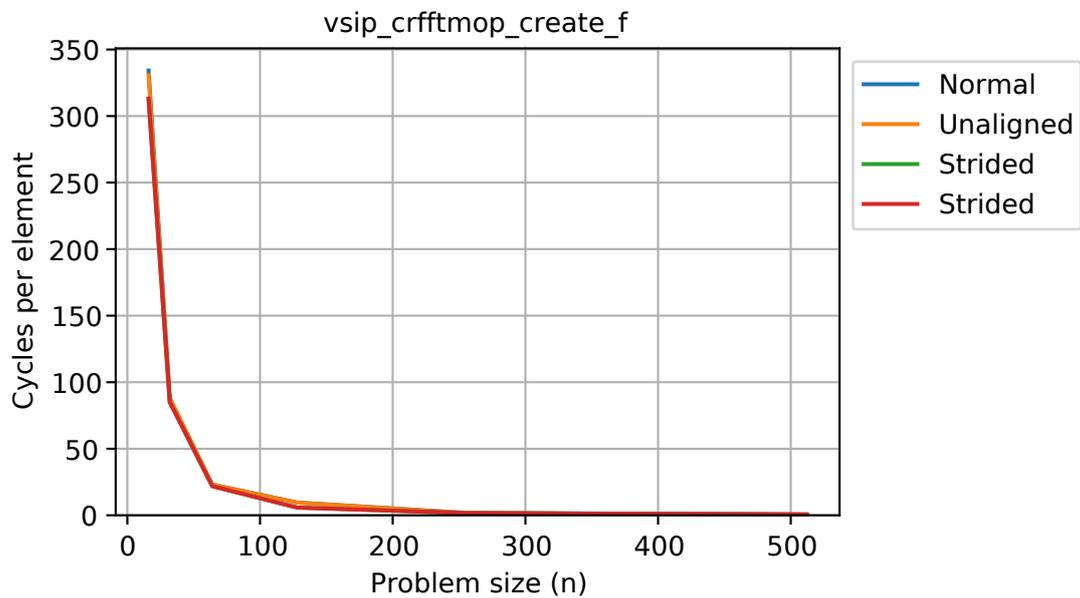
vsip_ccfftmip_create_f



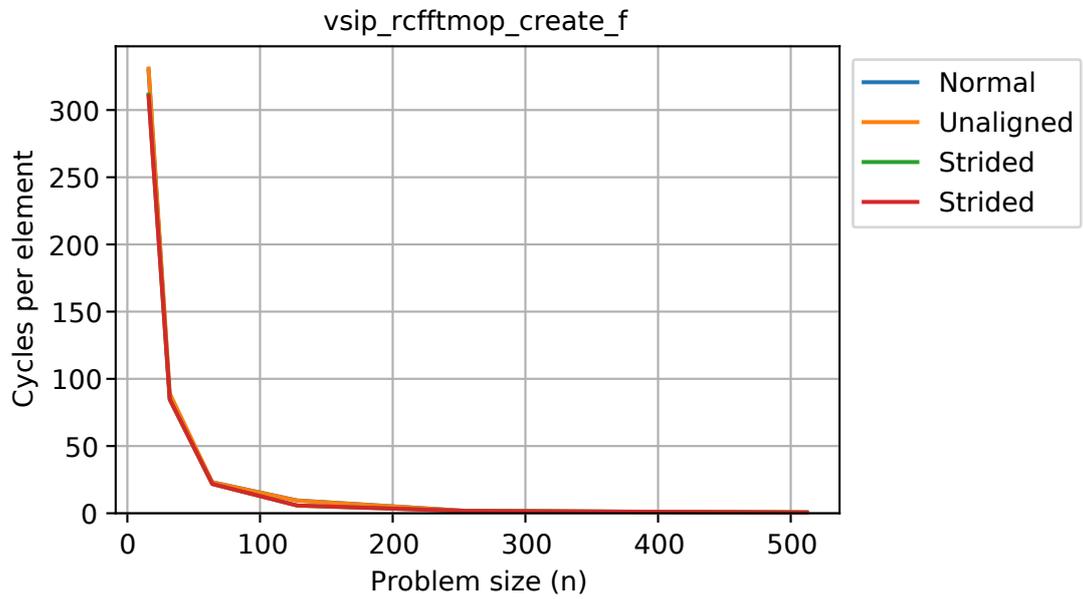
vsip_ccfftmop_create_f



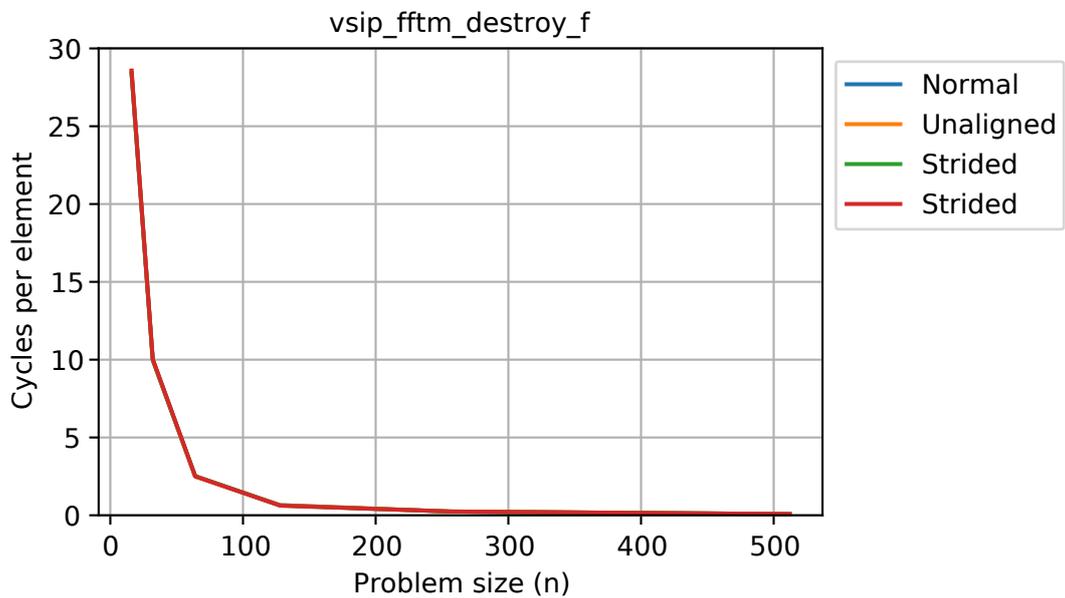
vsip_crfftmop_create_f



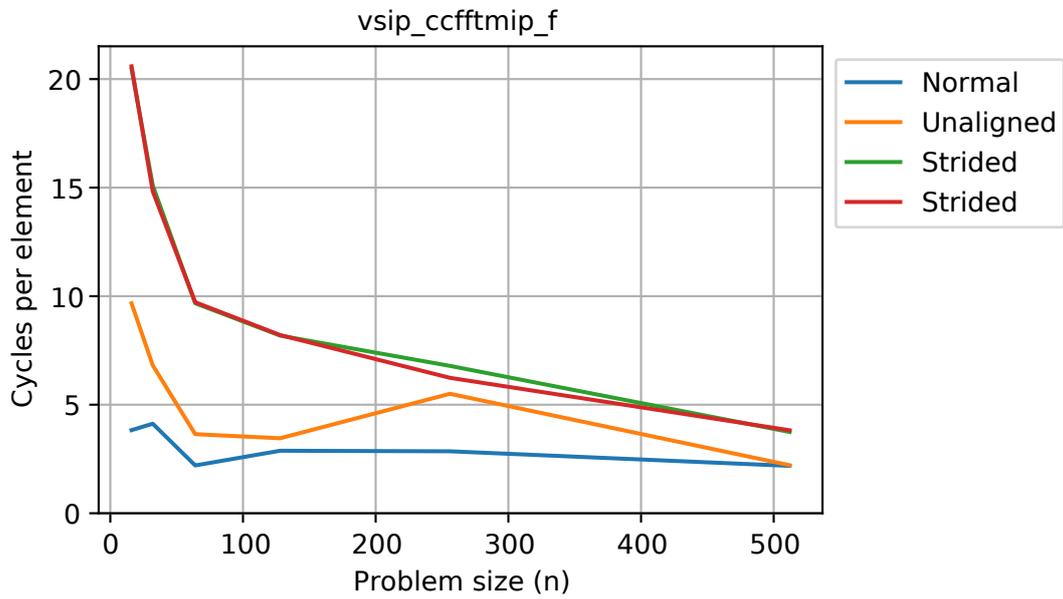
vsip_rcfftmap_create_f



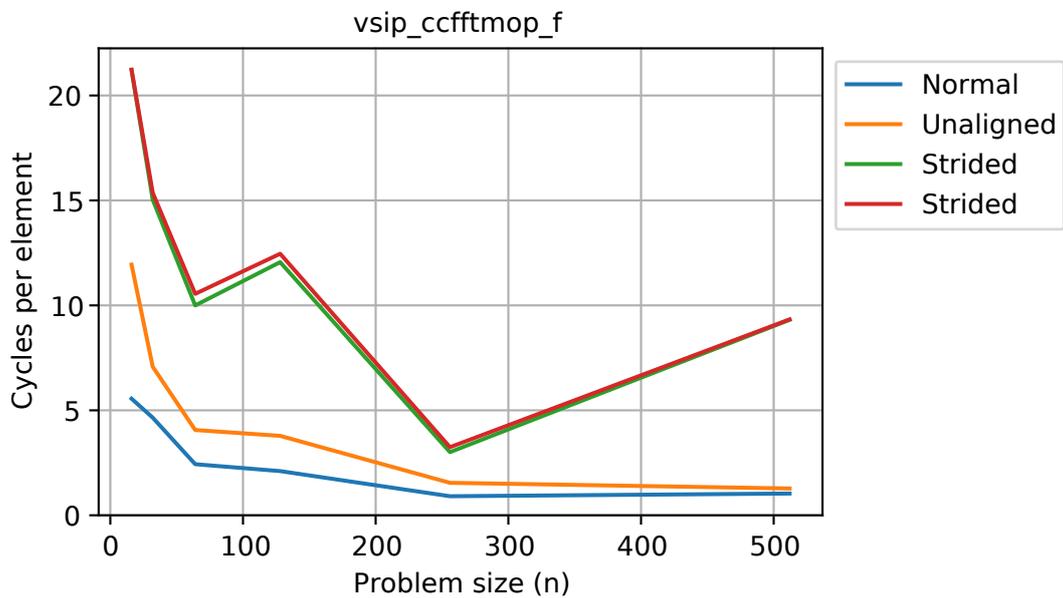
vsip_fftm_destroy_f



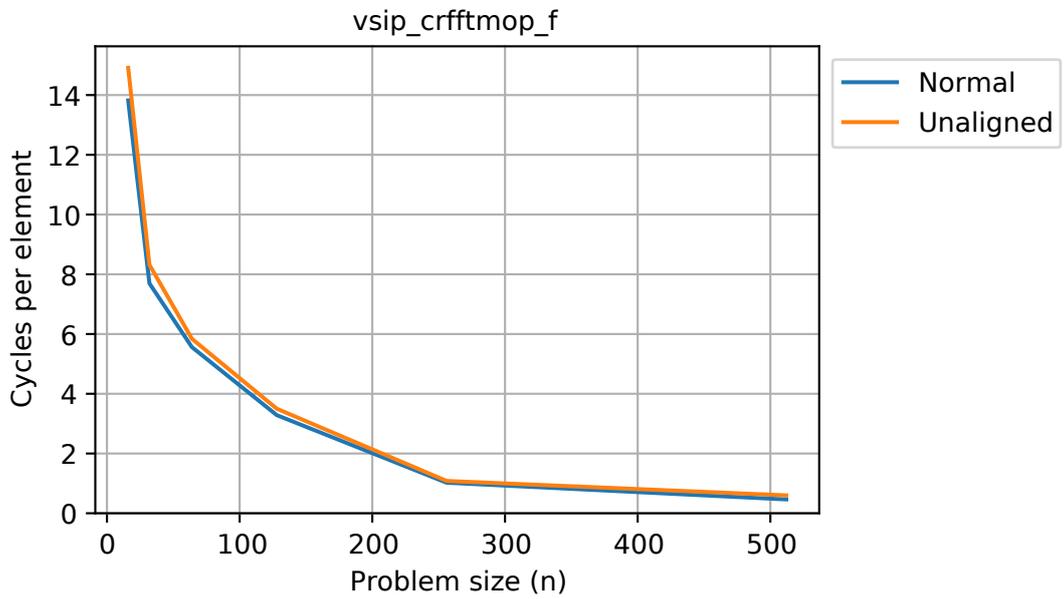
vsip_ccfftmip_f



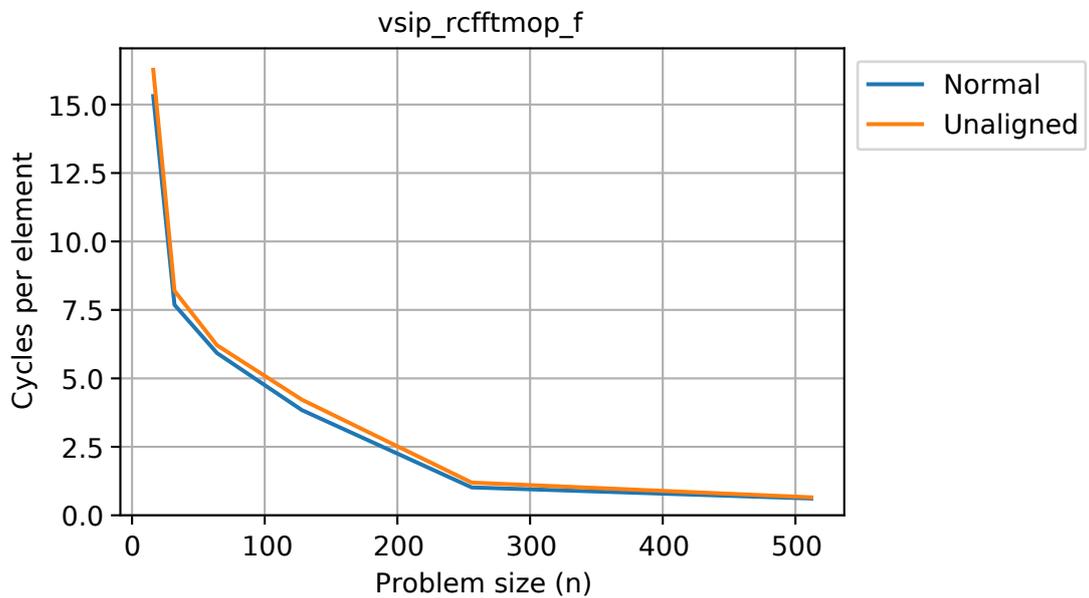
vsip_ccfftmop_f

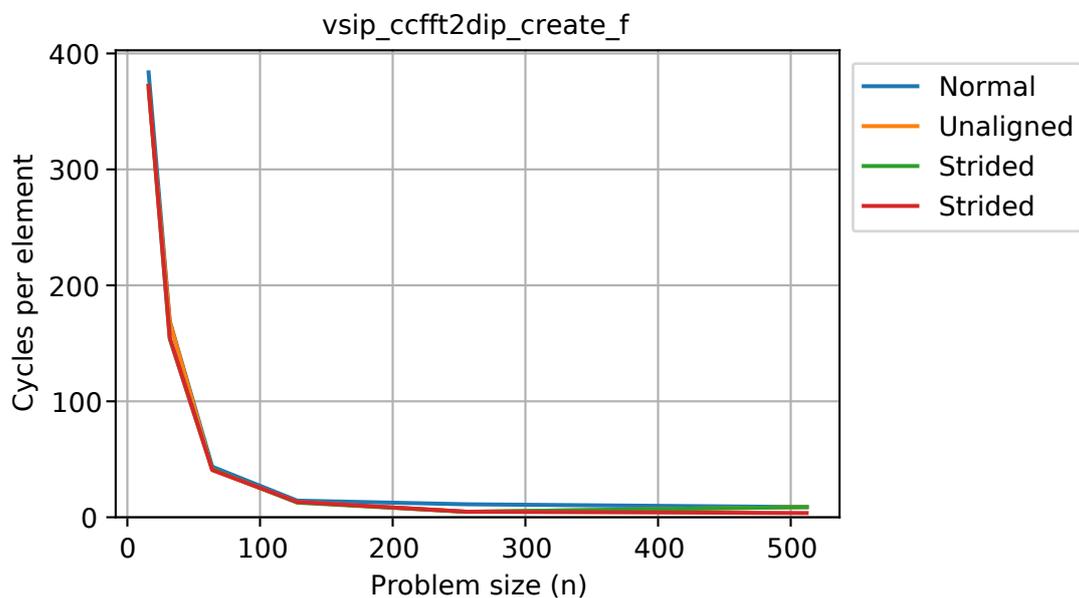
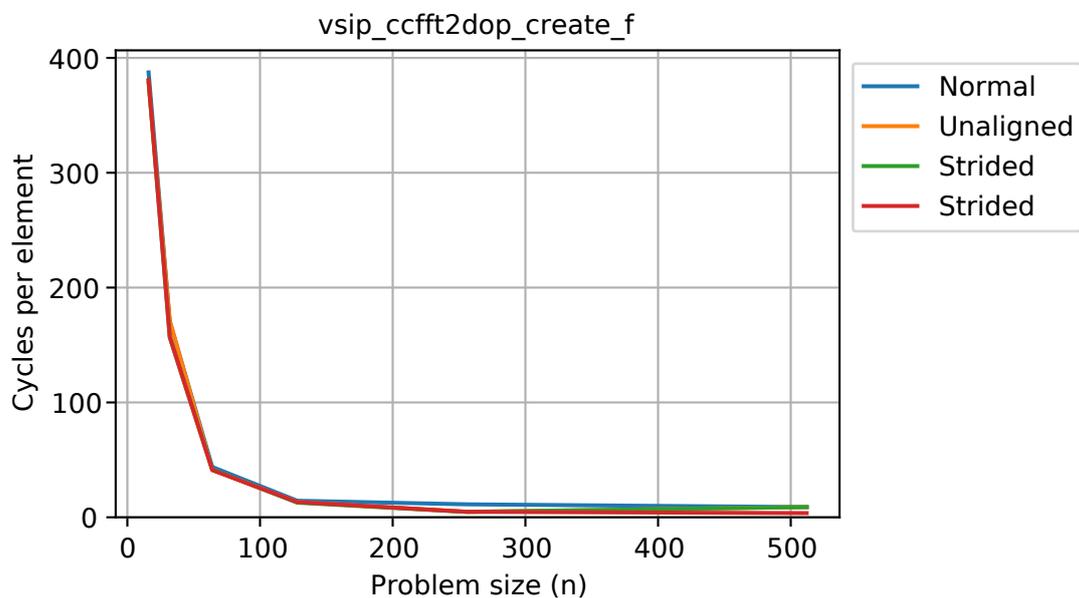


vsip_crfftmop_f

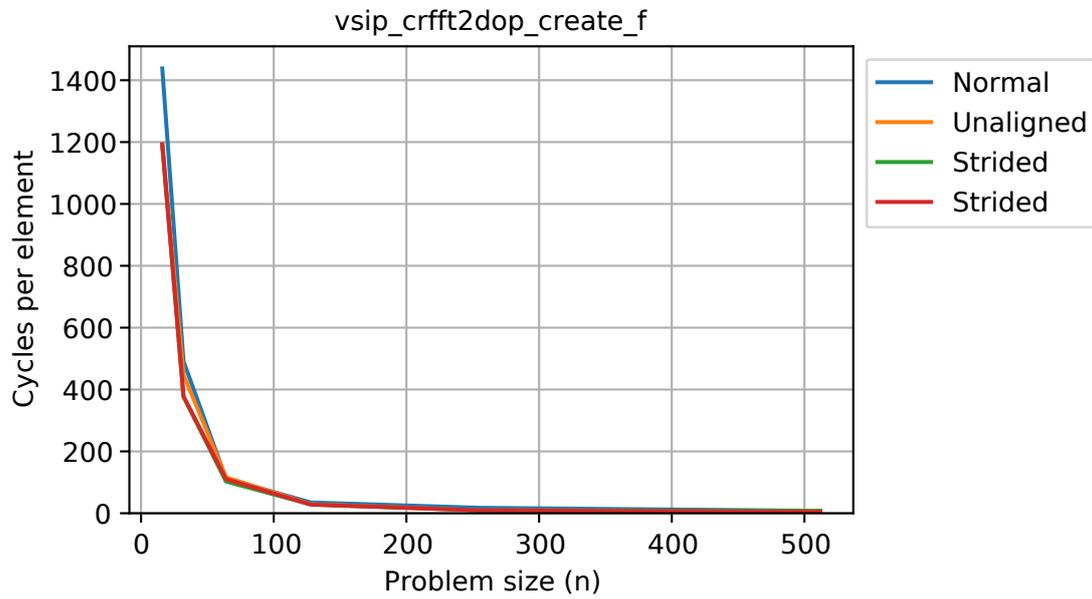


vsip_rcfftmop_f

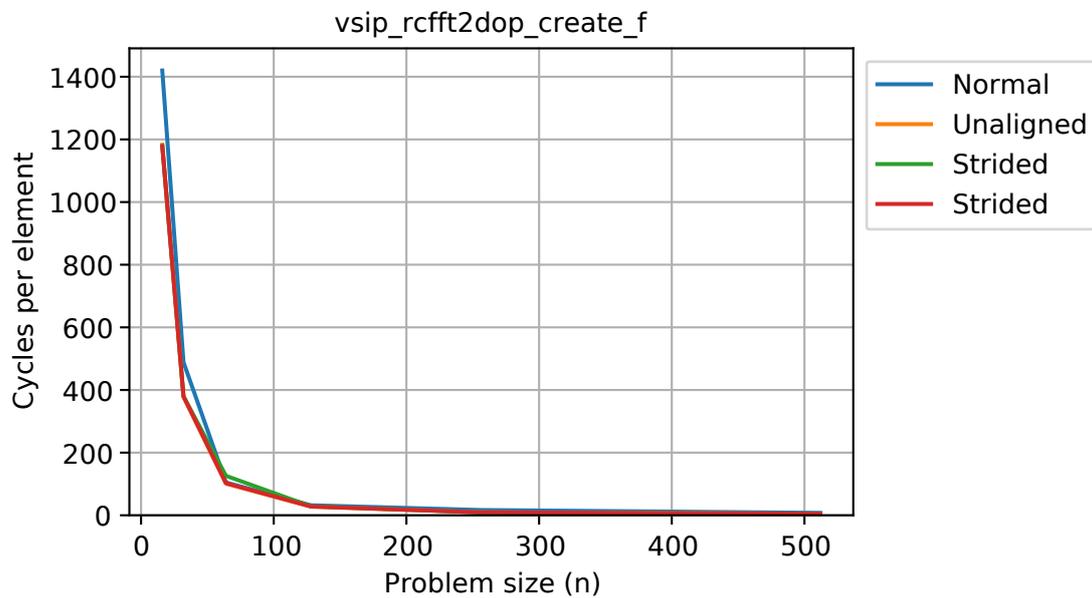


vsip_ccfft2dip_create_f**vsip_ccfft2dop_create_f**

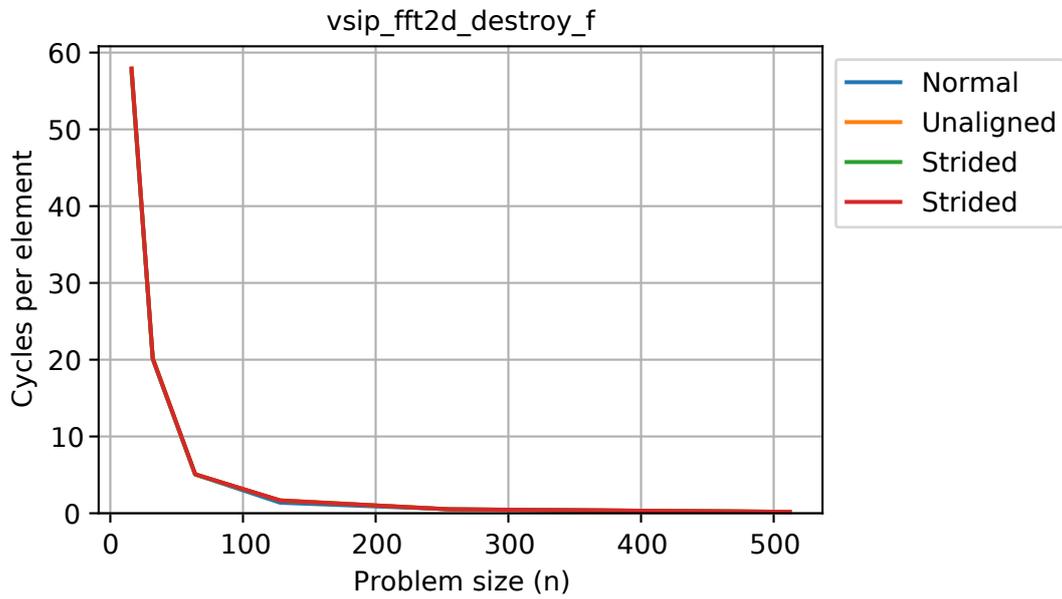
vsip_crfft2dop_create_f



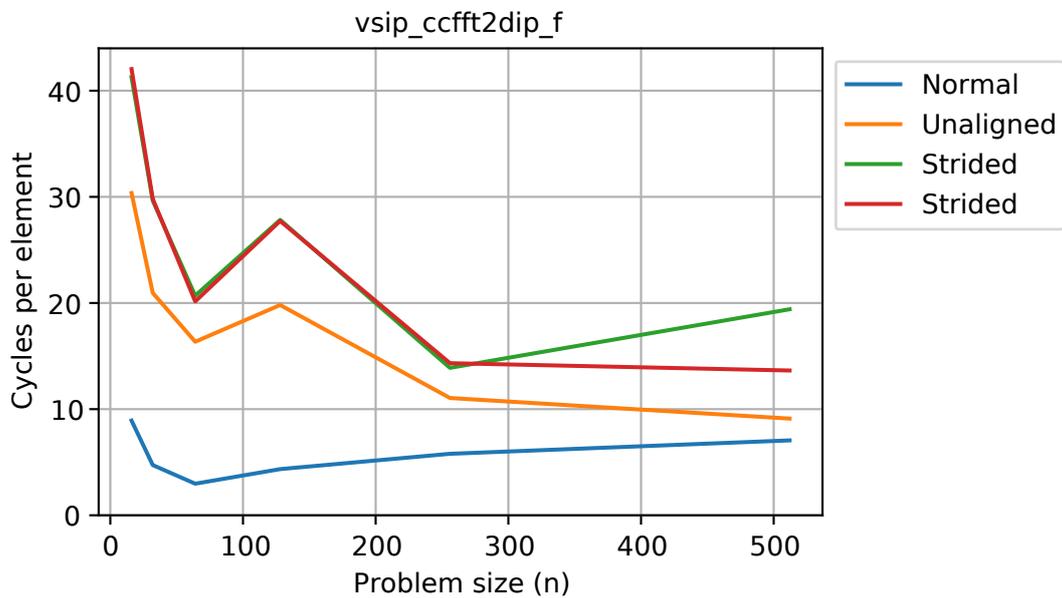
vsip_rcfft2dop_create_f



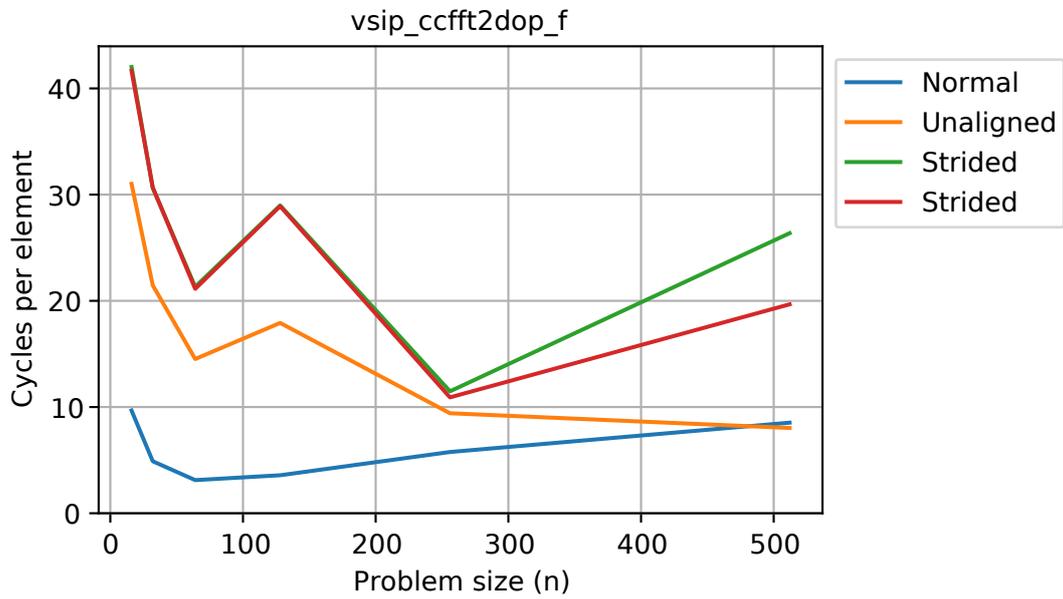
vsip_fft2d_destroy_f



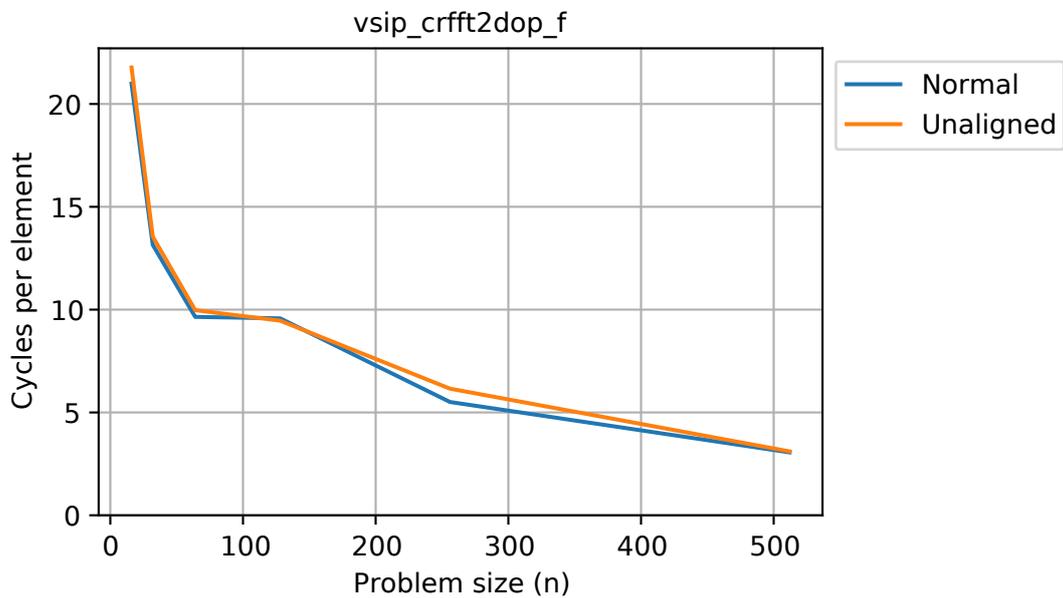
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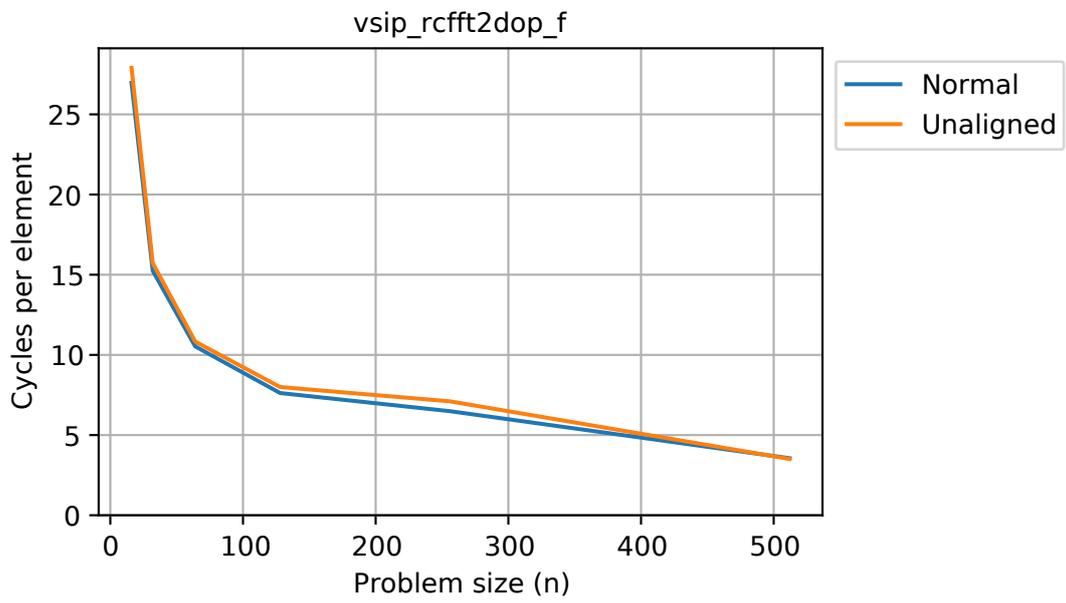


vsip_ccfft2dop_f



vsip_crfft2dop_f

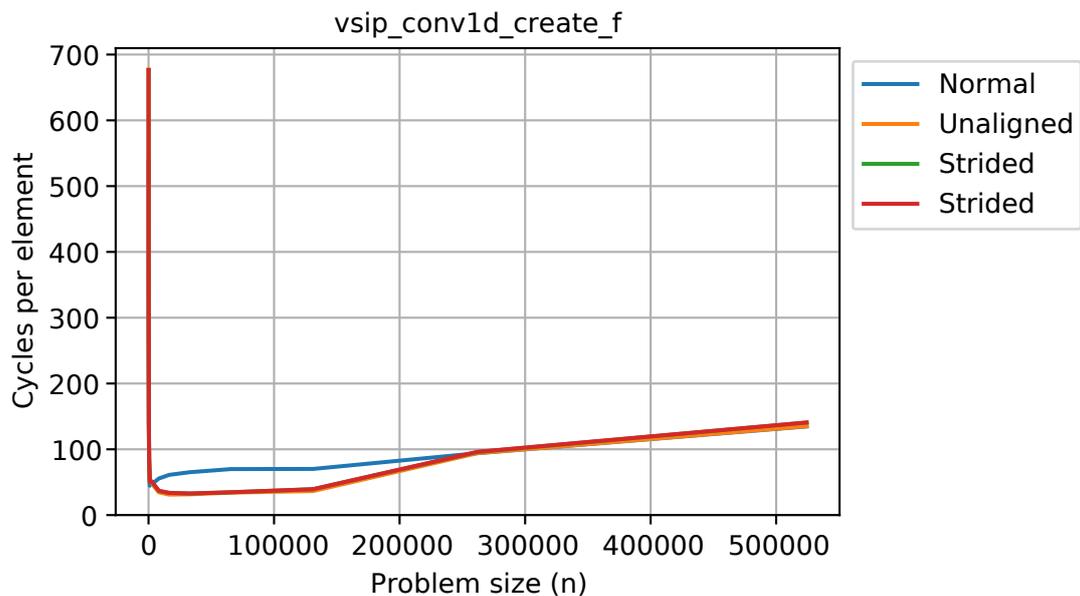


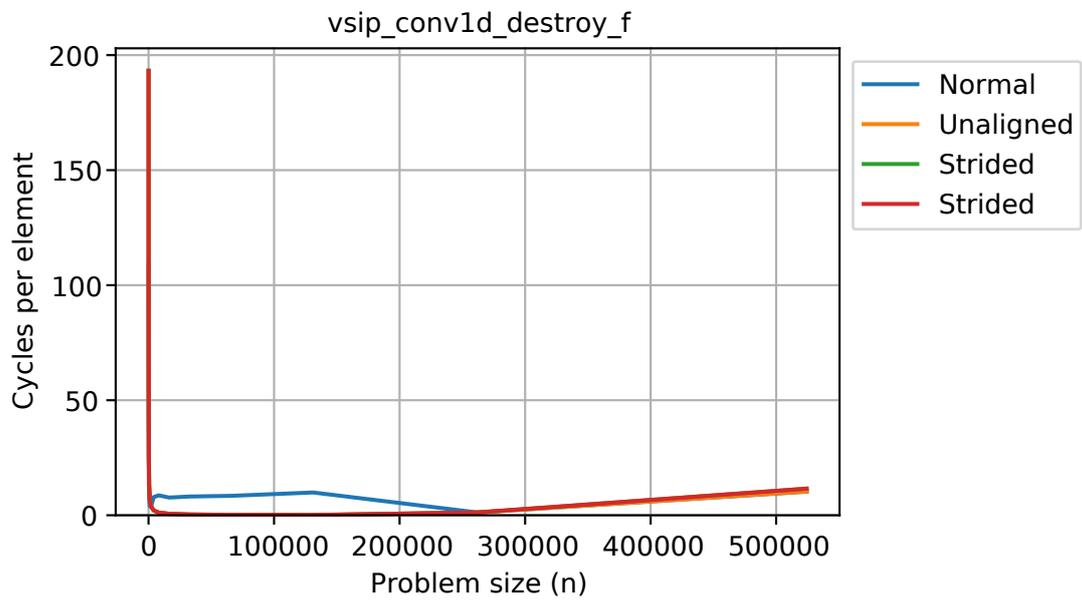
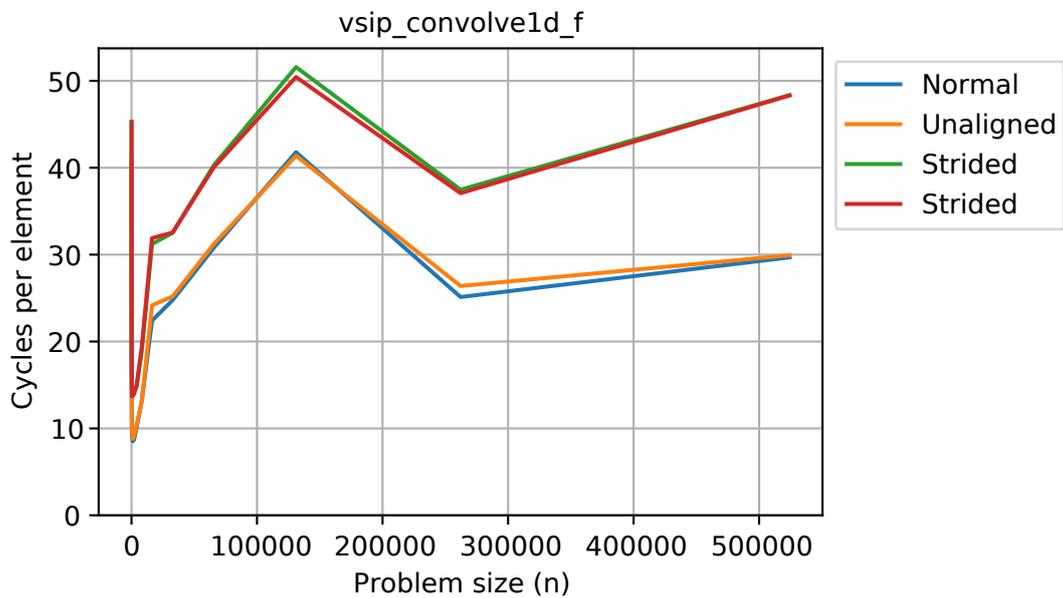
vsip_rcfft2dop_f

3.2 Convolution/Correlation Functions

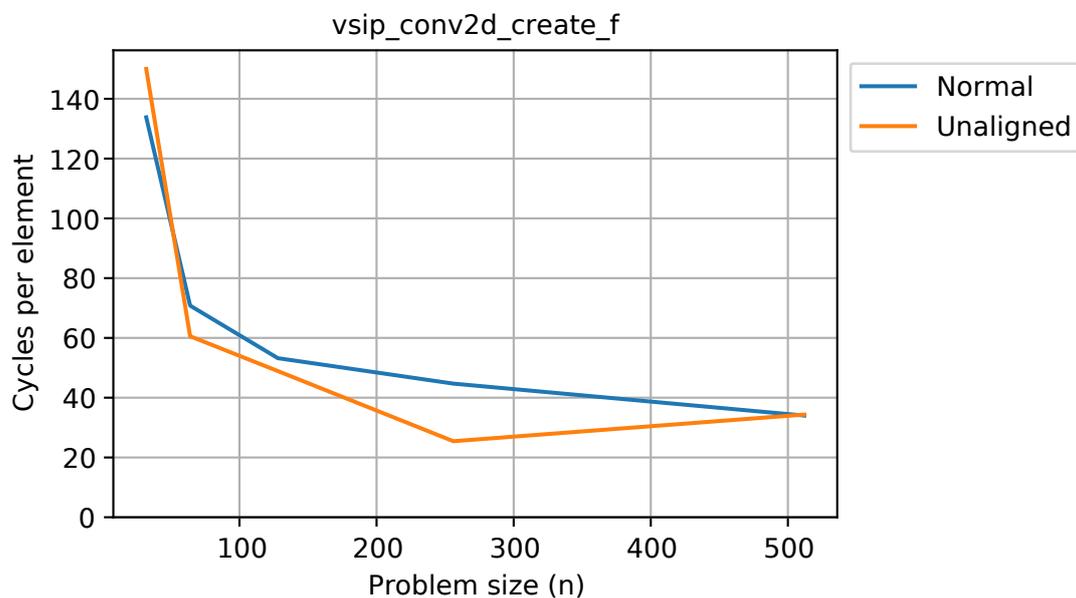
- `vsip_conv1d_create_f`
- `vsip_conv1d_destroy_f`
- `vsip_convolve1d_f`
- `vsip_conv2d_create_f`
- `vsip_conv2d_destroy_f`
- `vsip_convolve2d_f`
- `vsip_Dcorr1d_create_P`
- `vsip_Dcorr1d_destroy_P`
- `vsip_Dcorrelate1d_P`
- `vsip_Dcorr2d_create_P`
- `vsip_Dcorr2d_destroy_P`
- `vsip_Dcorrelate2d_P`

`vsip_conv1d_create_f`

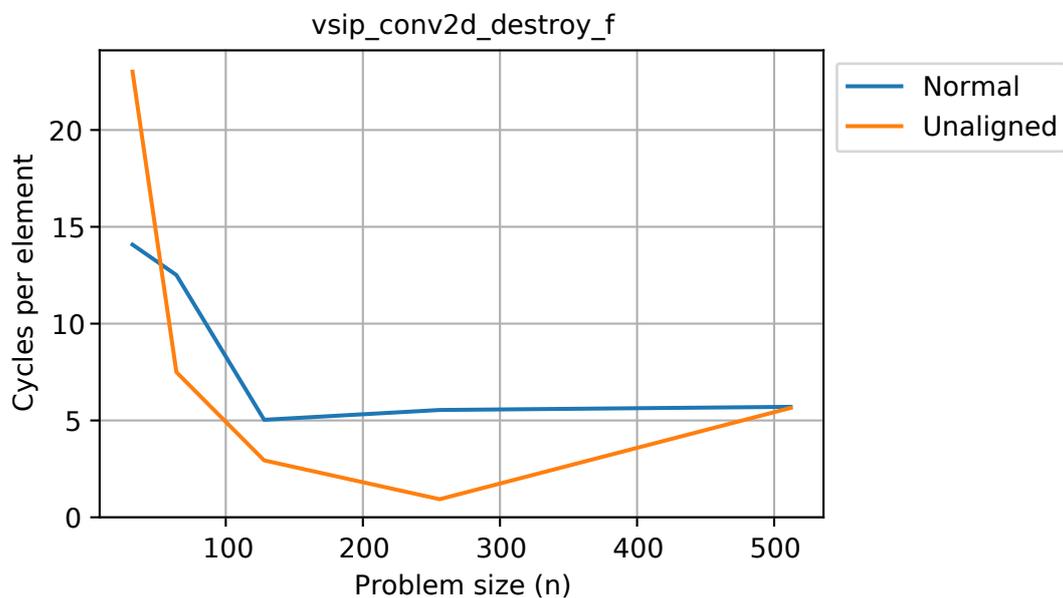


vsip_conv1d_destroy_f**vsip_convolve1d_f**

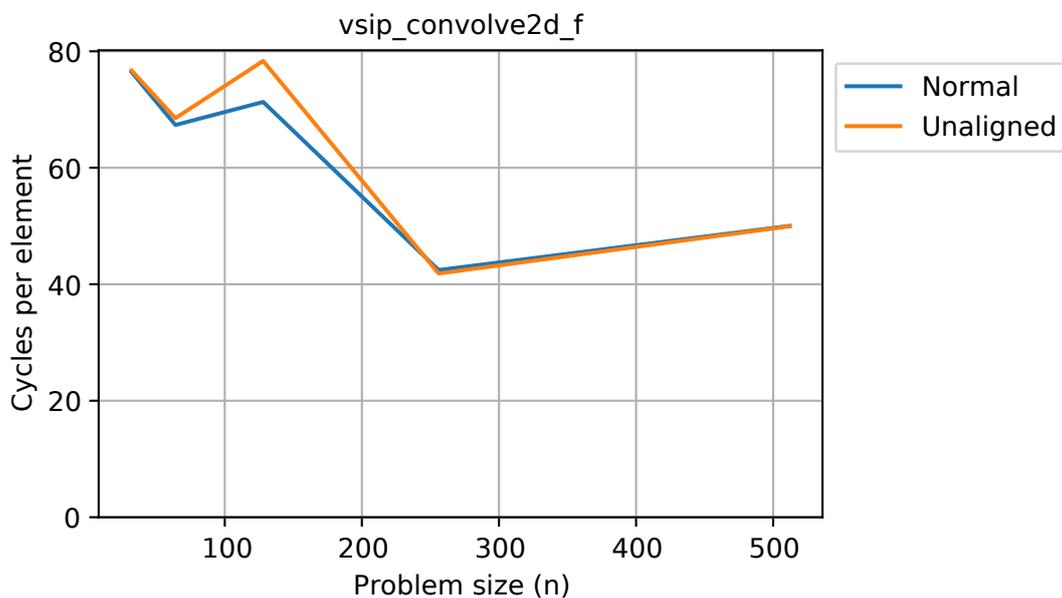
vsip_conv2d_create_f



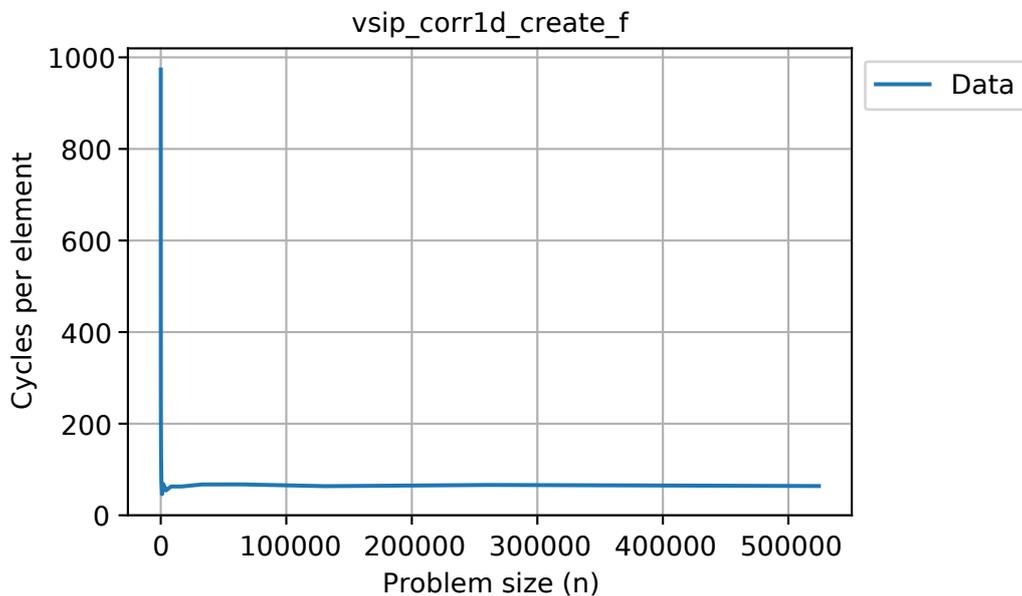
vsip_conv2d_destroy_f

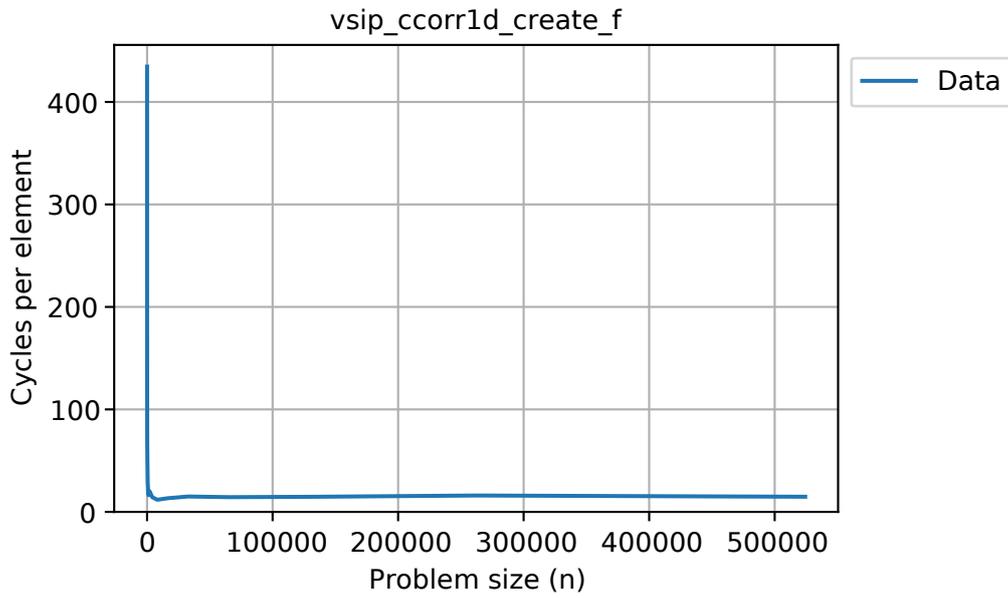


vsip_convolve2d_f

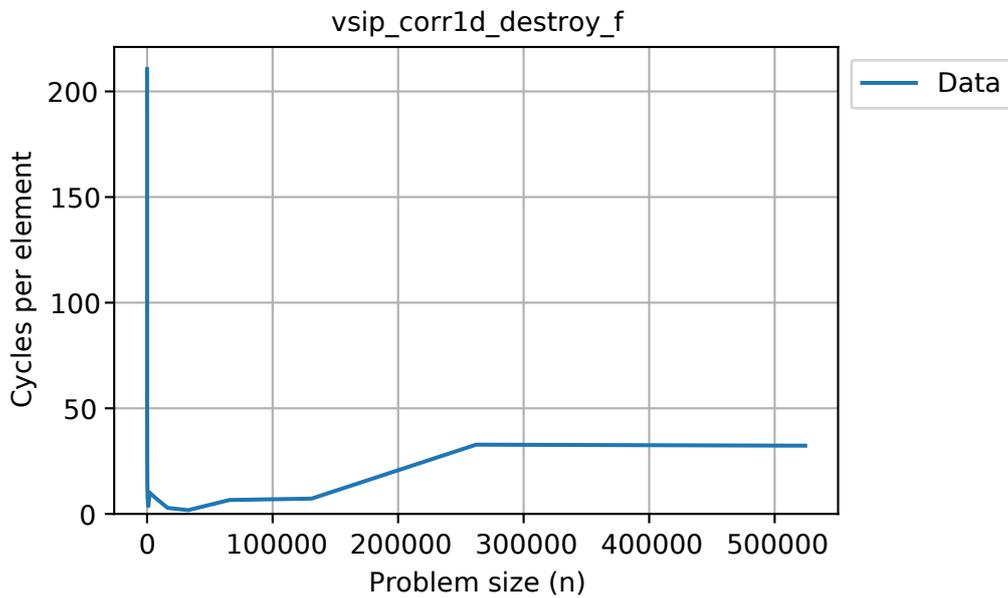


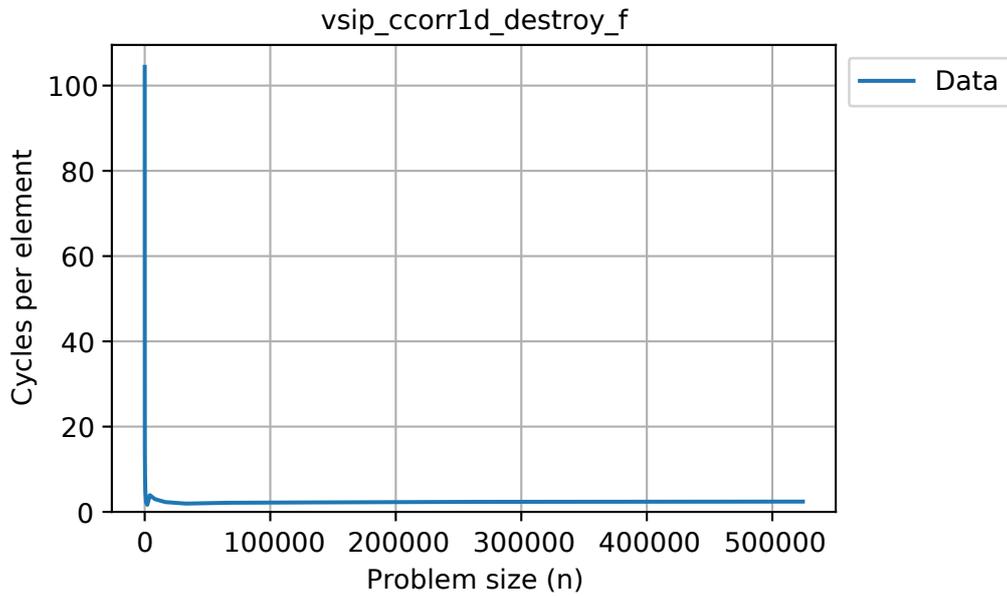
vsip_Dcorr1d_create_P



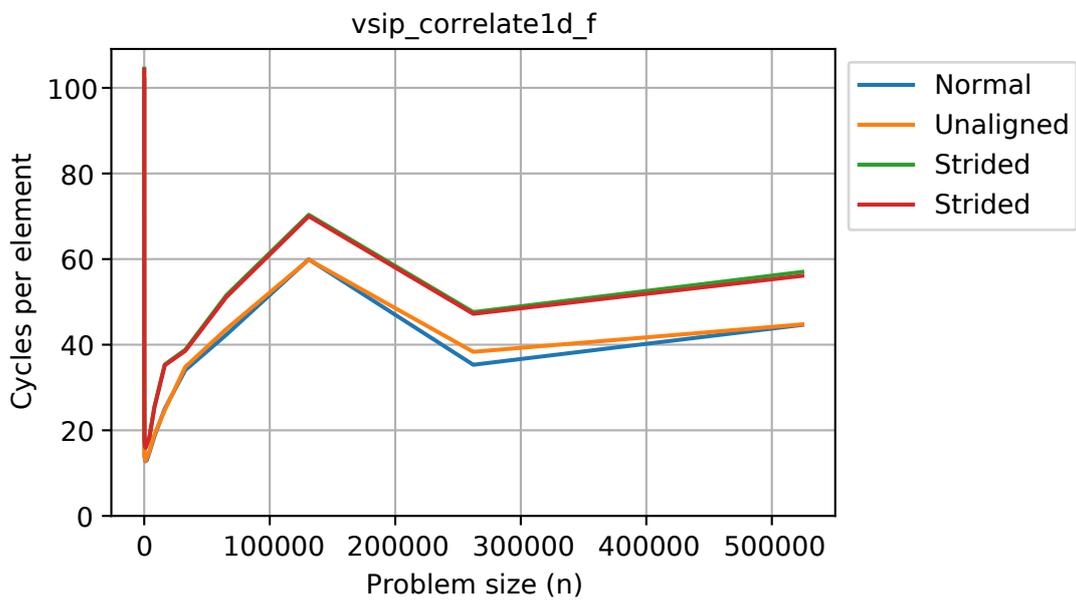


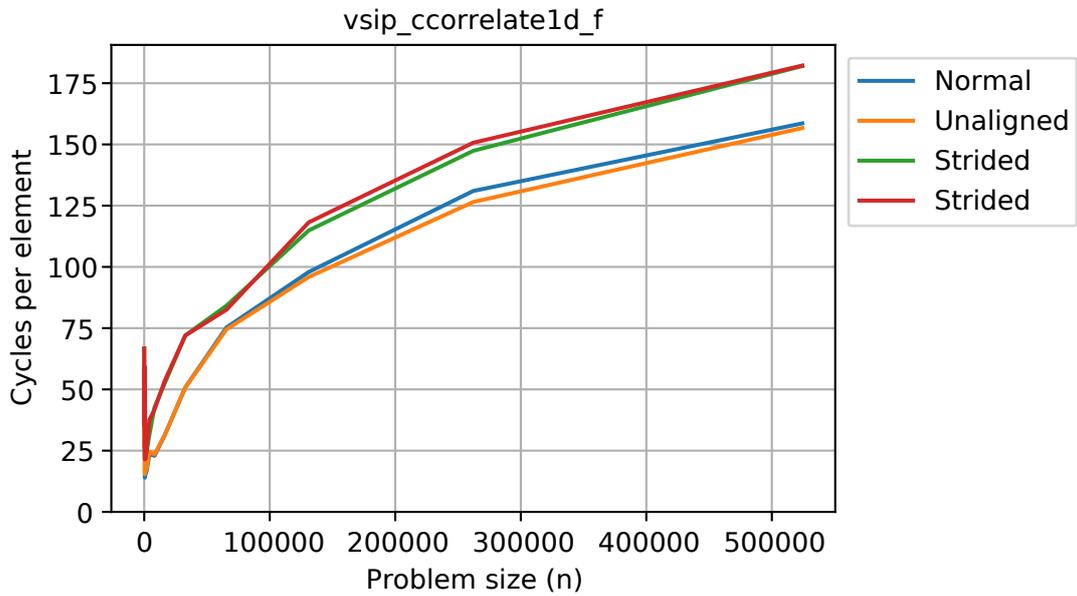
vsip_Dcorr1d_destroy_P



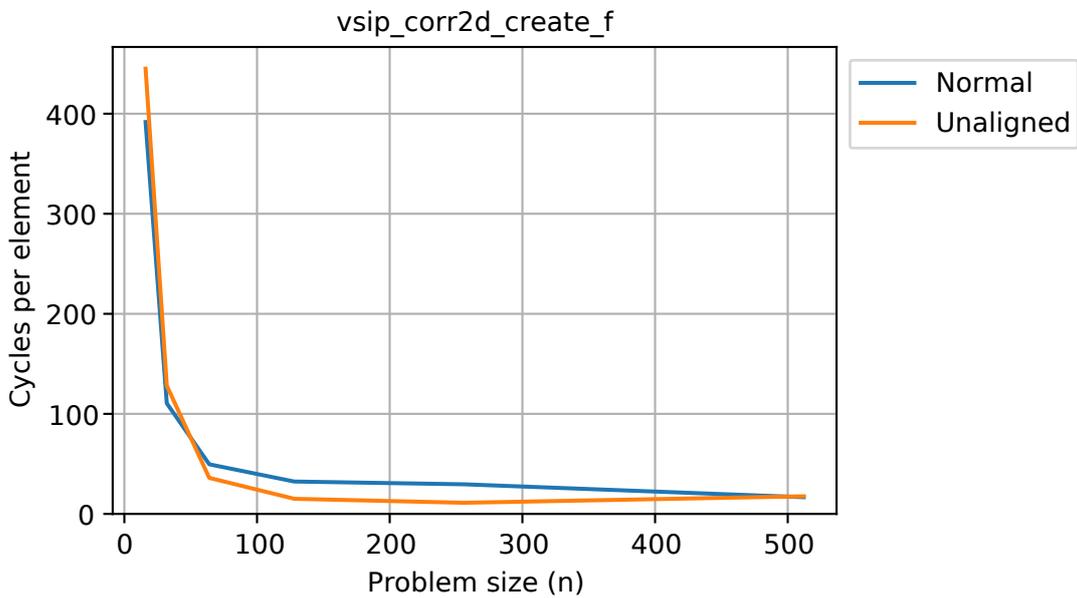


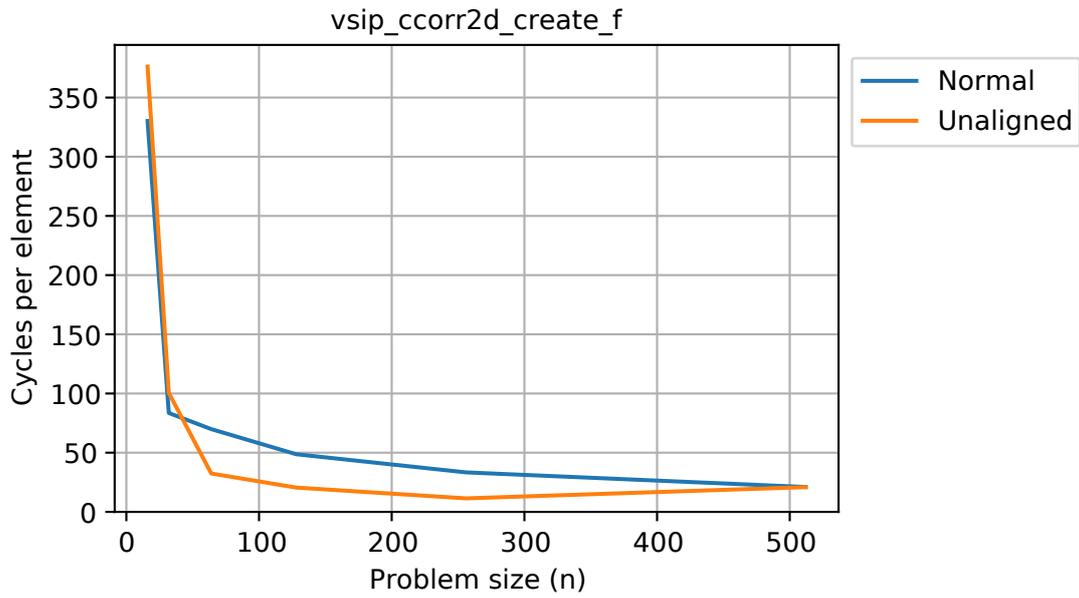
vsip_Dcorrelate1d_P



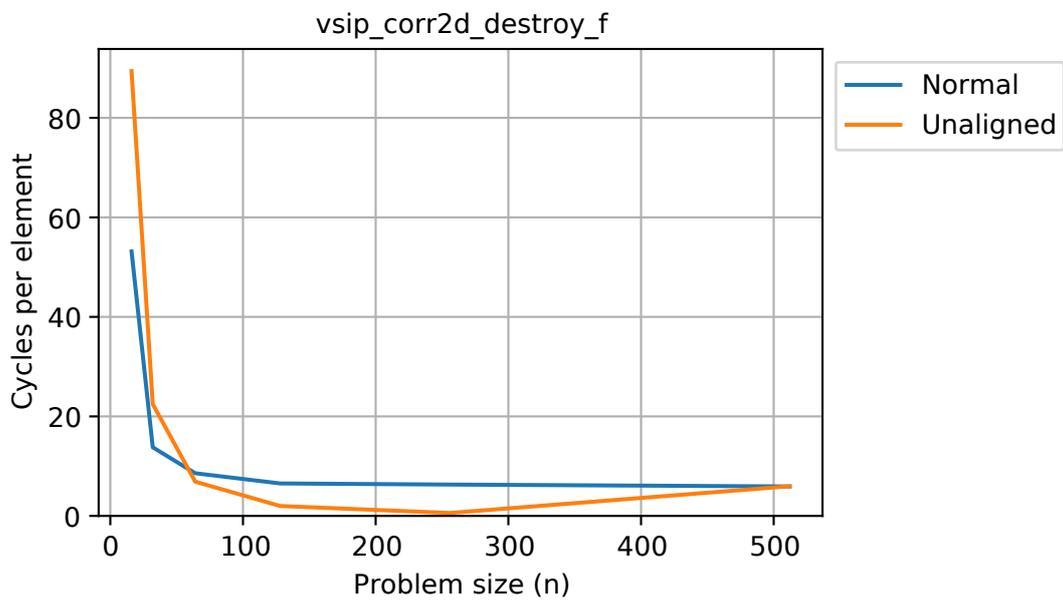


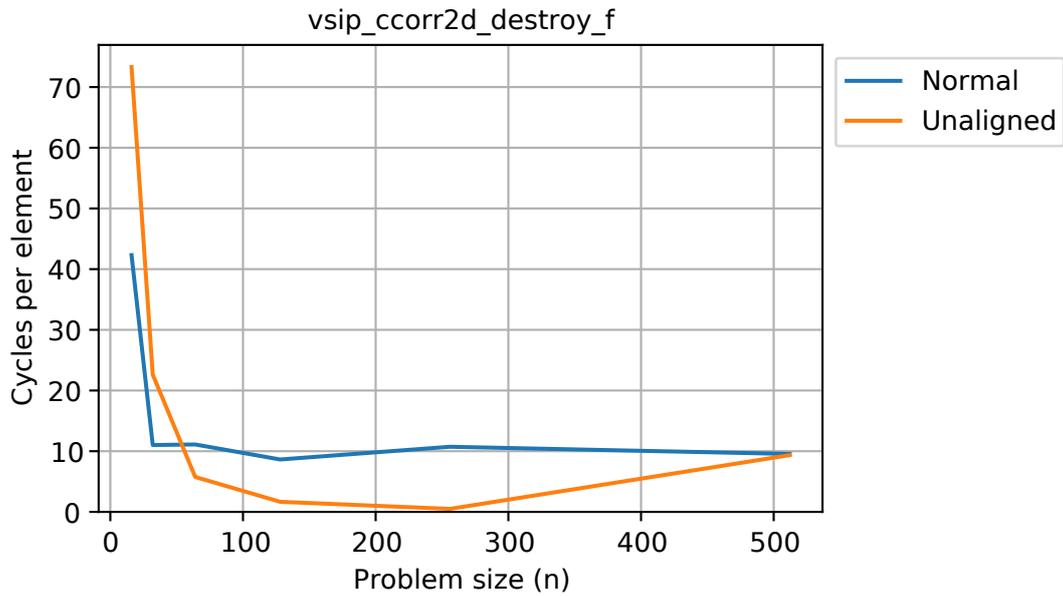
vsip_Dcorr2d_create_P



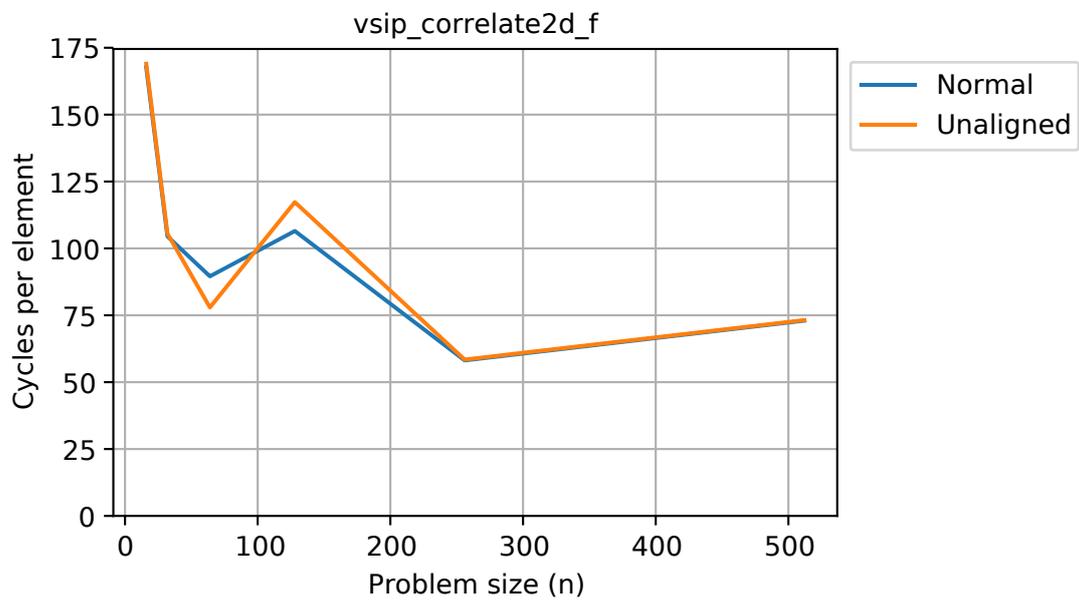


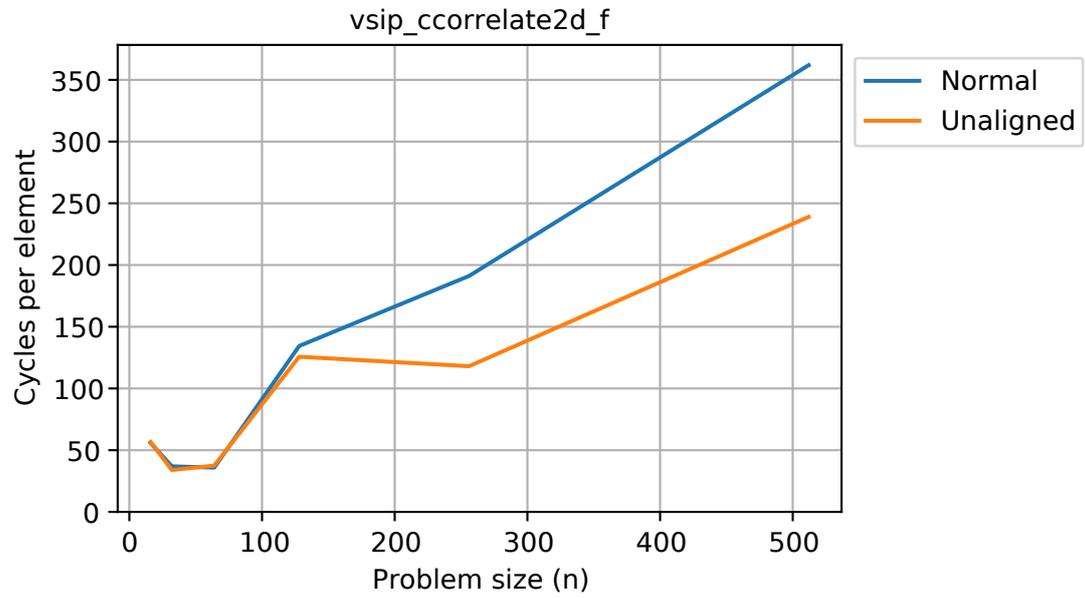
vsip_Dcorr2d_destroy_P





vsip_Dcorrelate2d_P

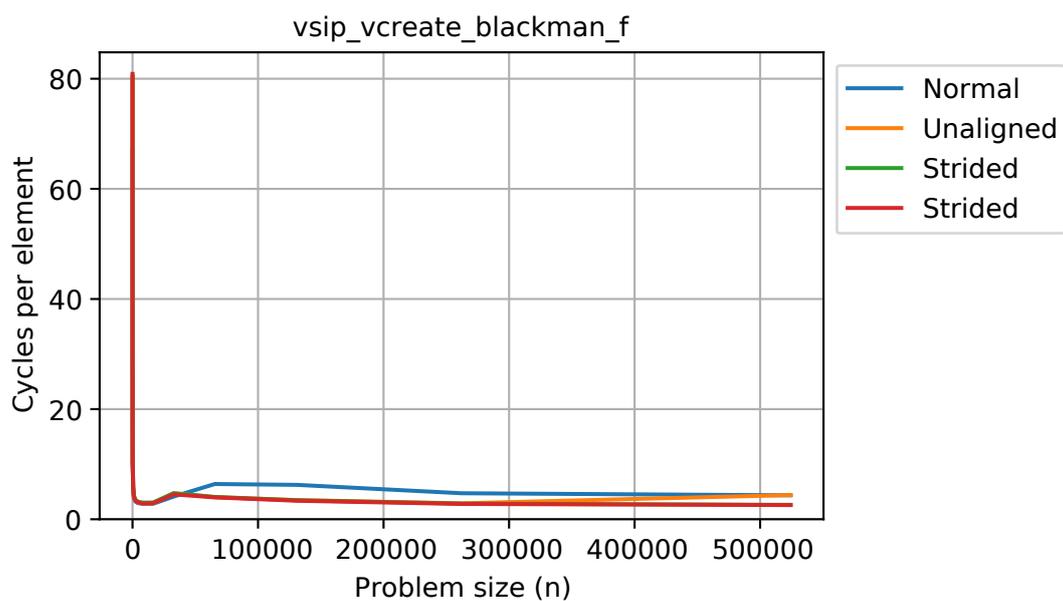




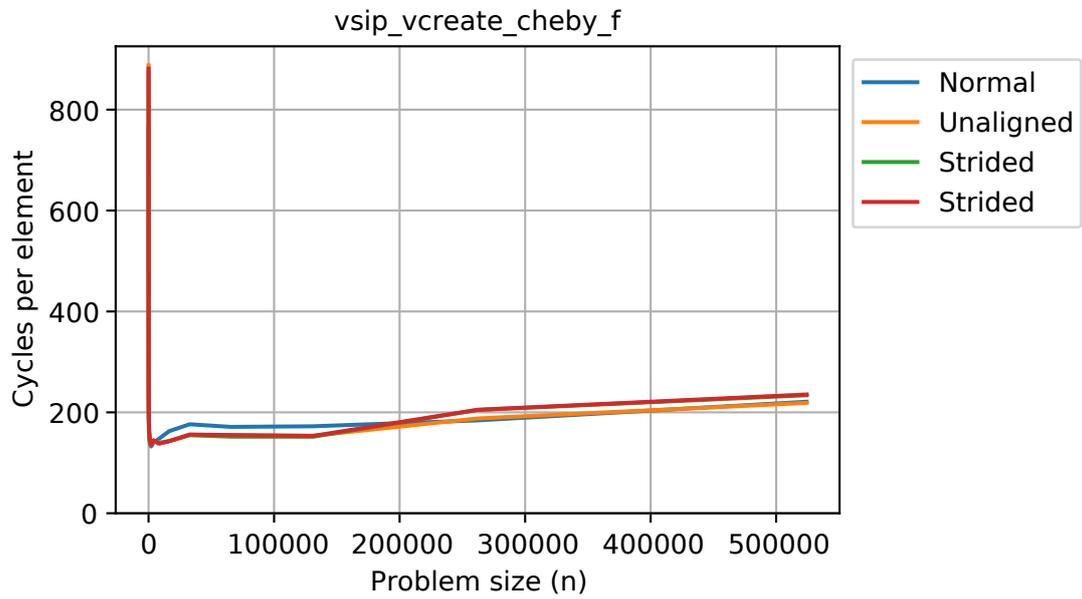
3.3 Window Functions

- `vsip_vcreate_blackman_f`
- `vsip_vcreate_cheby_f`
- `vsip_vcreate_hanning_f`
- `vsip_vcreate_kaiser_f`

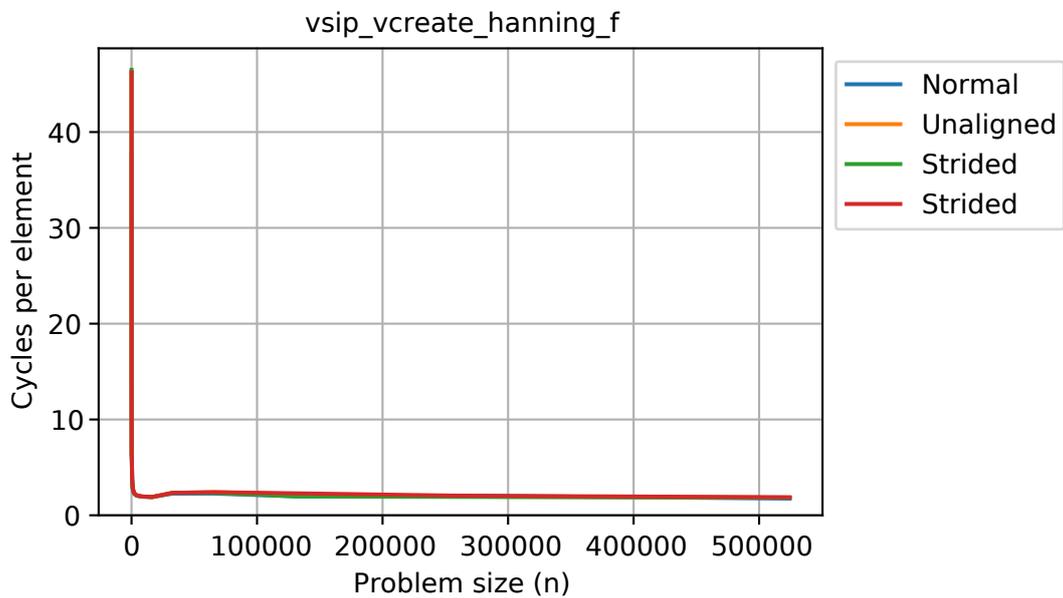
`vsip_vcreate_blackman_f`

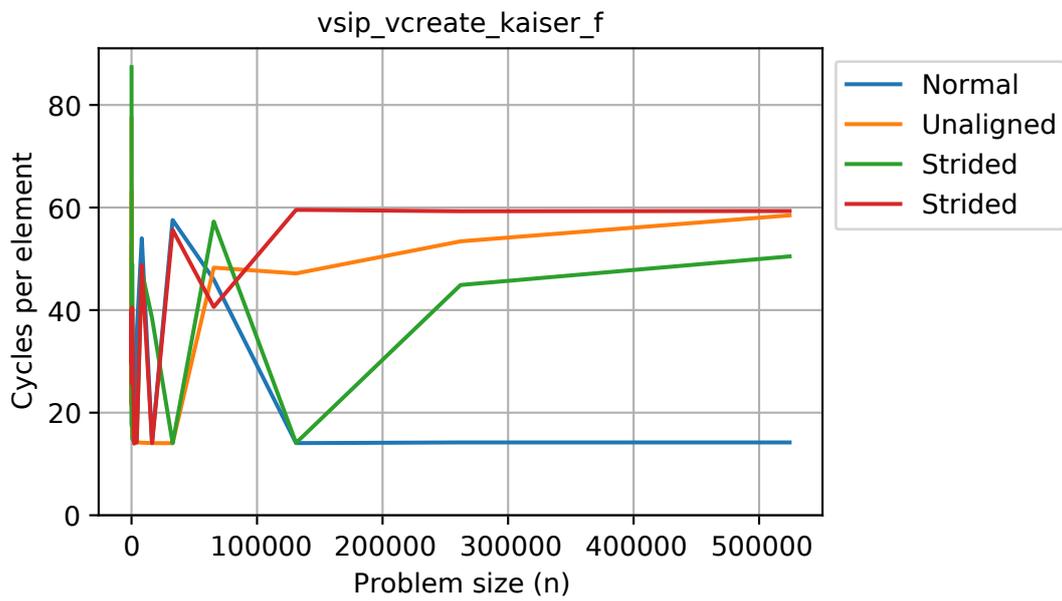


vsip_vcreate_cheby_f



vsip_vcreate_hanning_f

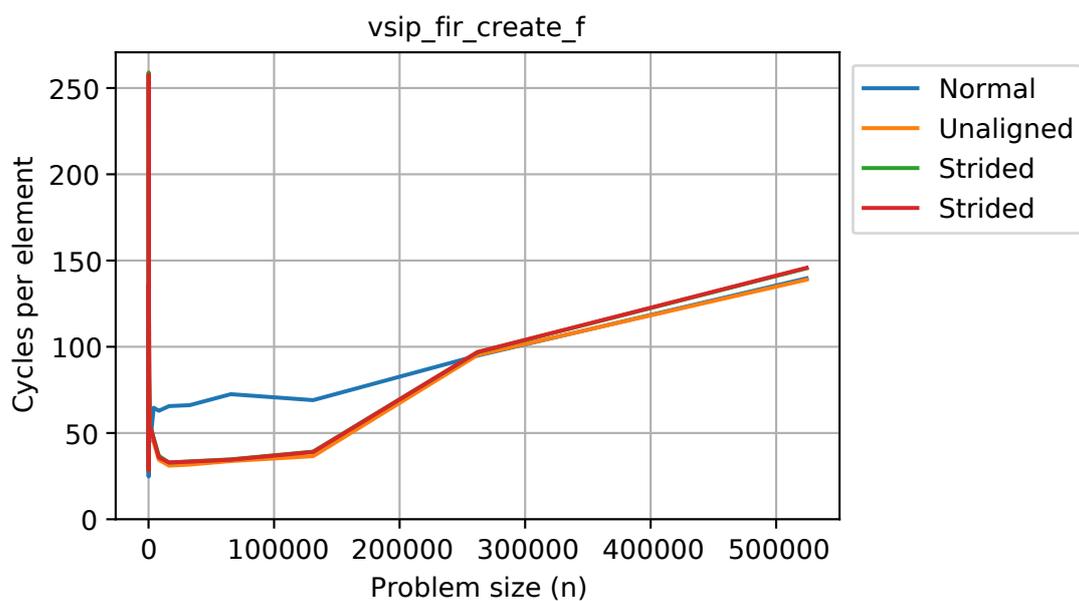


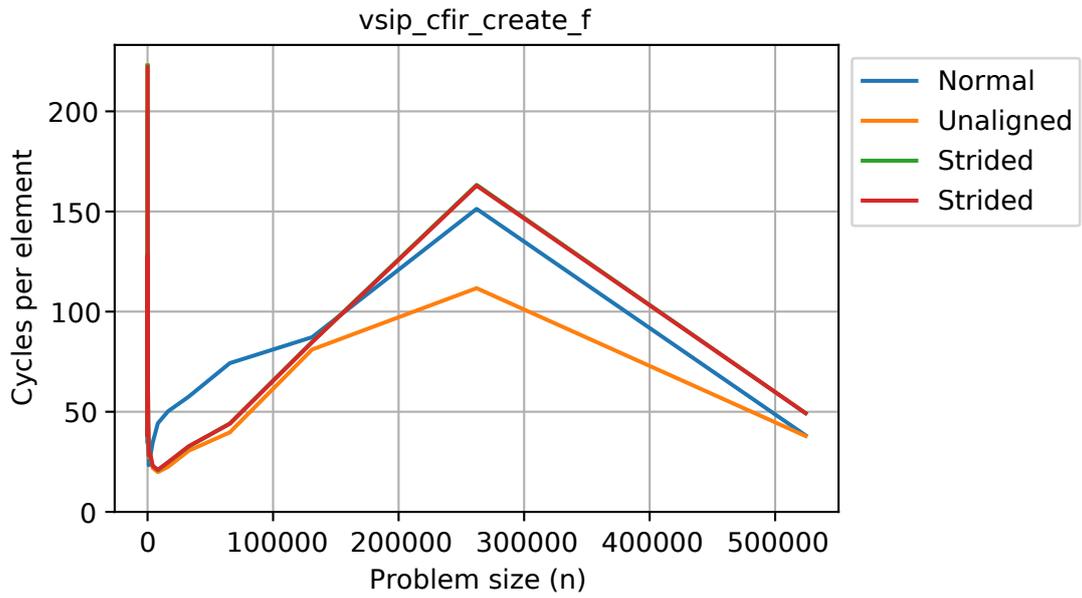
vsip_vcreate_kaiser_f

3.4 Filter Functions

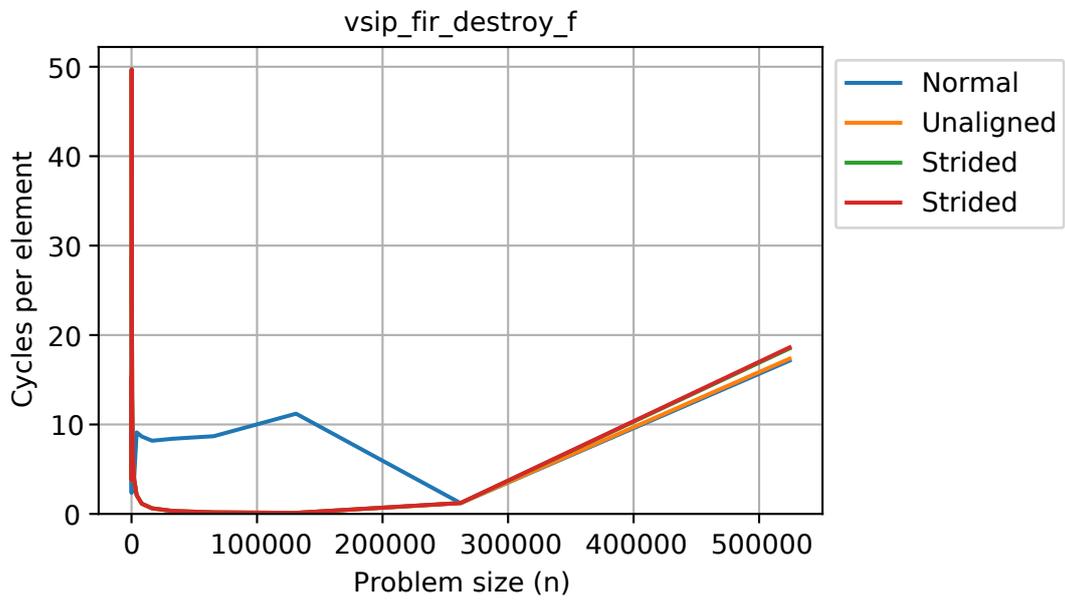
- `vsip_Dfir_create_P`
- `vsip_Dfir_destroy_P`
- `vsip_Dfirflt_P`
- `vsip_Dfir_reset_P`

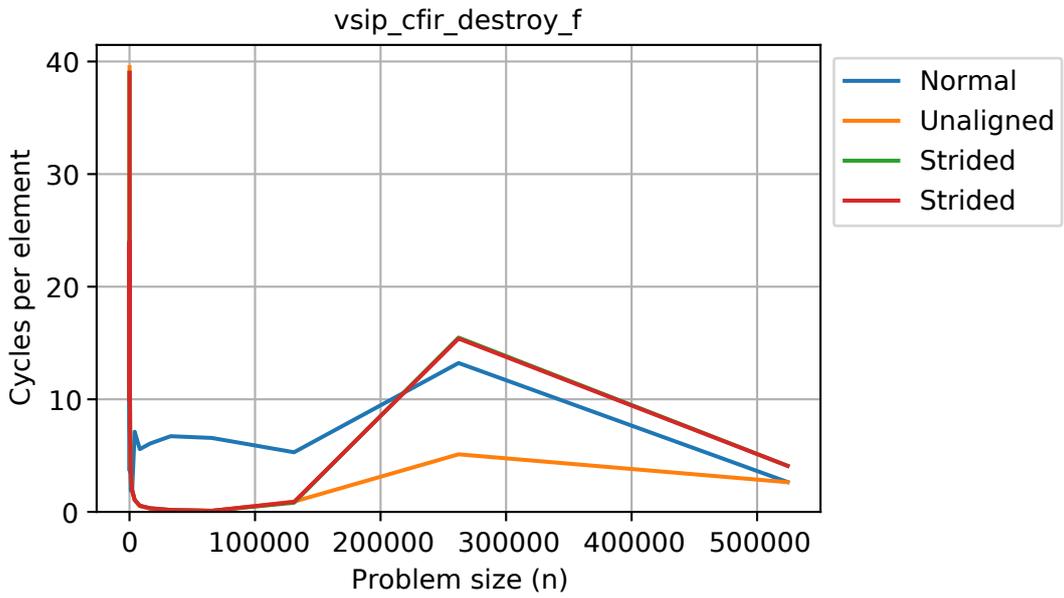
`vsip_Dfir_create_P`



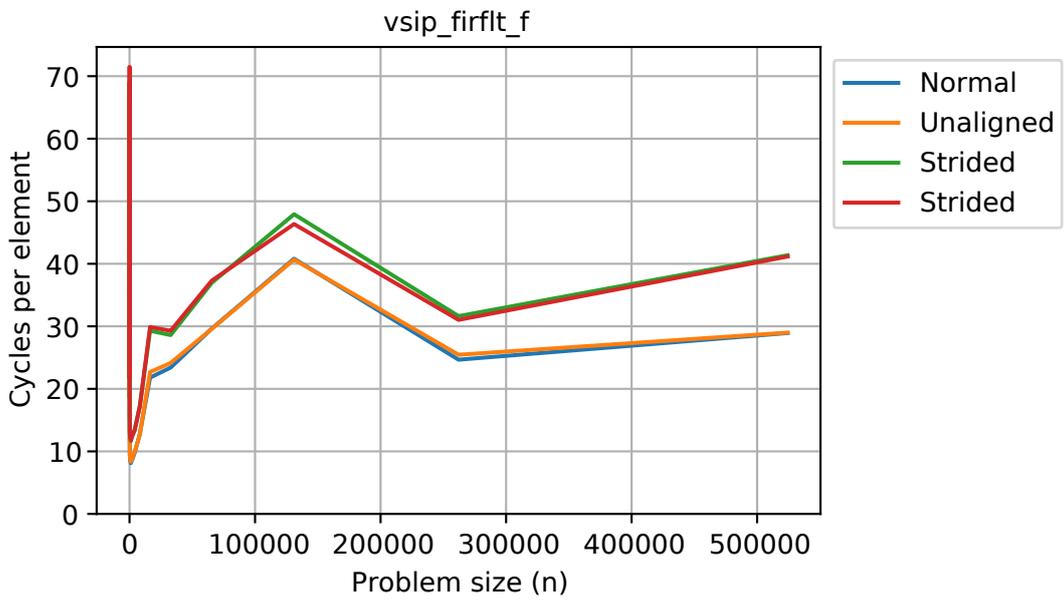


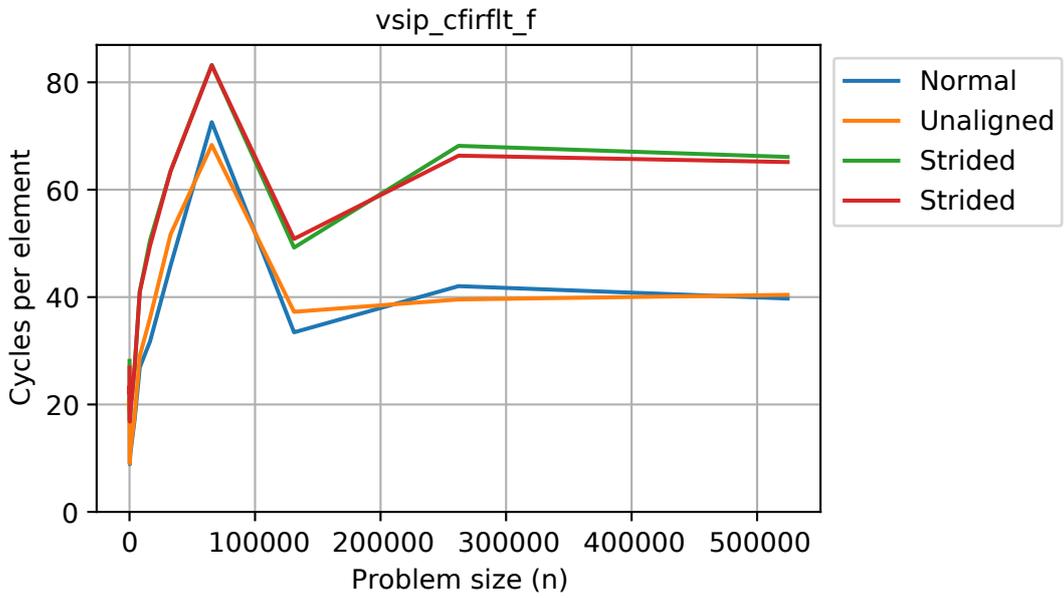
vsip_Dfir_destroy_P





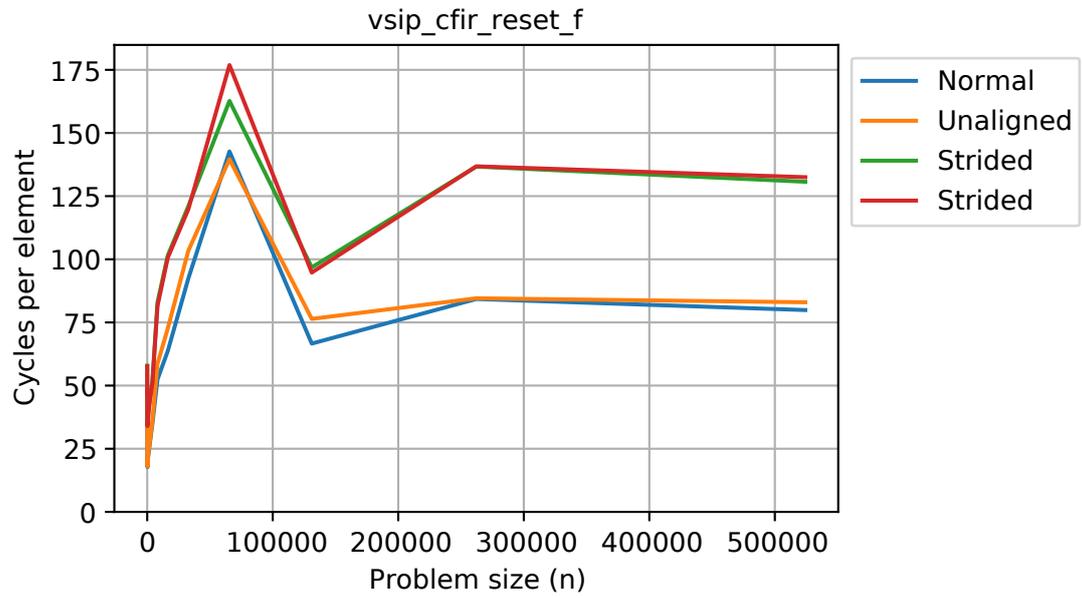
vsip_Dfirflt_P





vsip_Dfir_reset_P

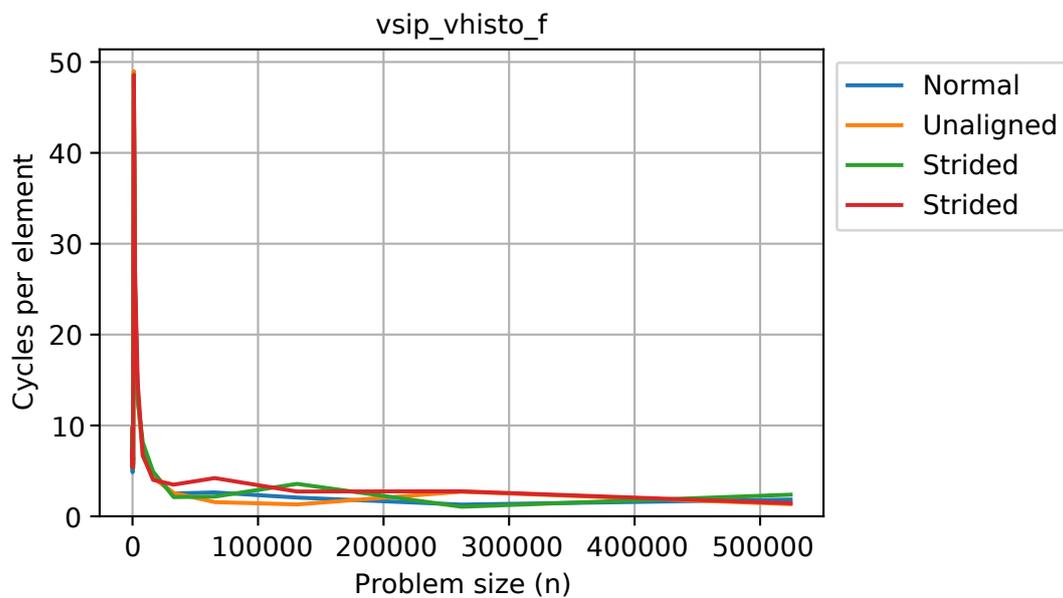




3.5 Miscellaneous Signal Processing Functions

- `vsip_vhisto_f`

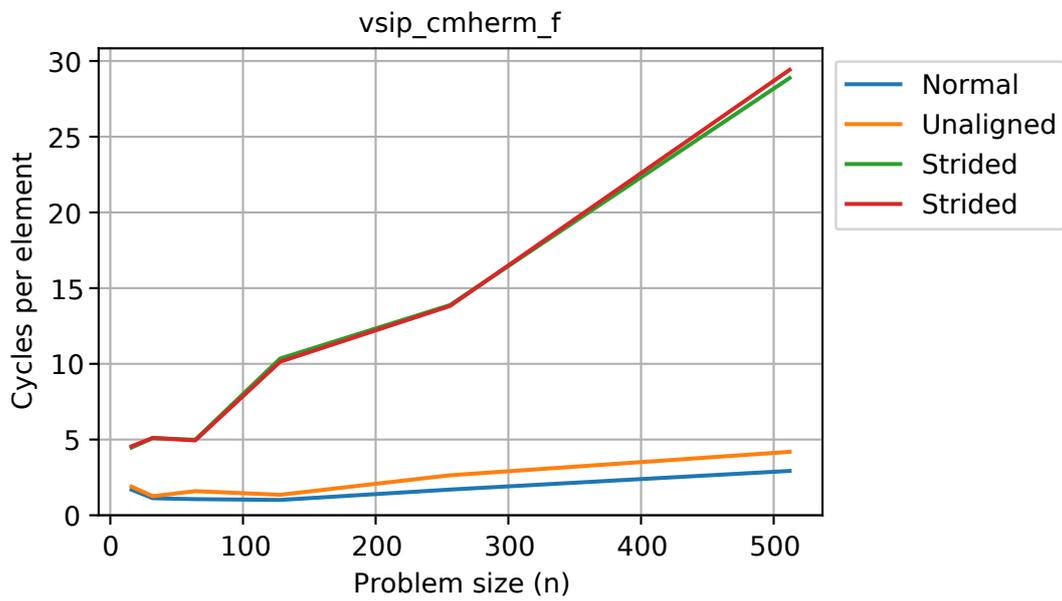
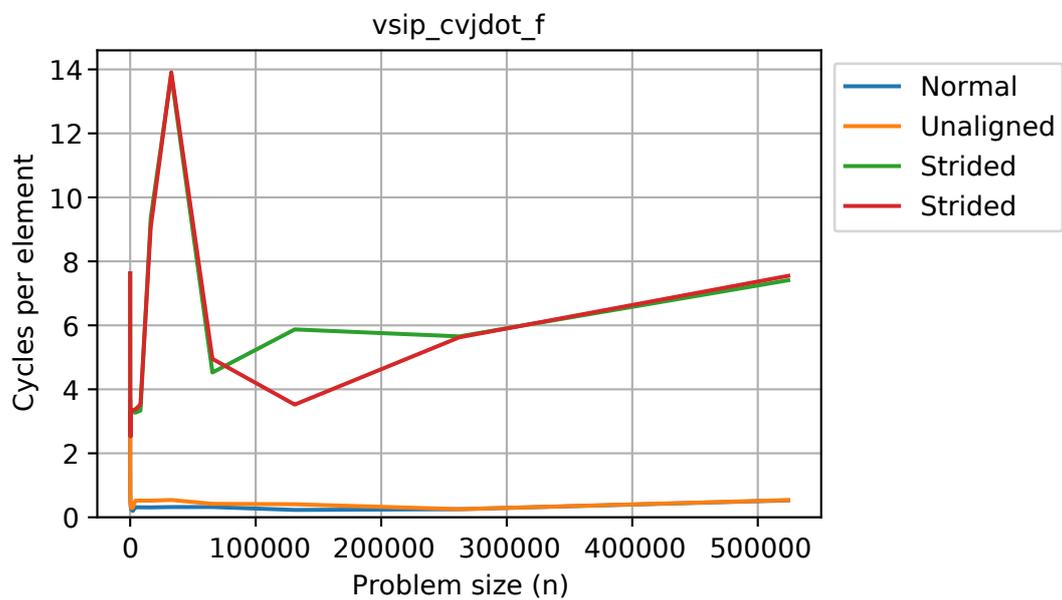
`vsip_vhisto_f`

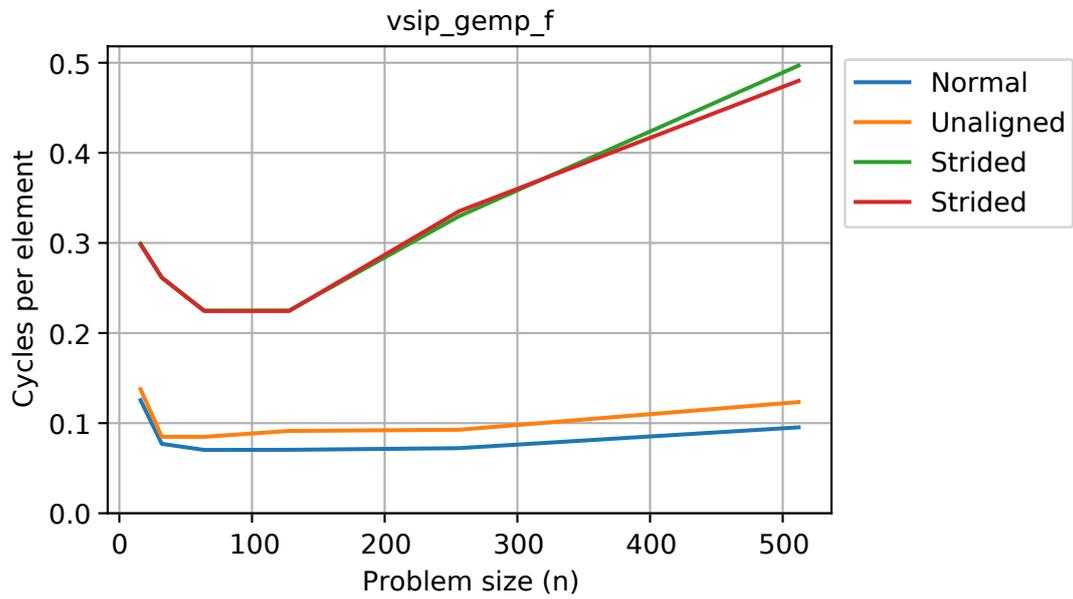
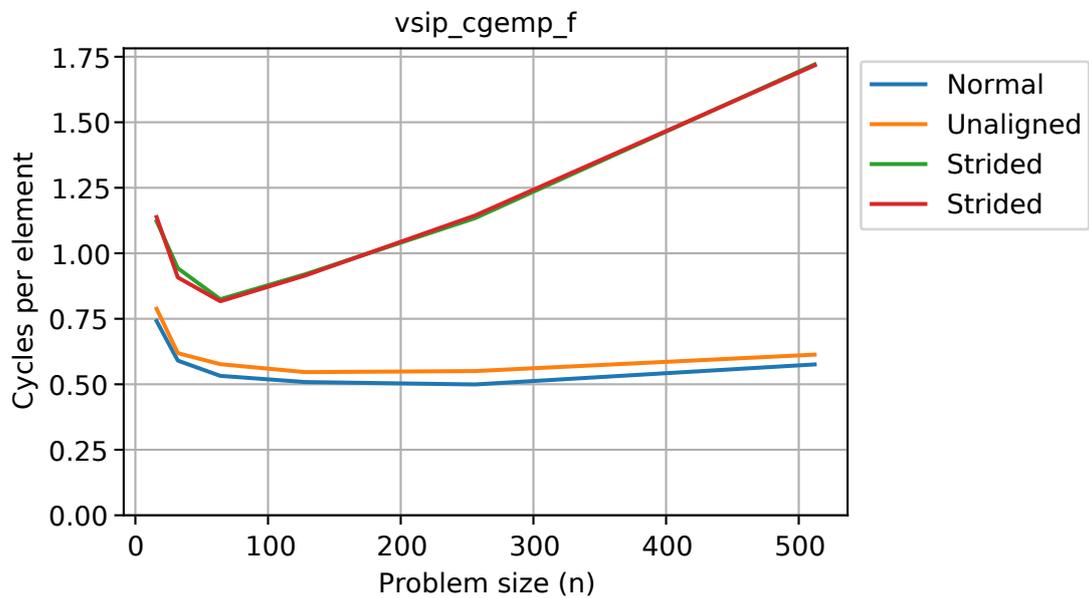


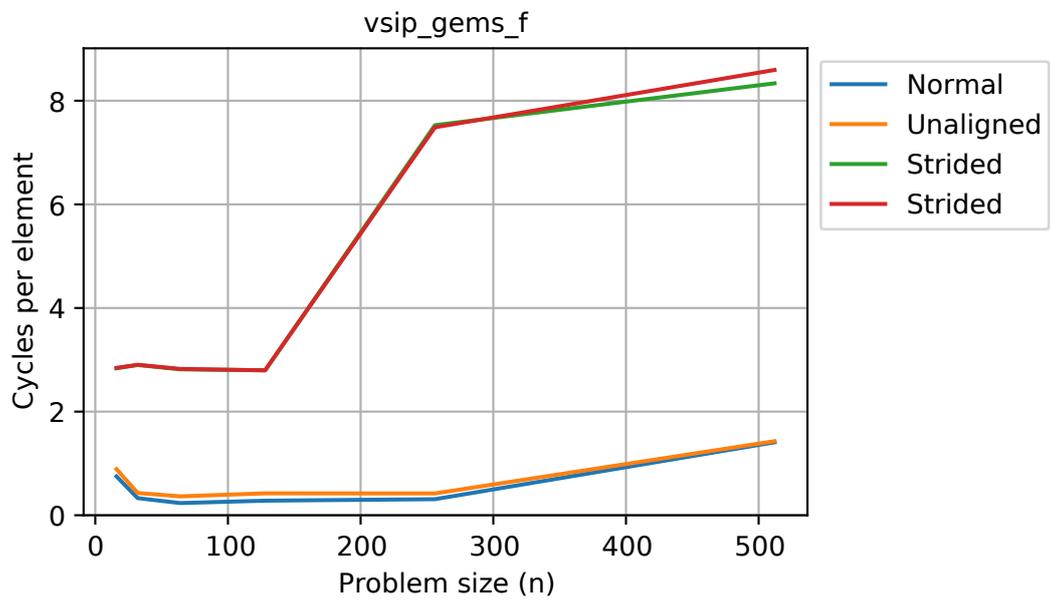
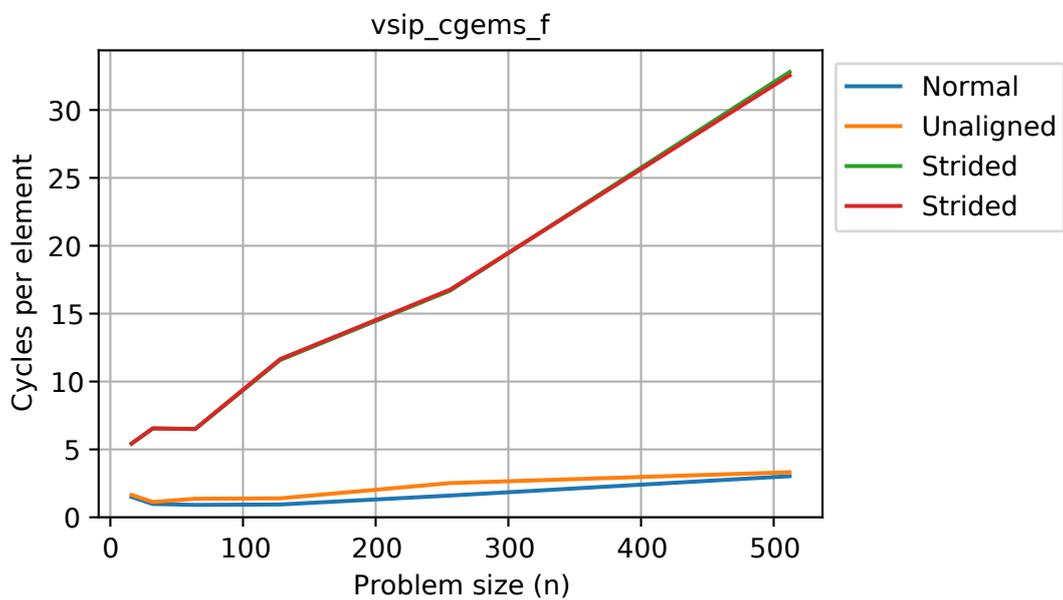
Chapter 4. Linear Algebra

4.1 Matrix and Vector Operations

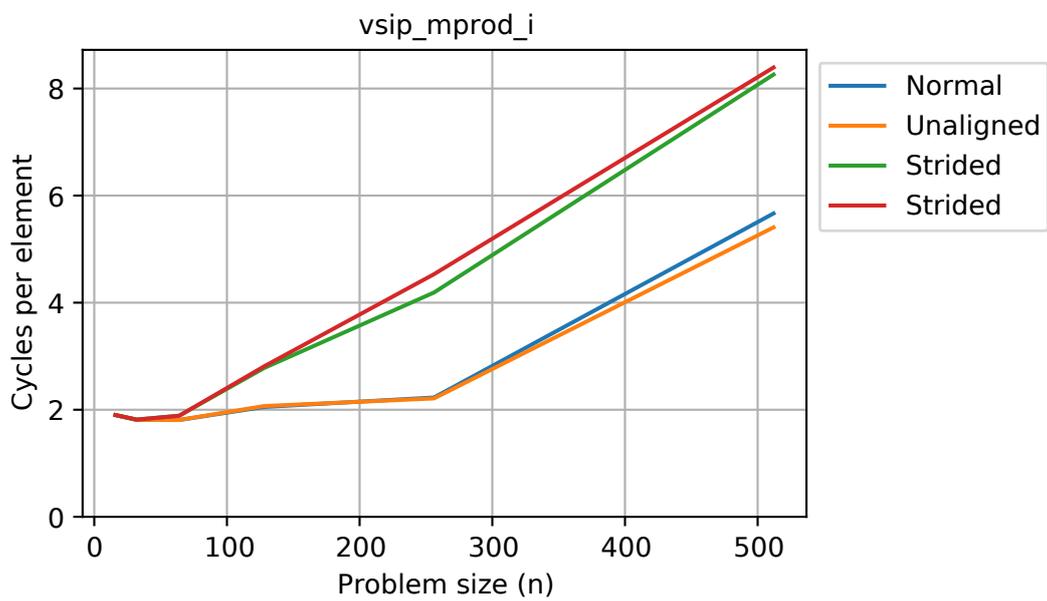
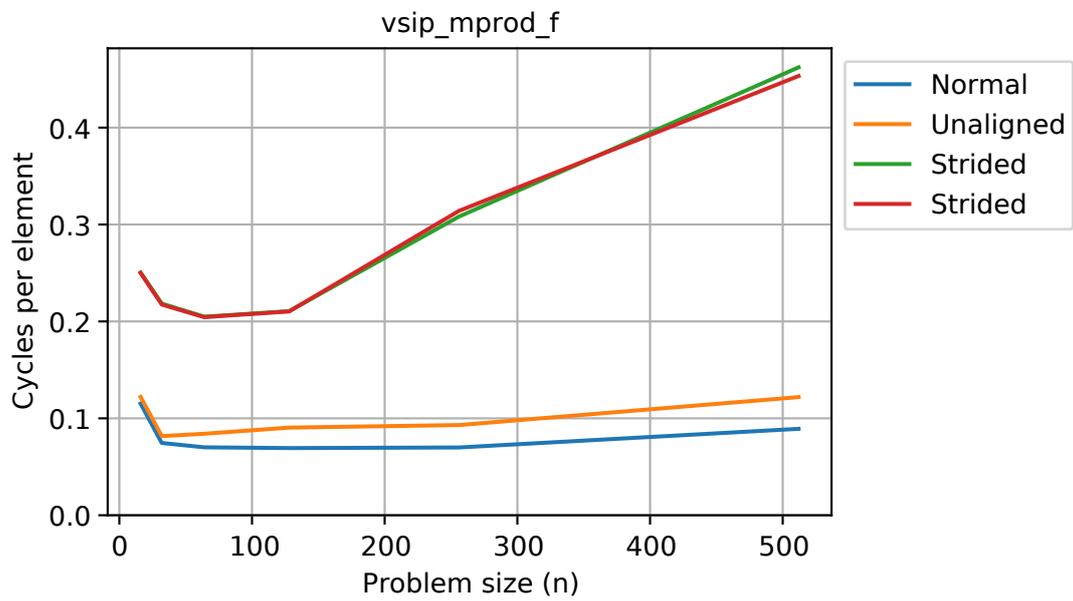
- `vsip_cmherm_f`
- `vsip_cvjdot_f`
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- `vsip_Dmprod_P`
- `vsip_cmprodh_P`
- `vsip_cmprodj_P`
- `vsip_Dmprodt_P`
- `vsip_Dmvprod_P`
- `vsip_Dmtrans_P`
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- `vsip_cvouter_f`

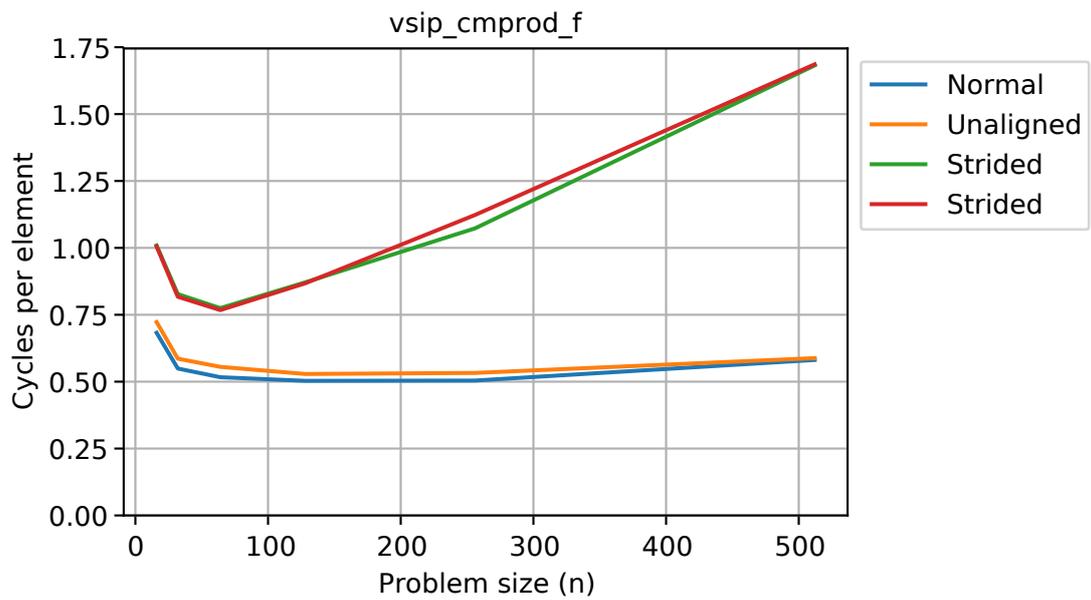
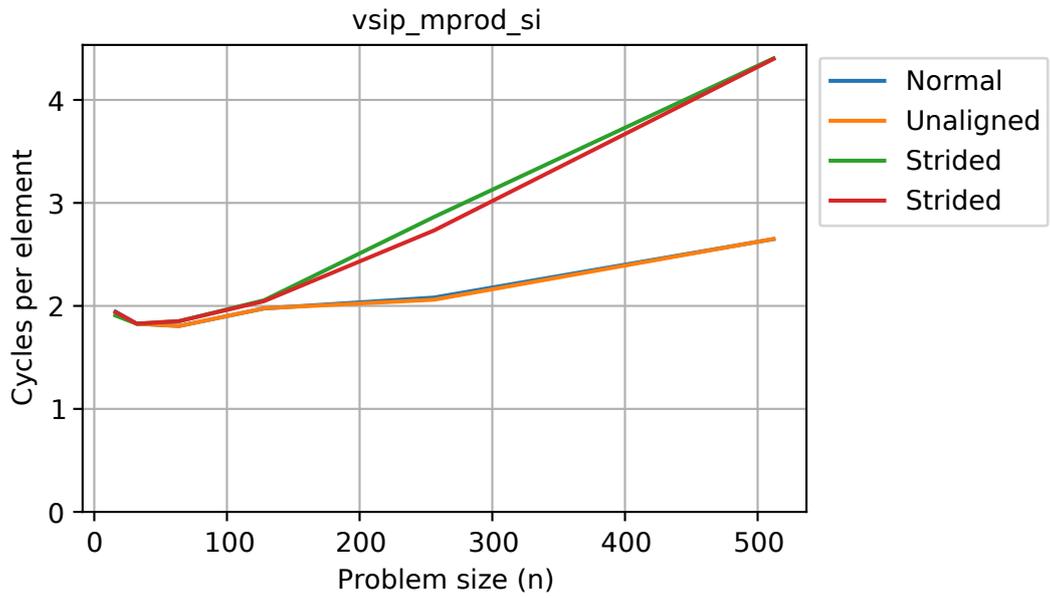
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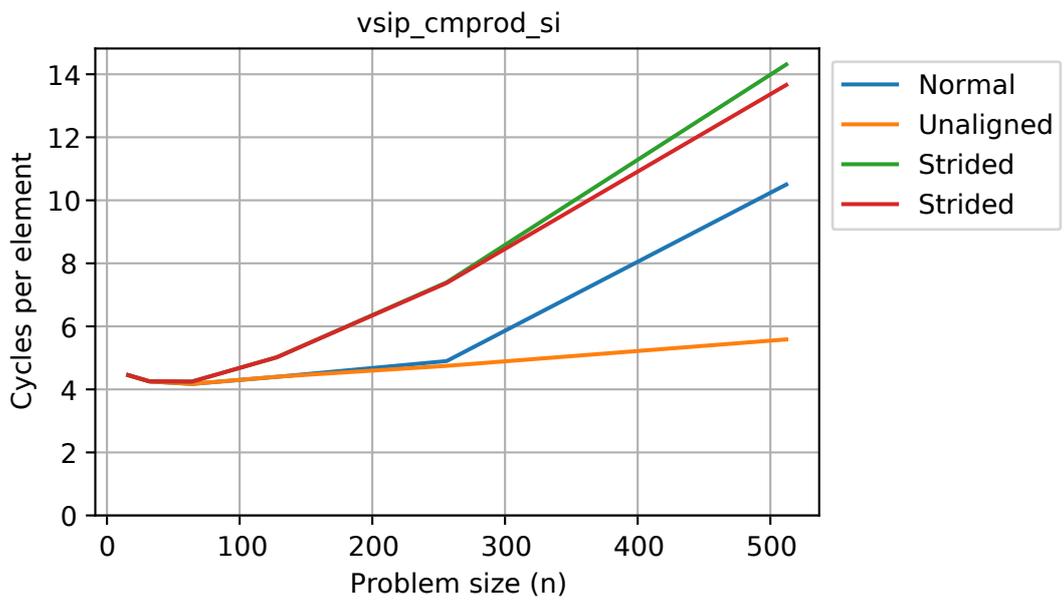
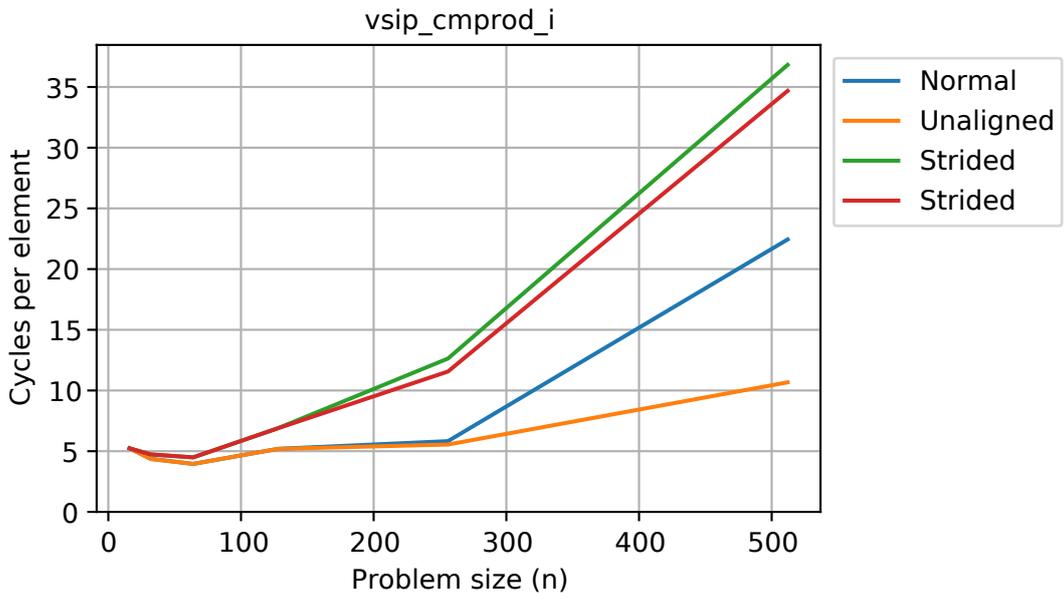
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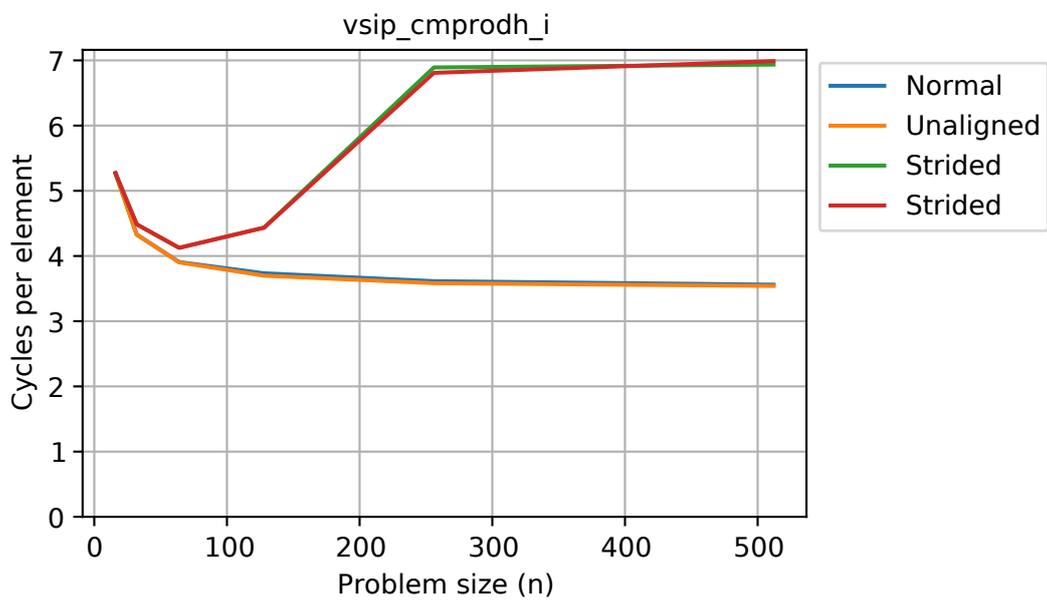
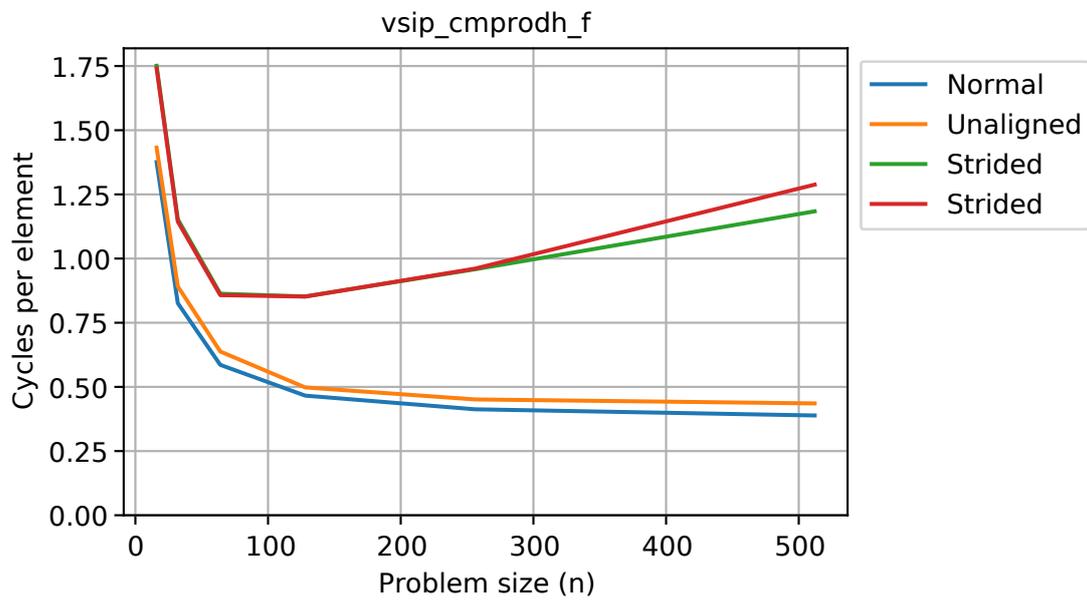
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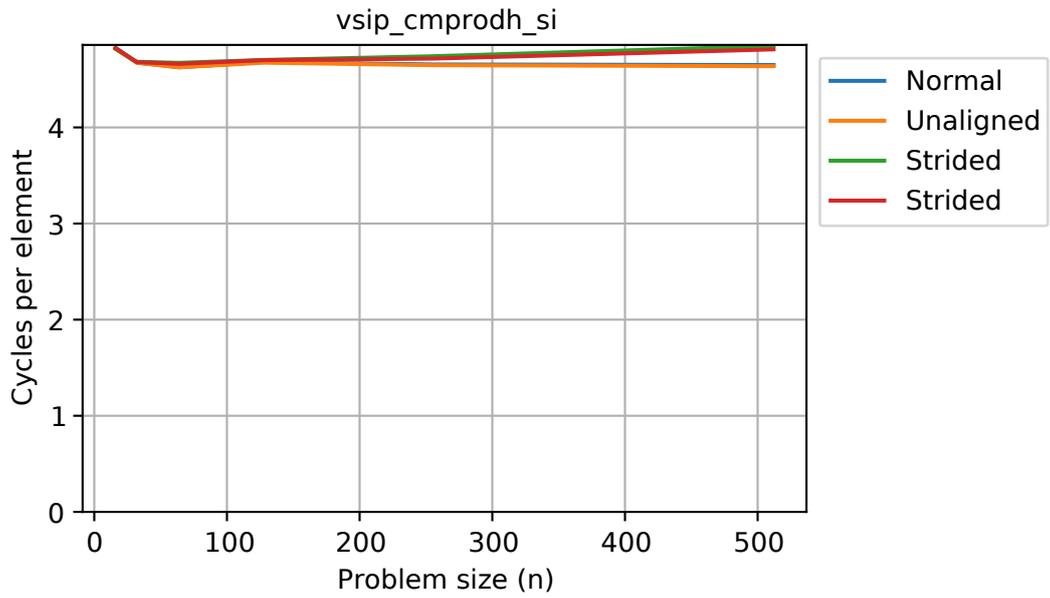




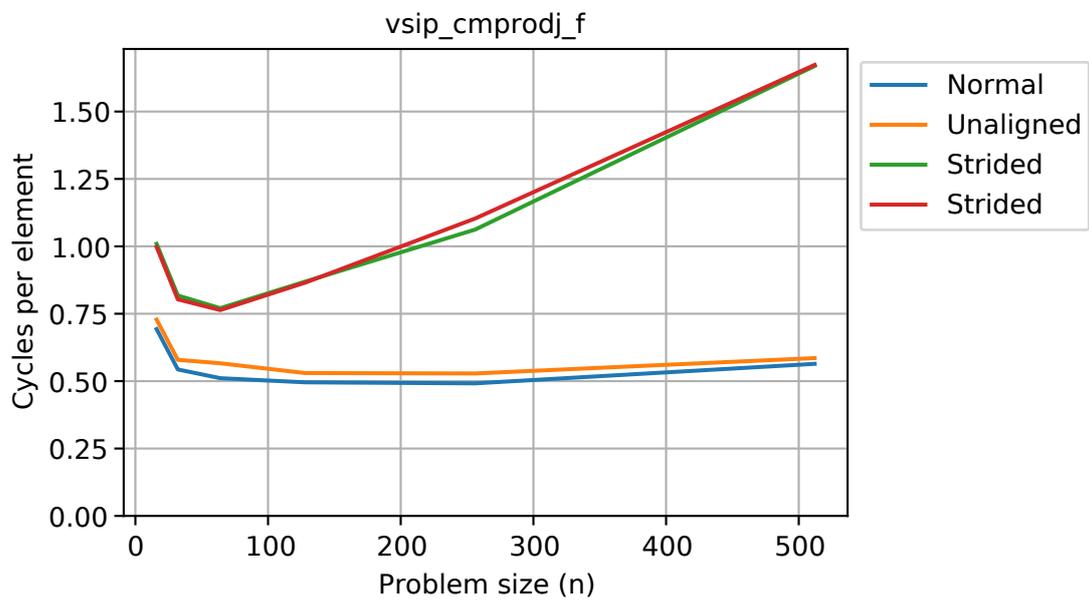


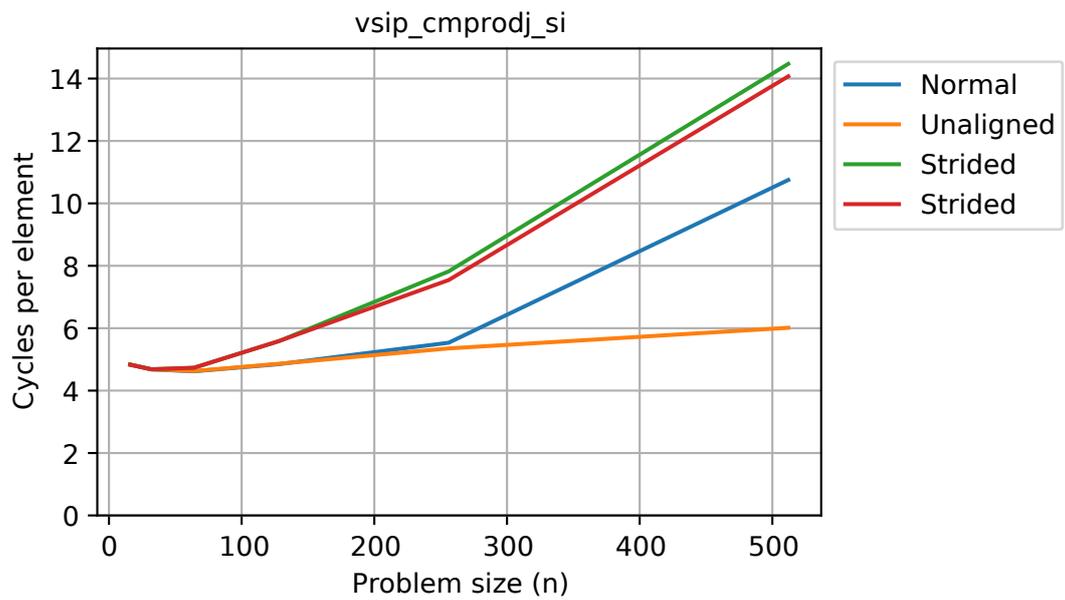
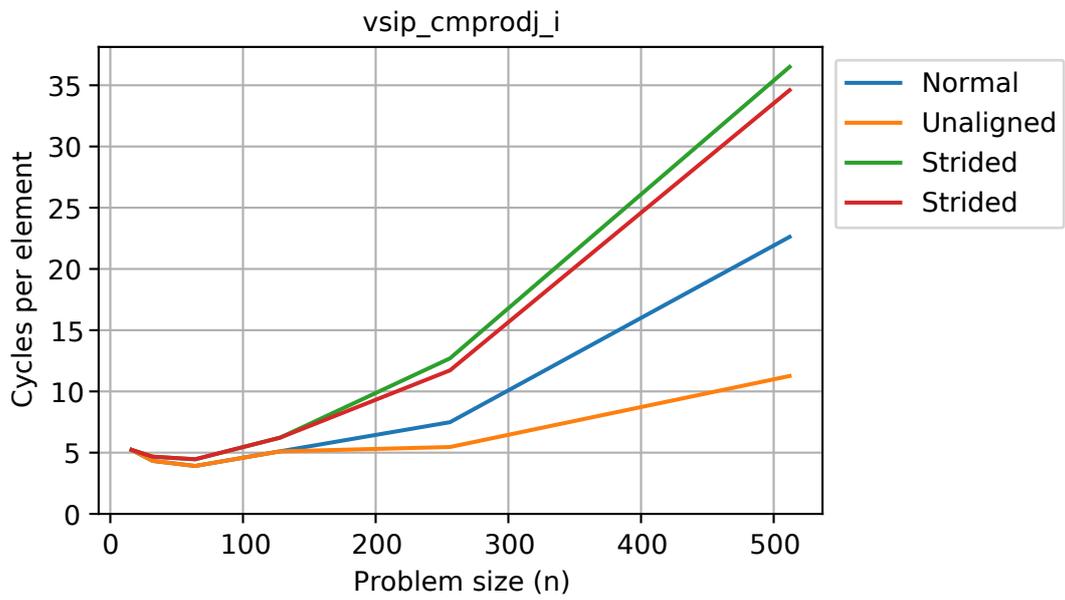
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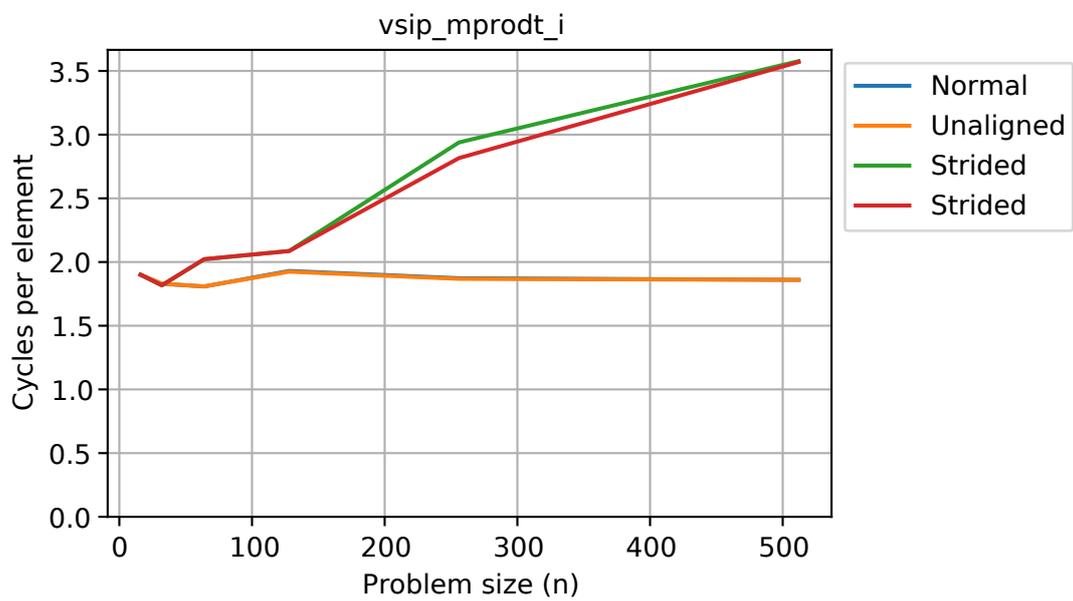
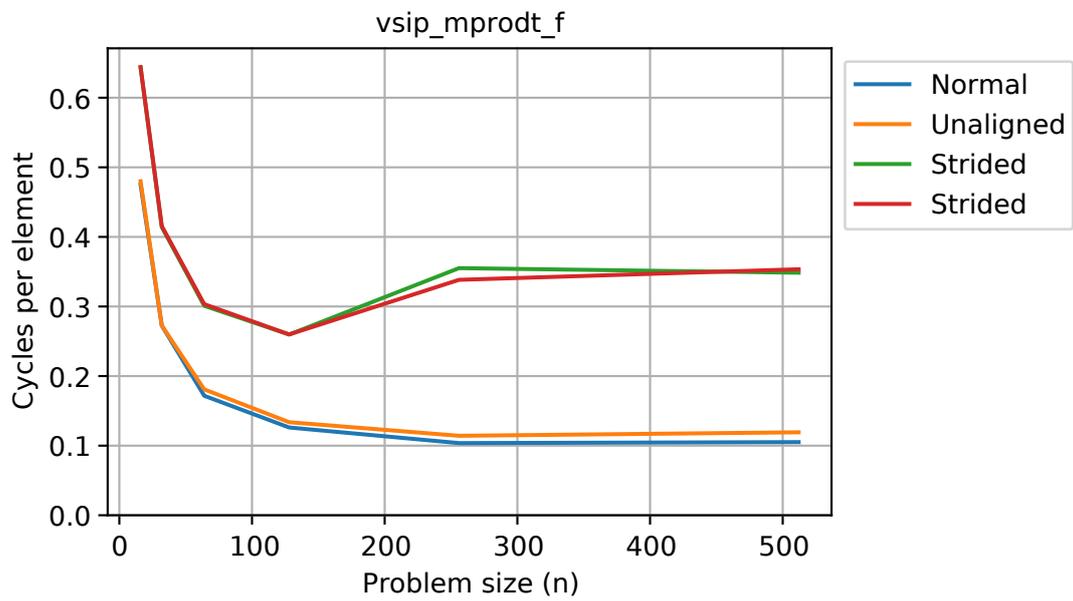


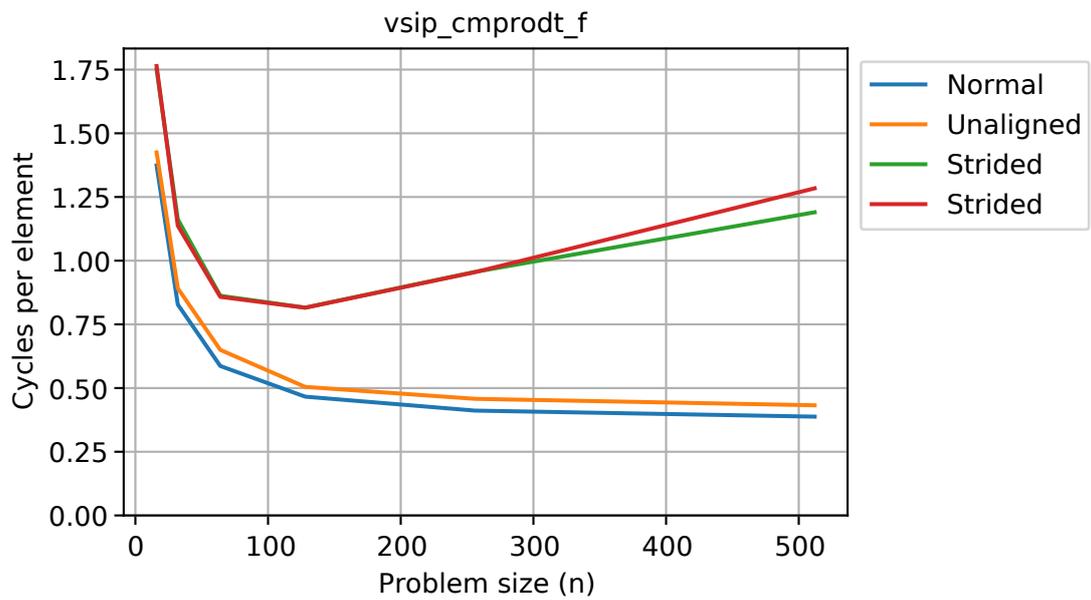
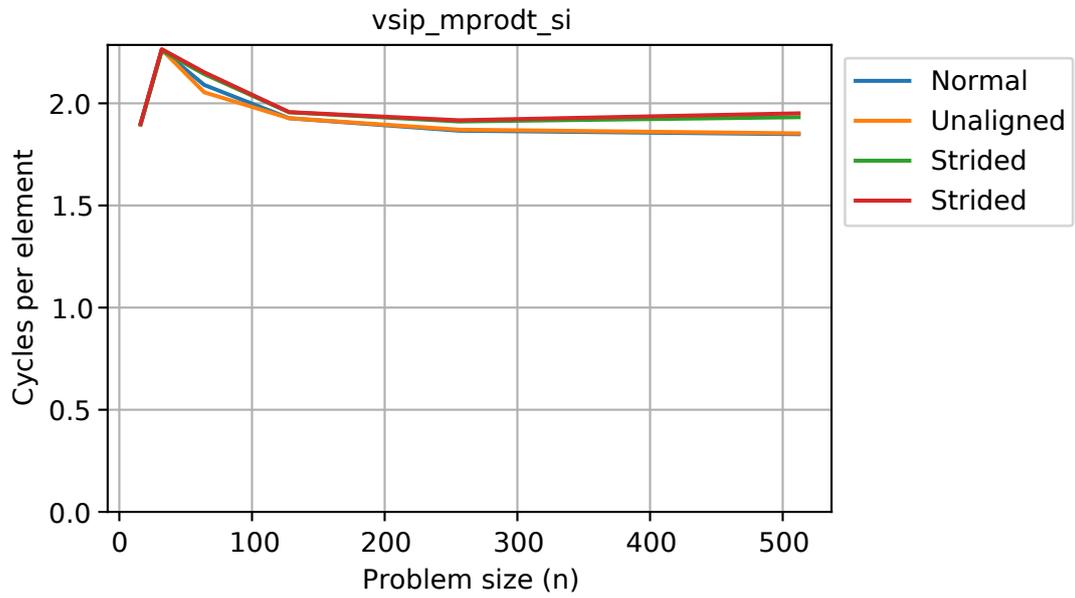
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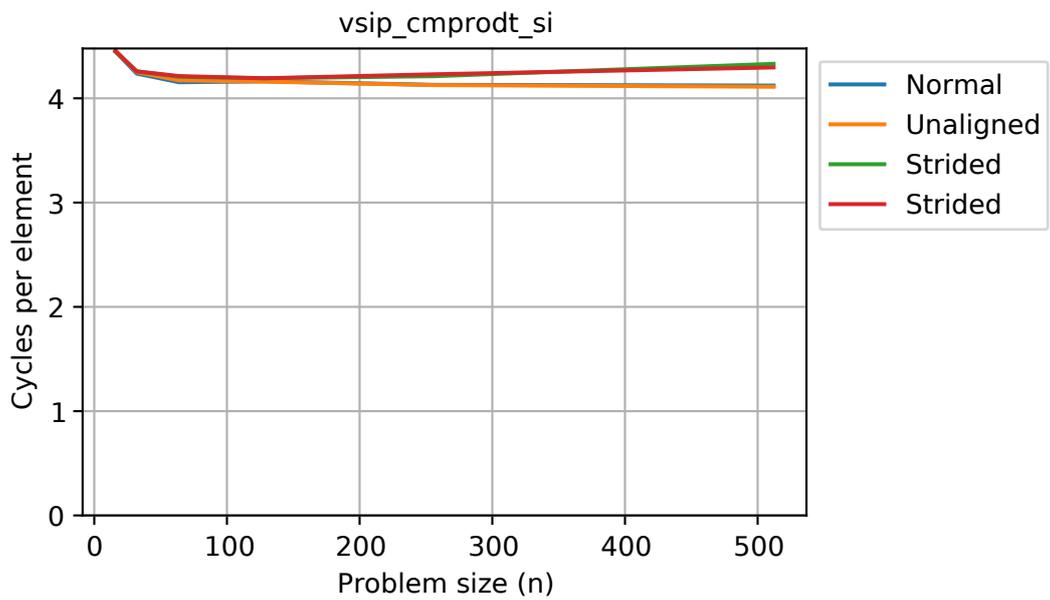
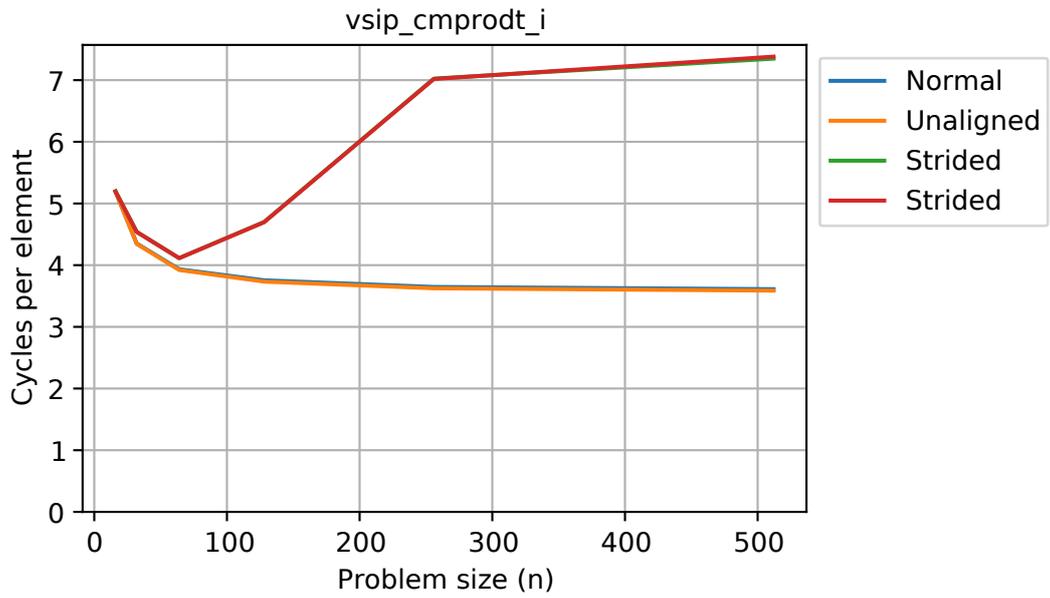




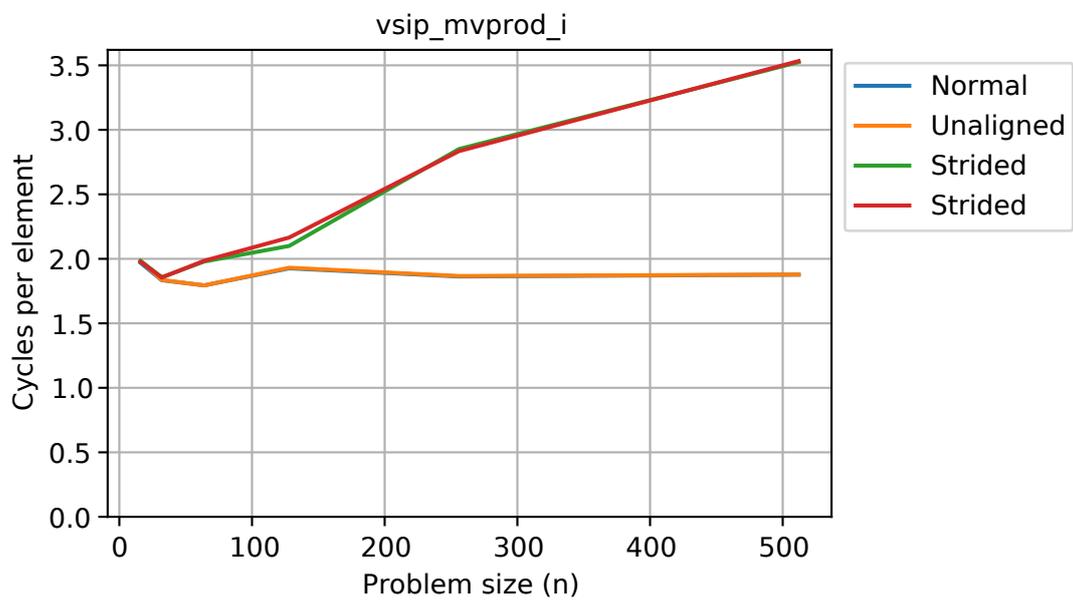
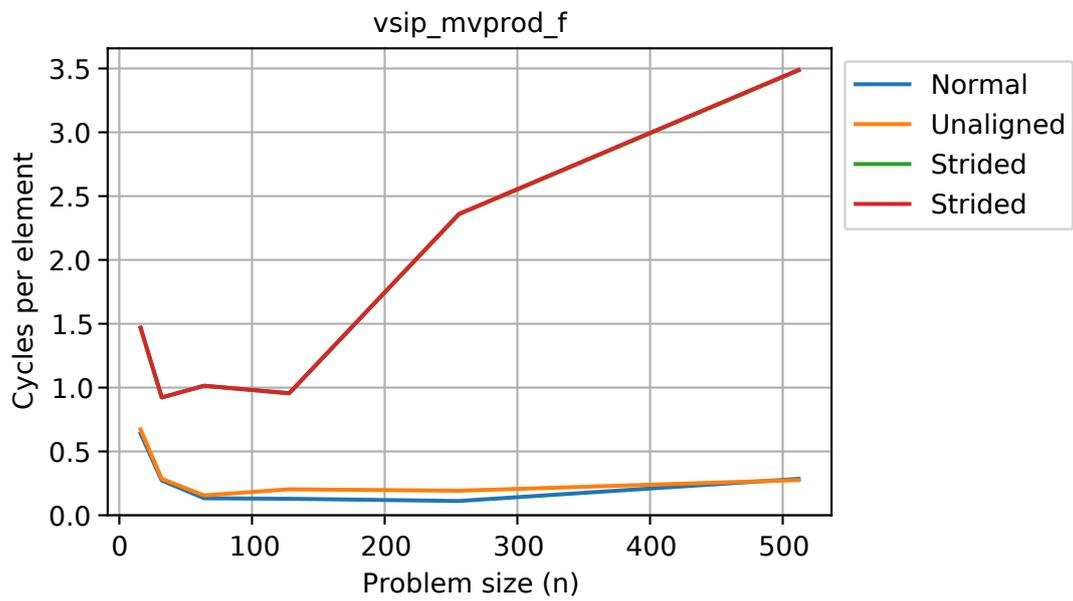
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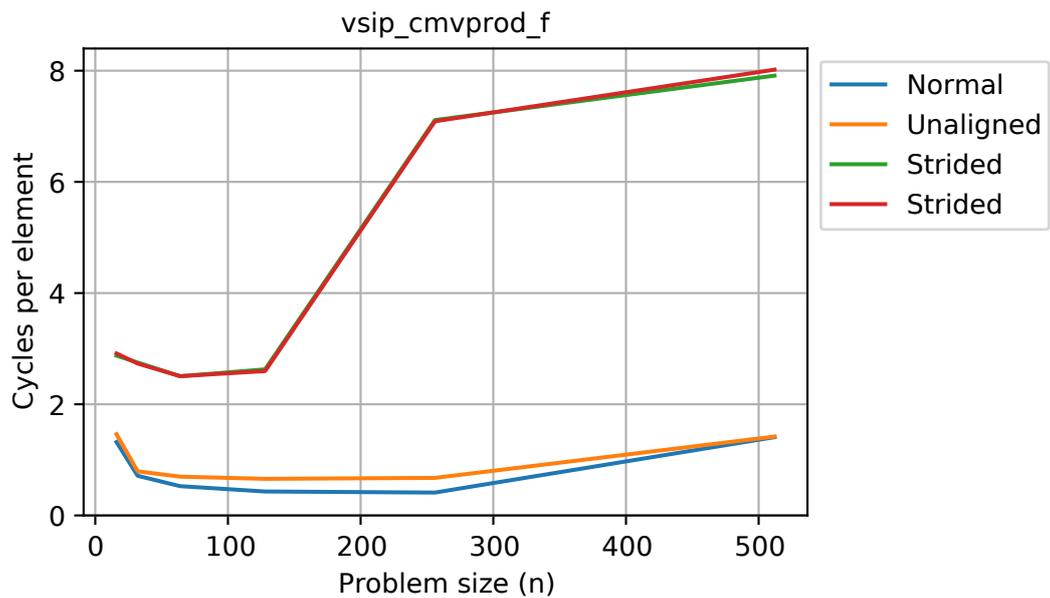
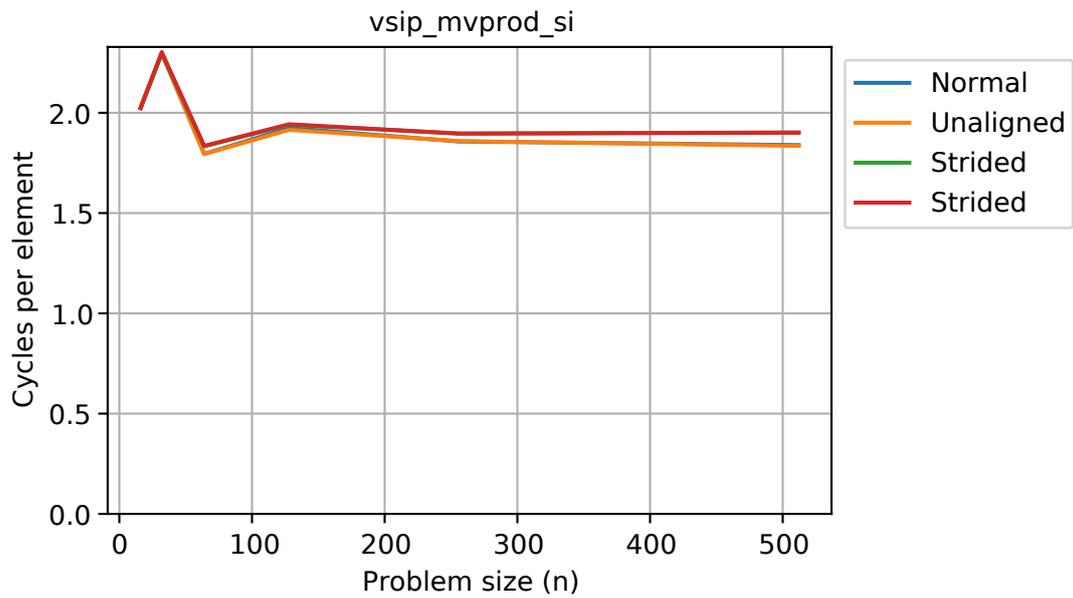


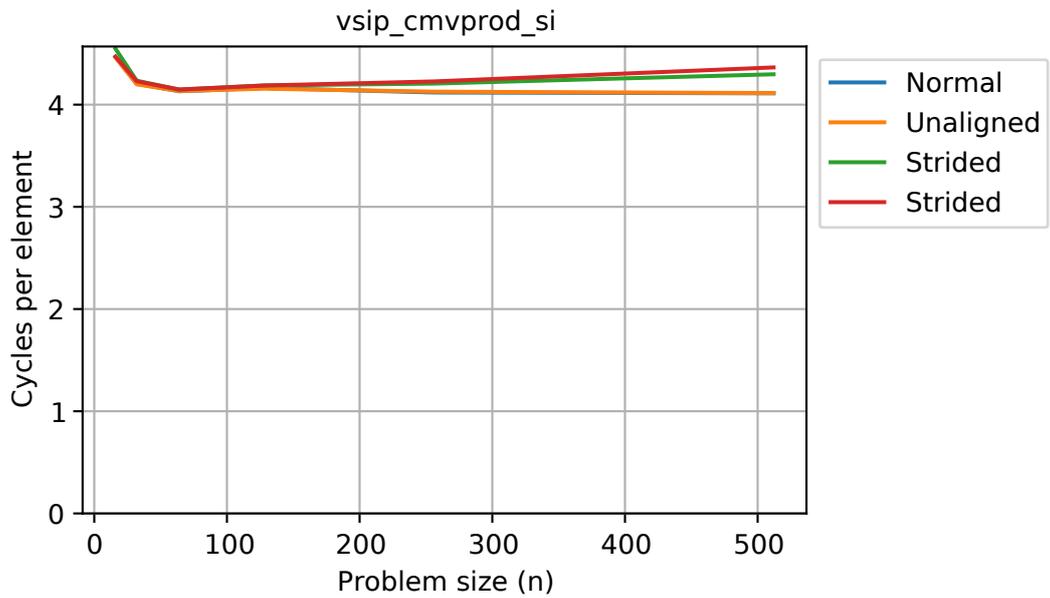
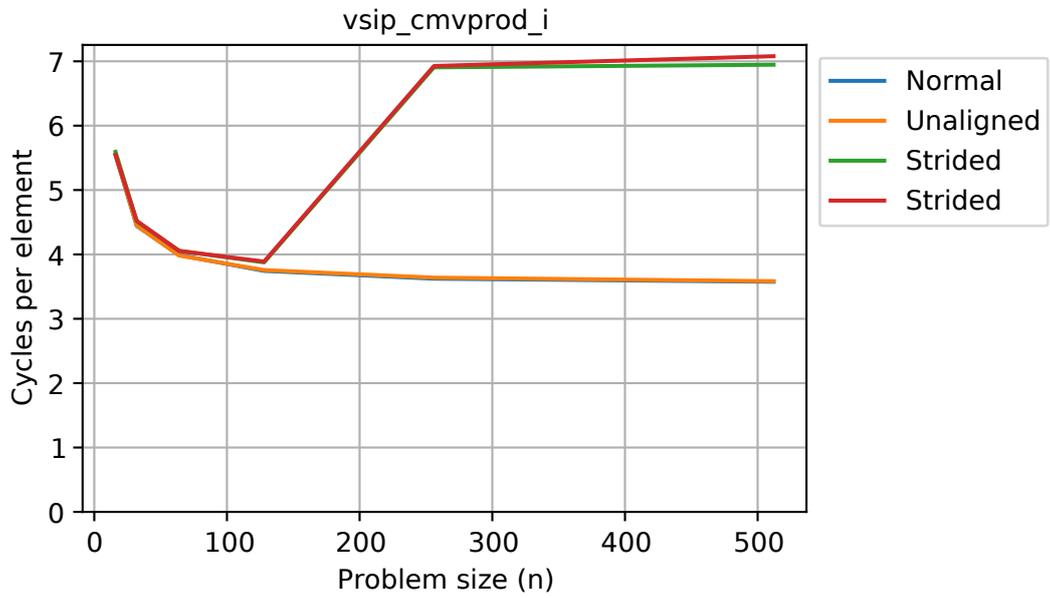




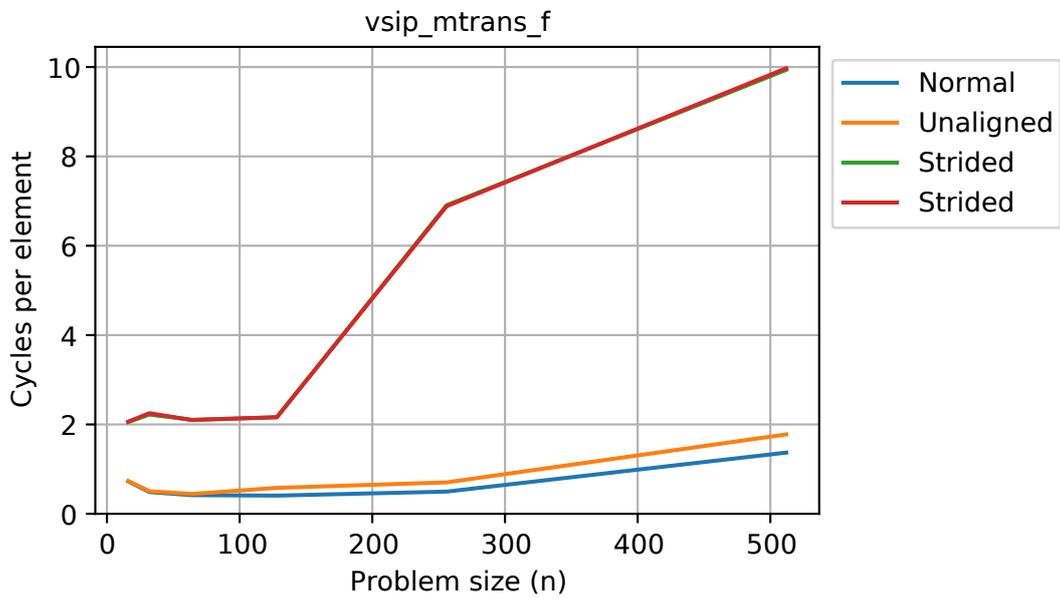
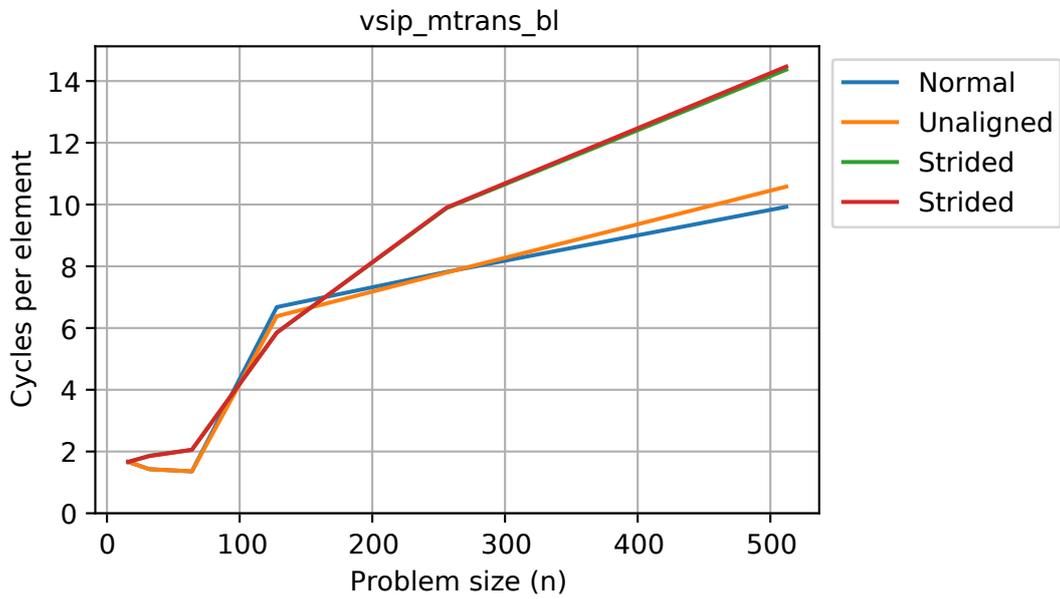
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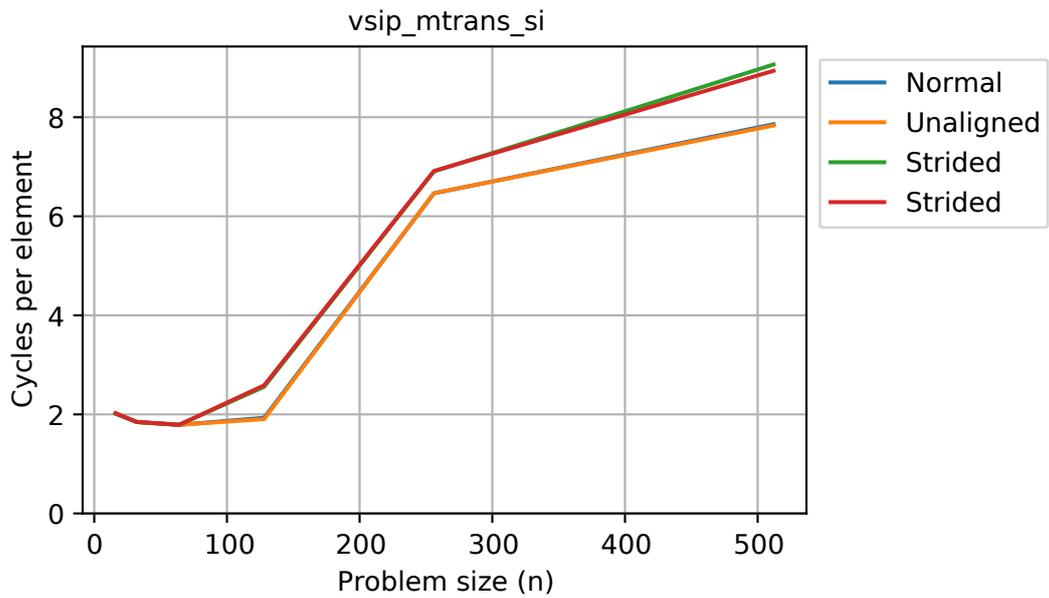
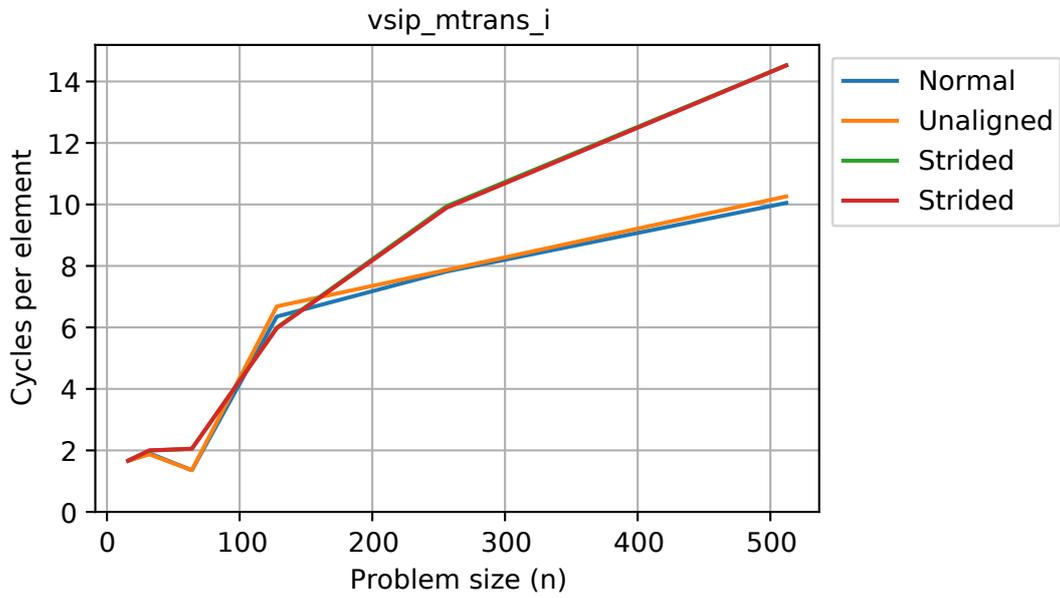


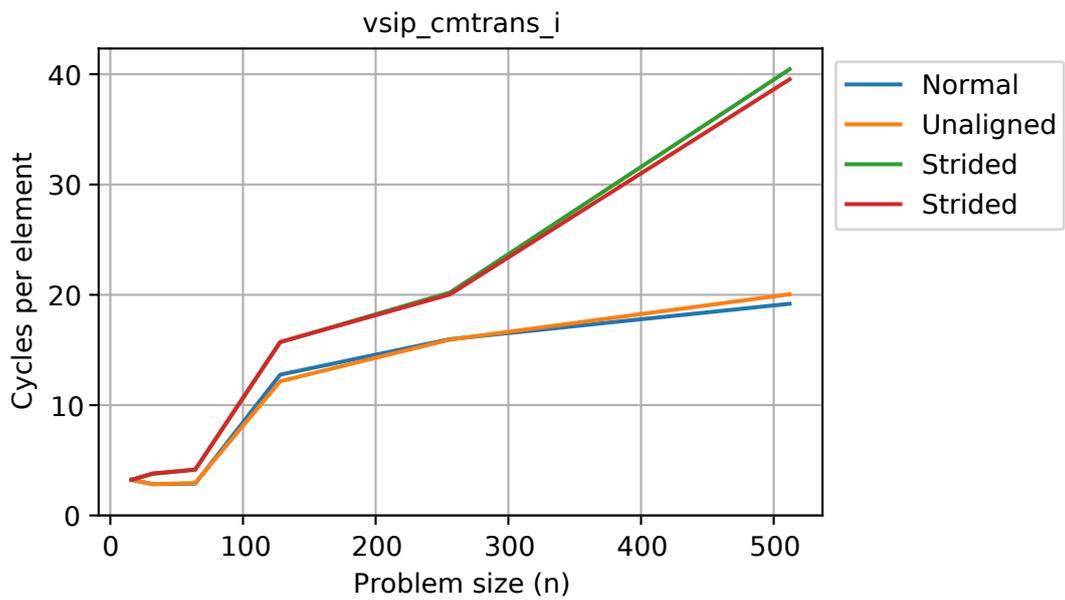
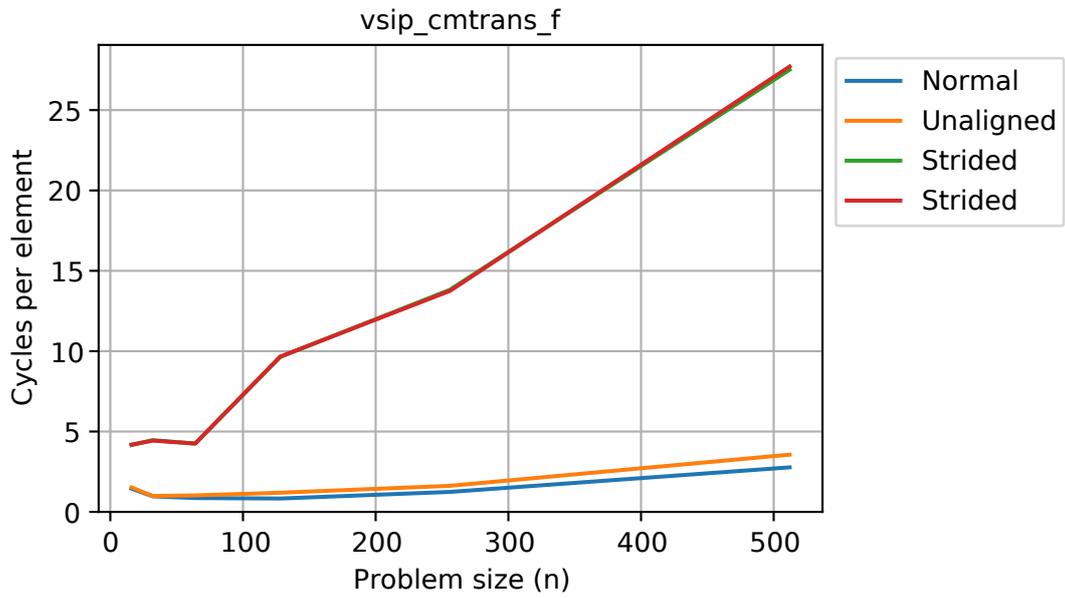


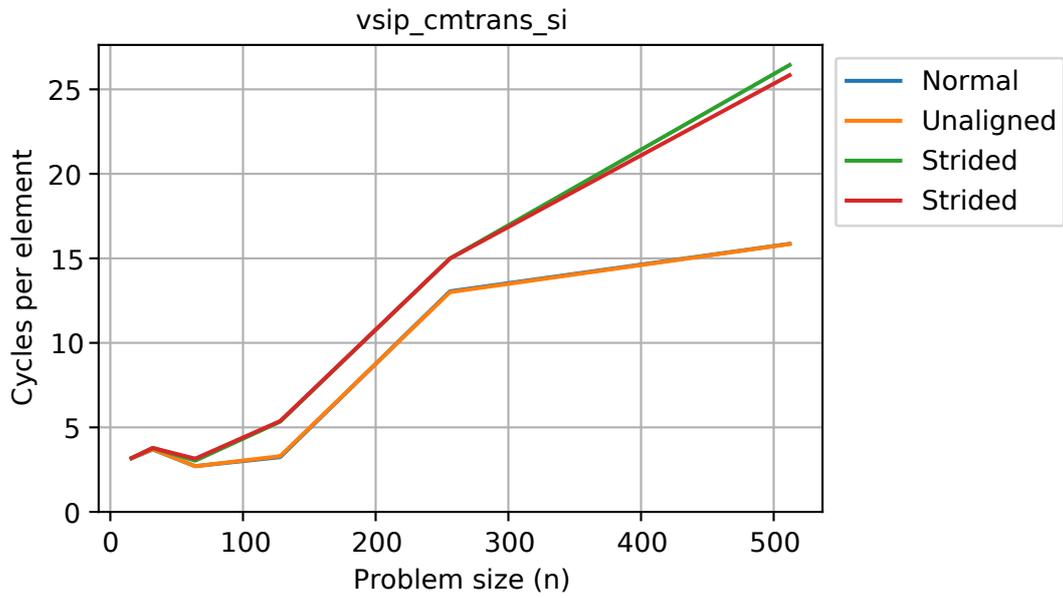


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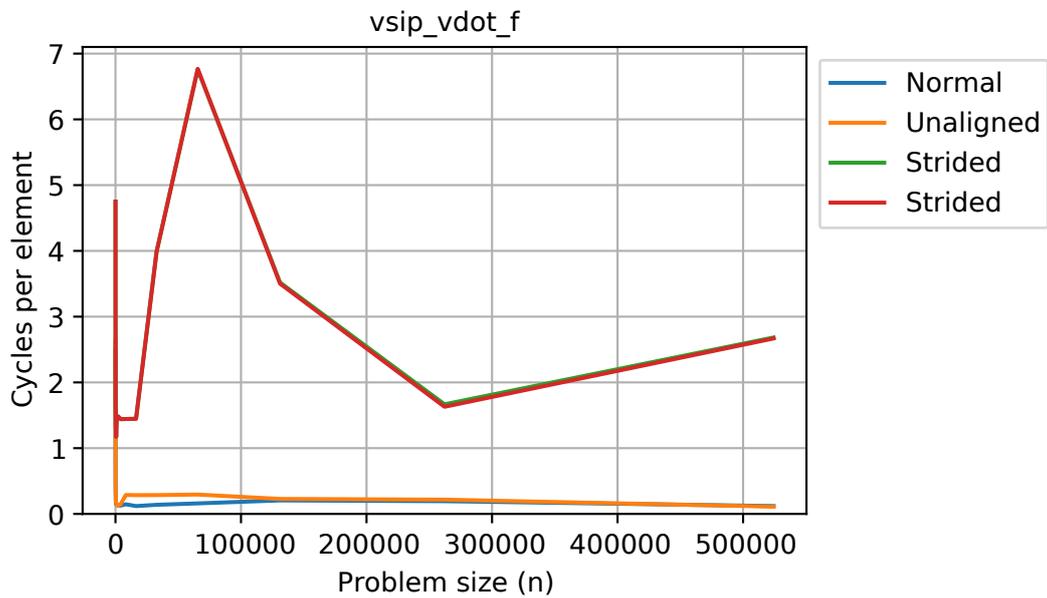


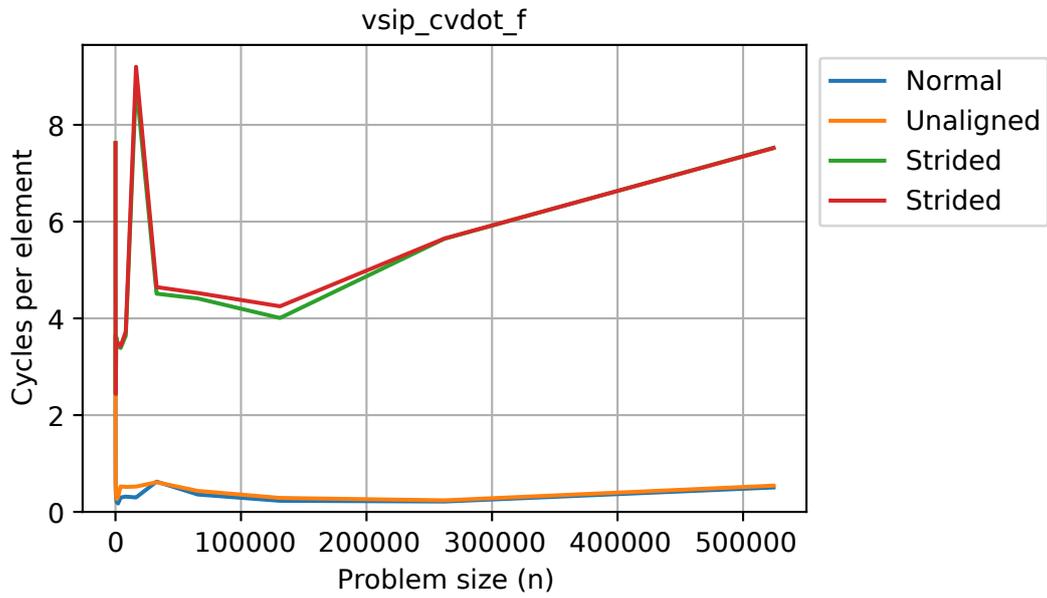




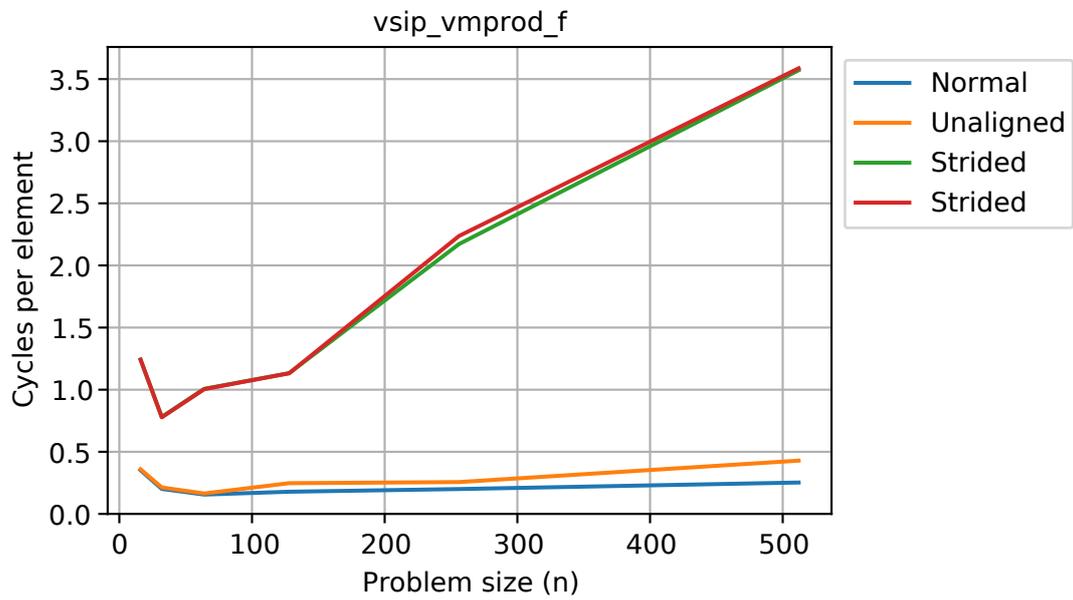


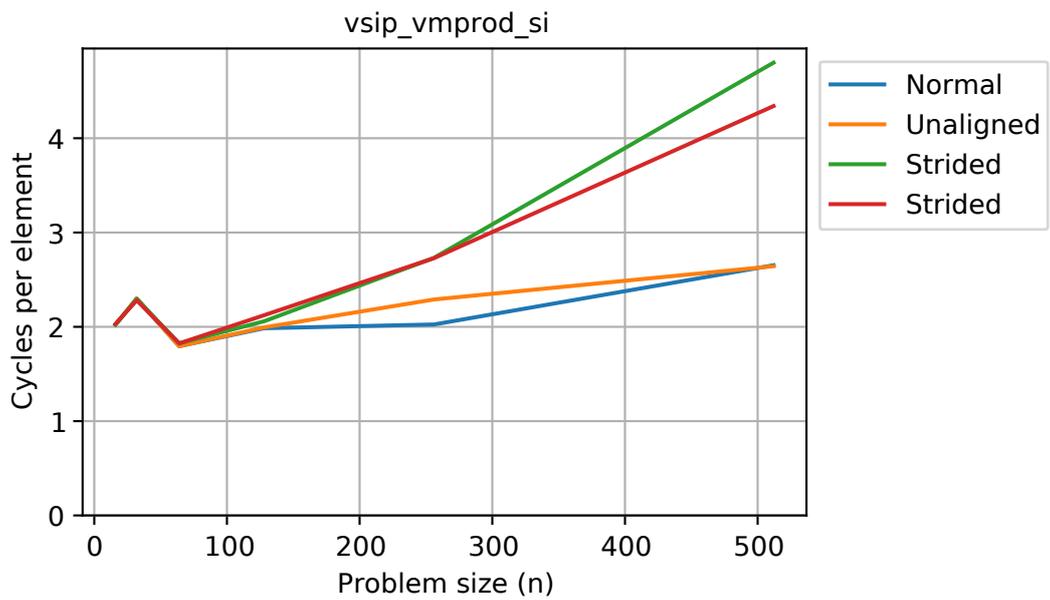
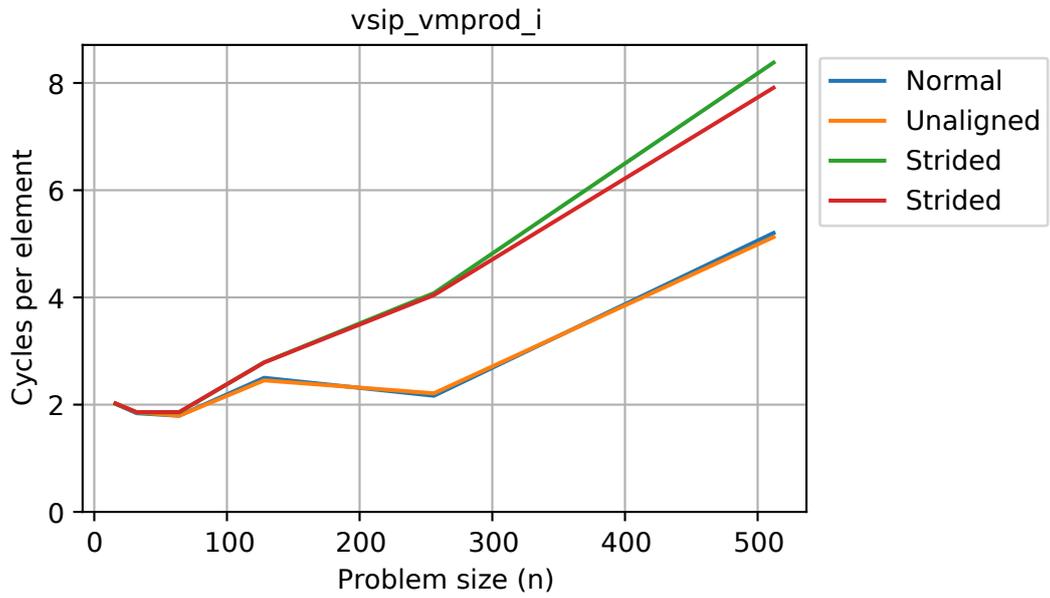
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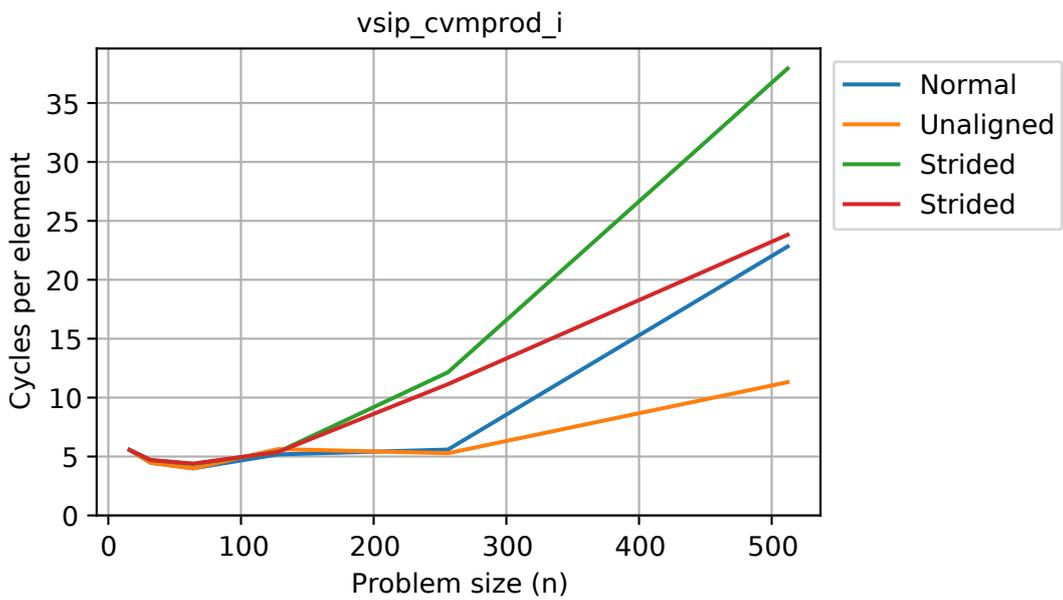
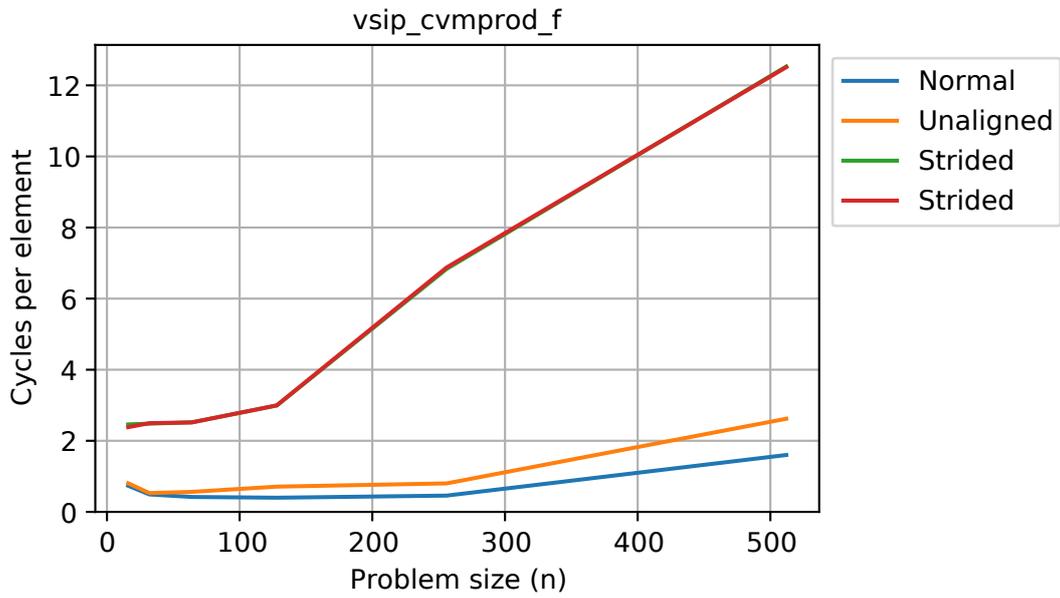


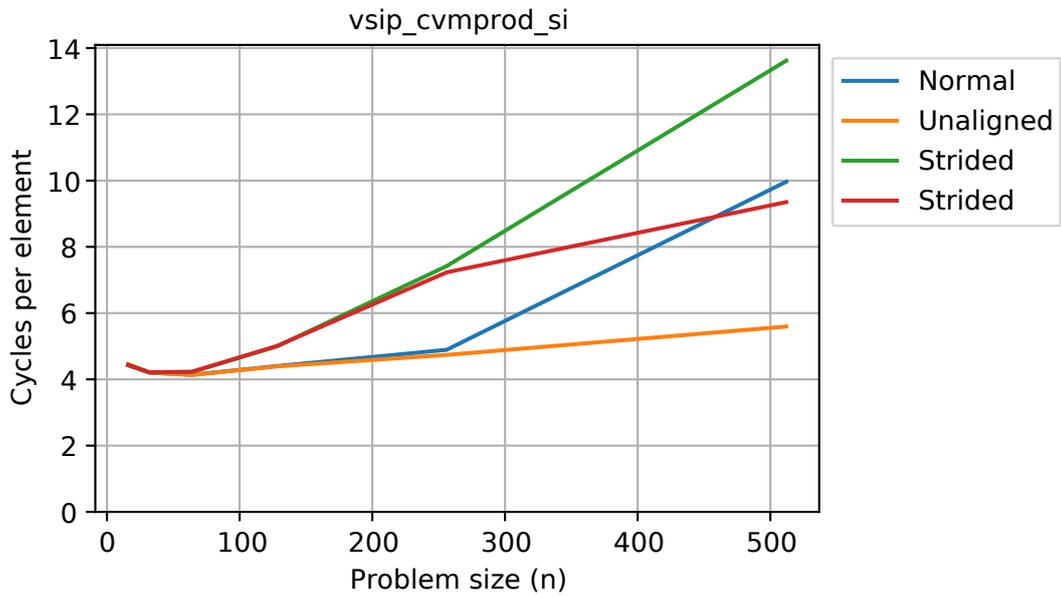


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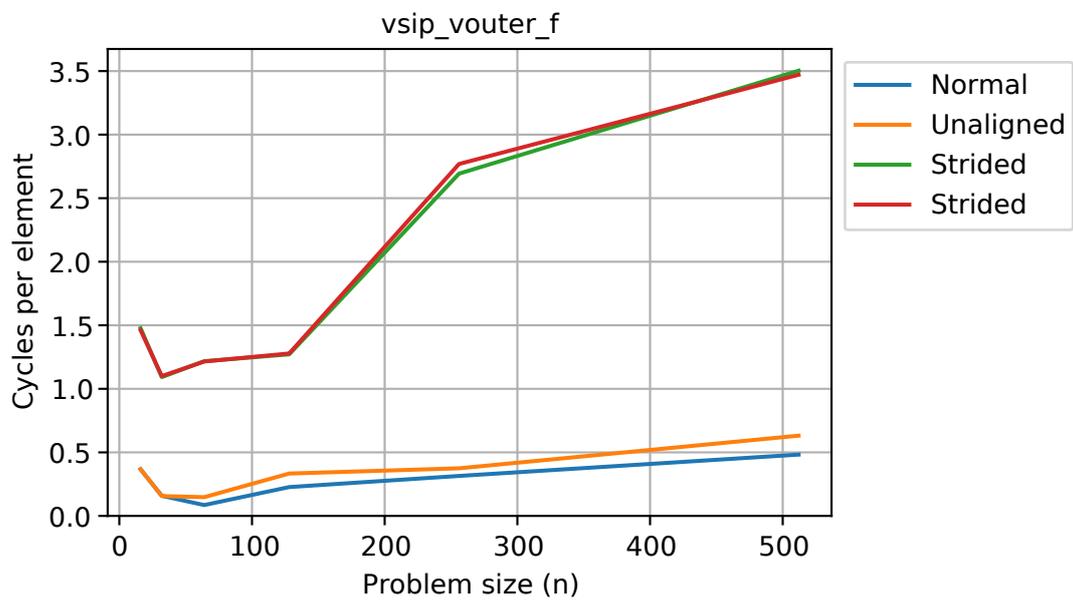


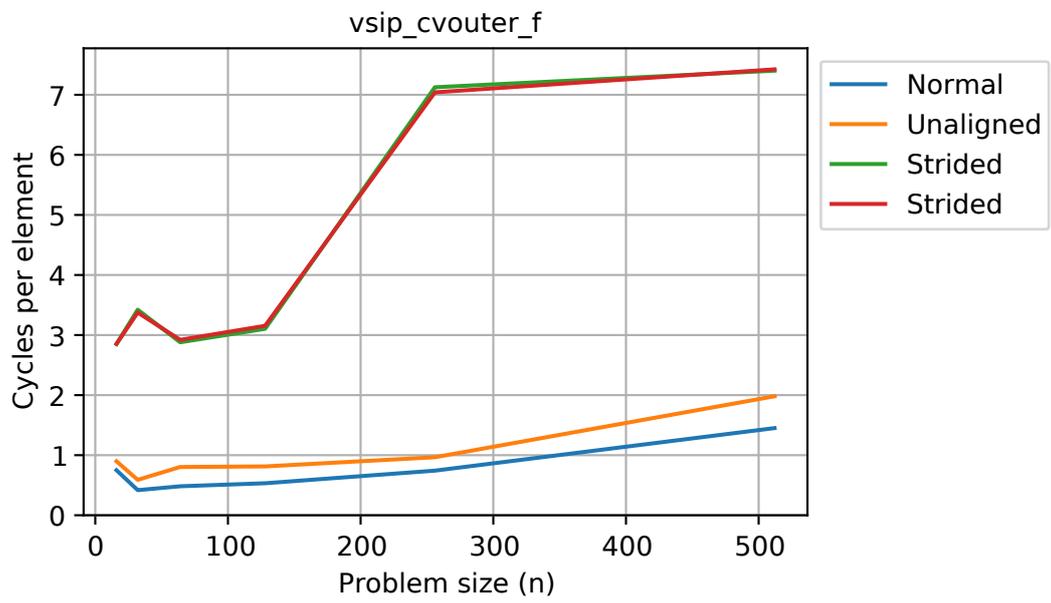






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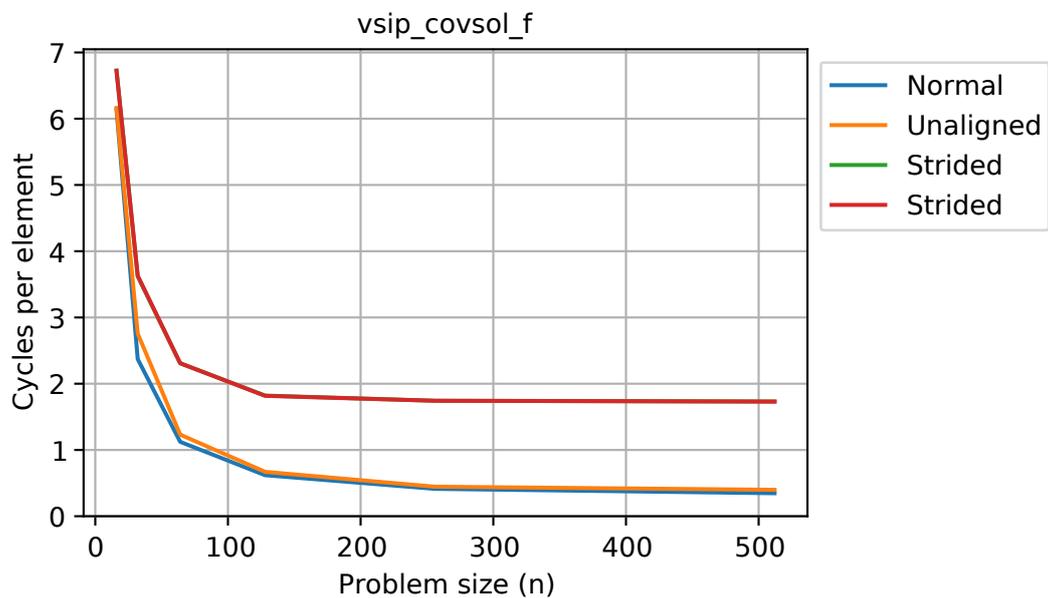


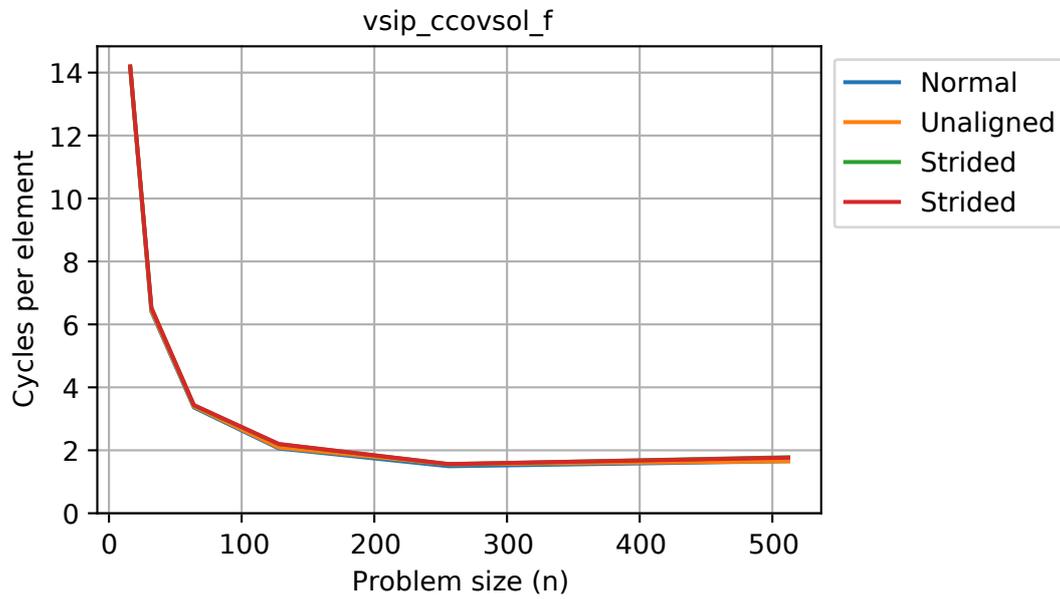
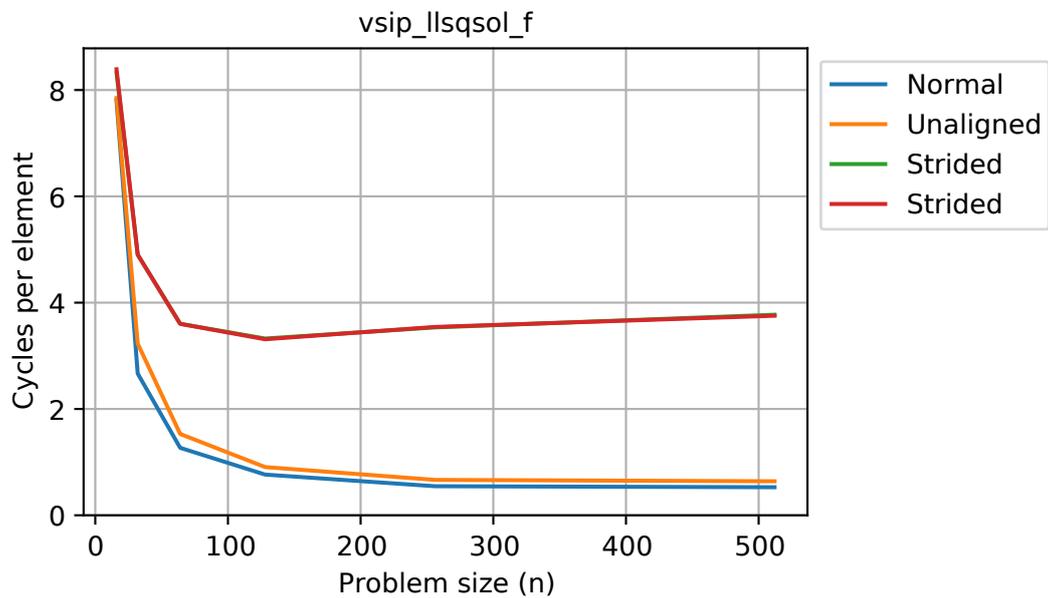
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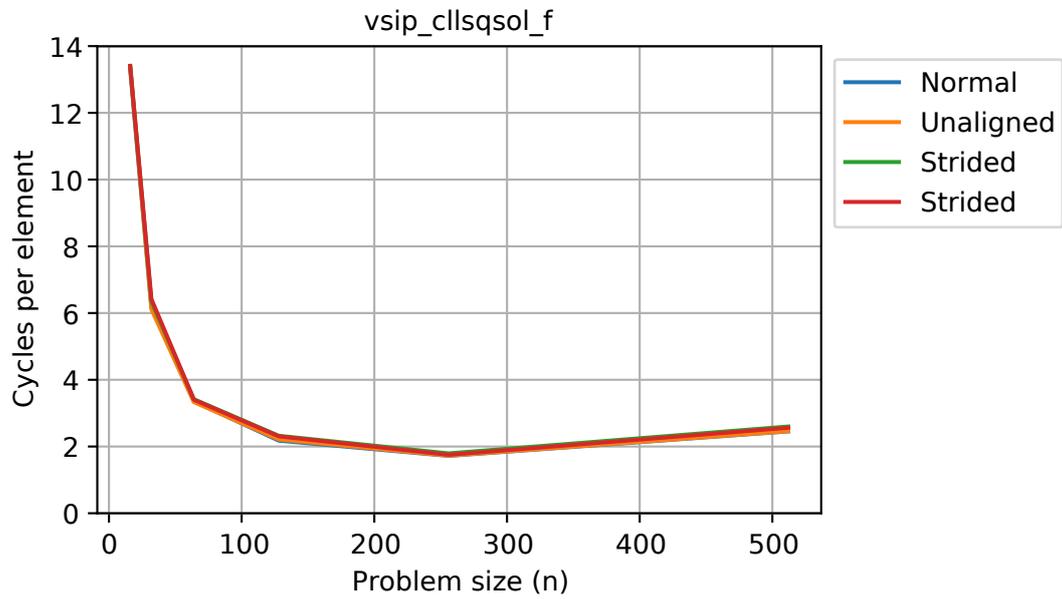
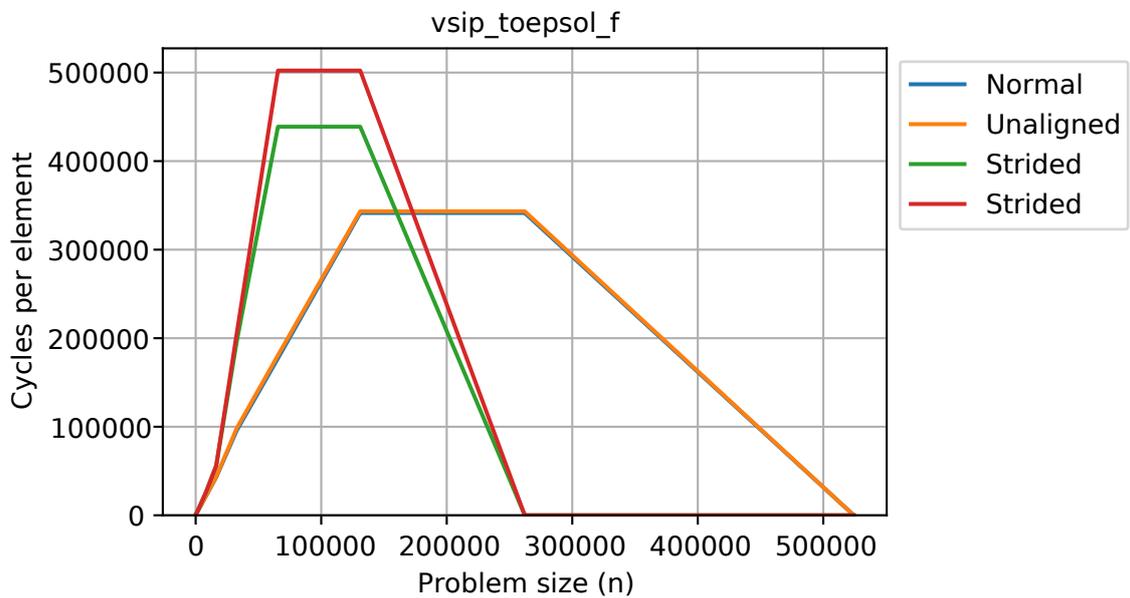
4.2 Special Linear System Solvers

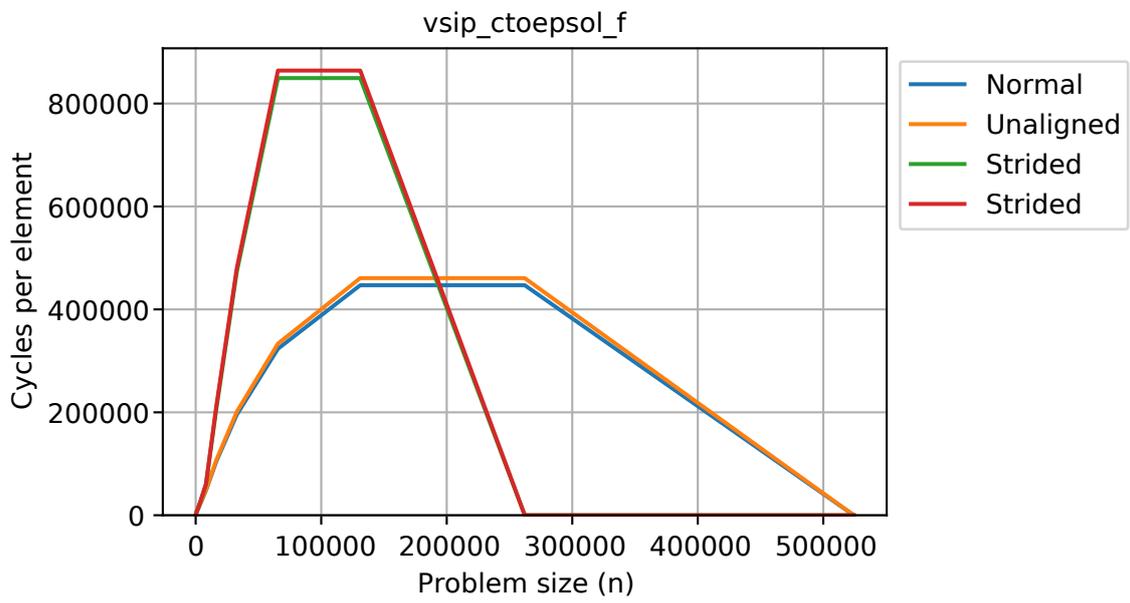
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- `vsip_ccovsol_f`
- `vsip_llsqsol_f`
- `vsip_cllsqsol_f`
- `vsip_toepsol_f`
- `vsip_ctoepsol_f`

`vsip_covsol_f`



vsip_ccovsol_f**vsip_llsqsol_f**

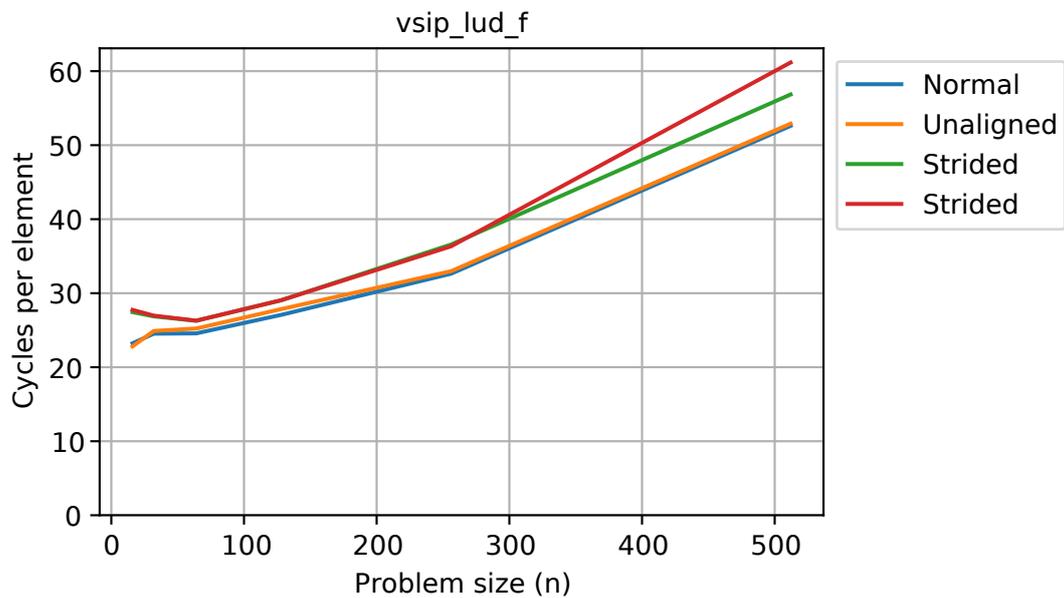
vsip_cllsqsol_f**vsip_toepsol_f**

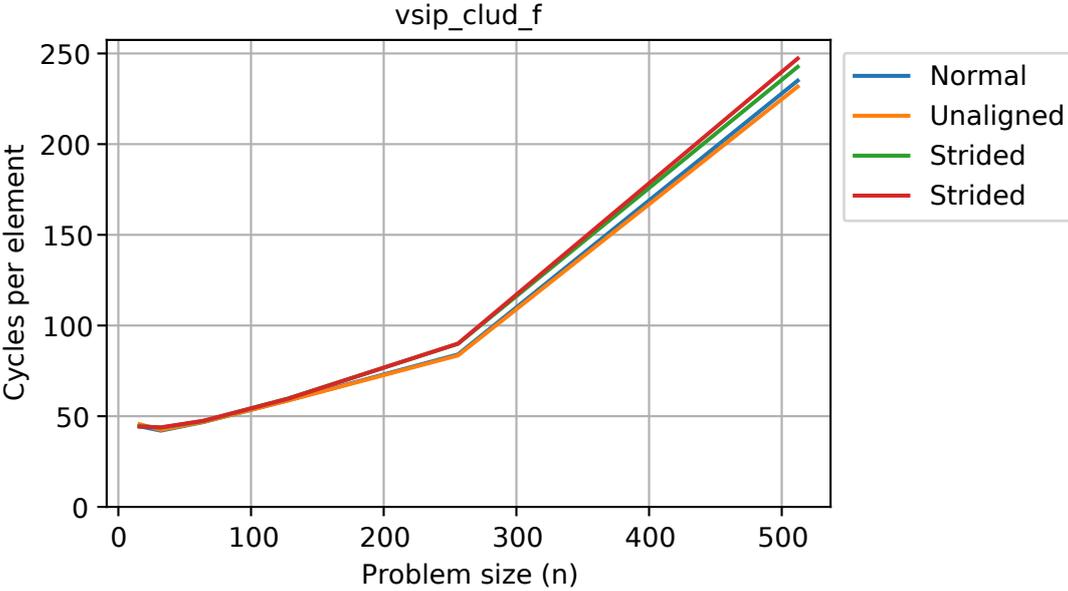
vsip_ctoepsol_f

4.3 General Square Linear System Solver

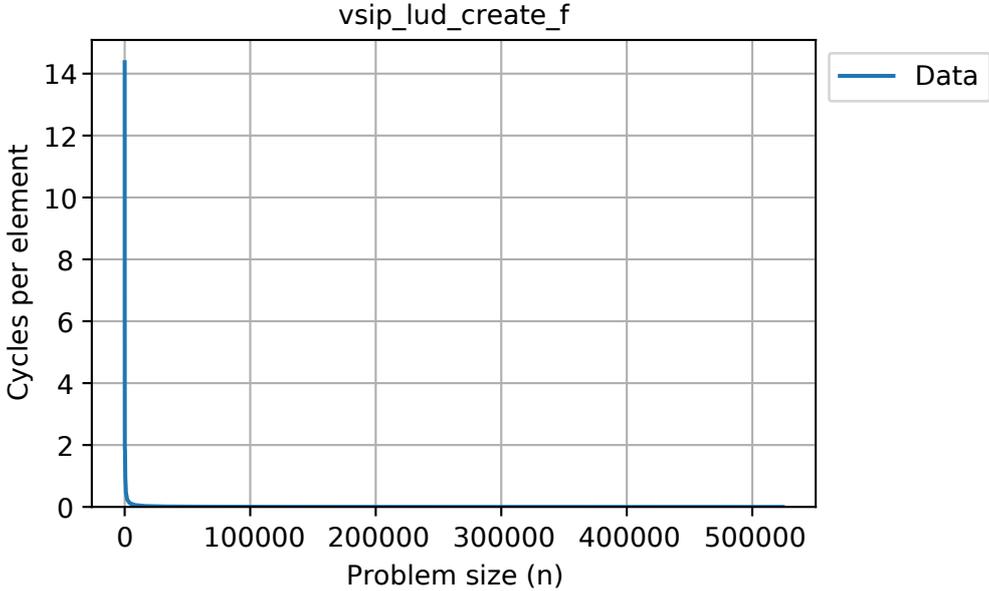
- `vsip_Dlud_P`
- `vsip_Dlud_create_P`
- `vsip_Dlud_destroy_P`
- `vsip_lusol_f`
- `vsip_clusol_f`

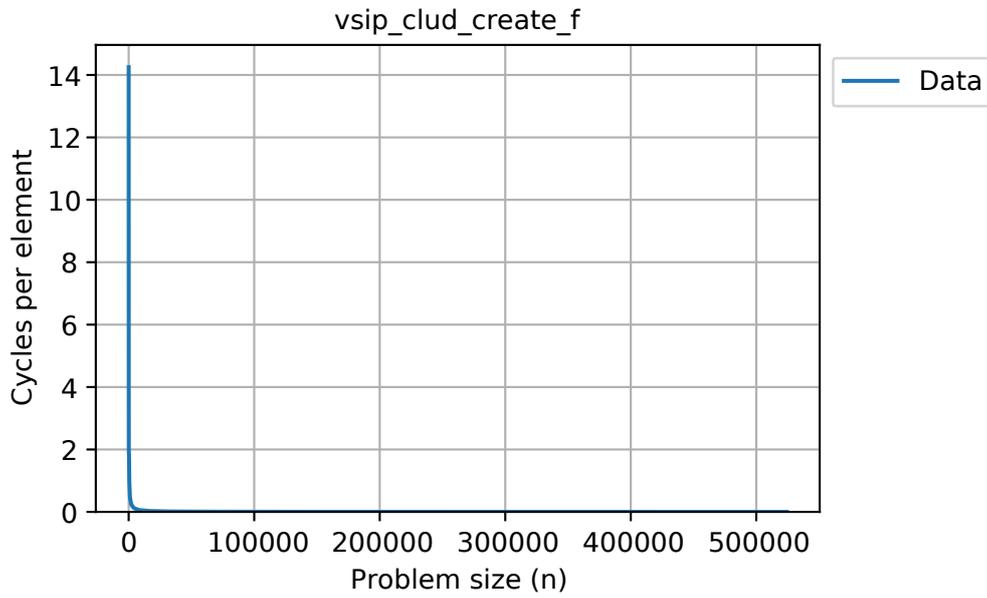
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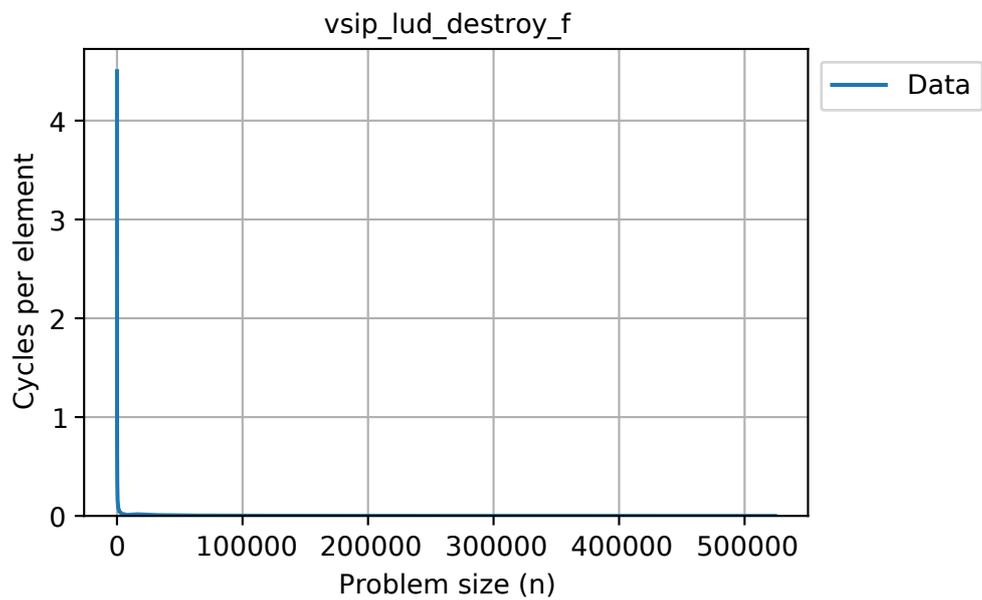


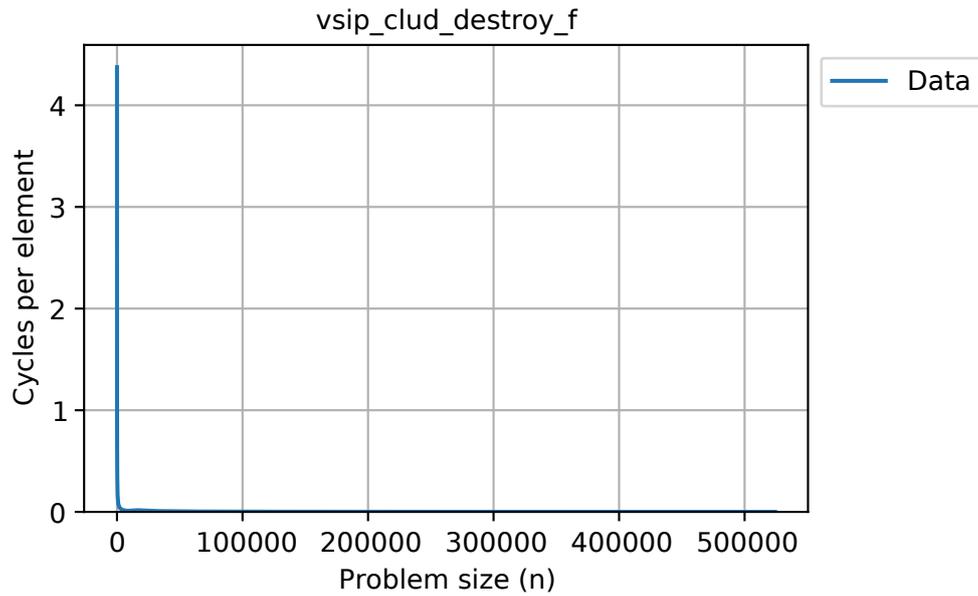
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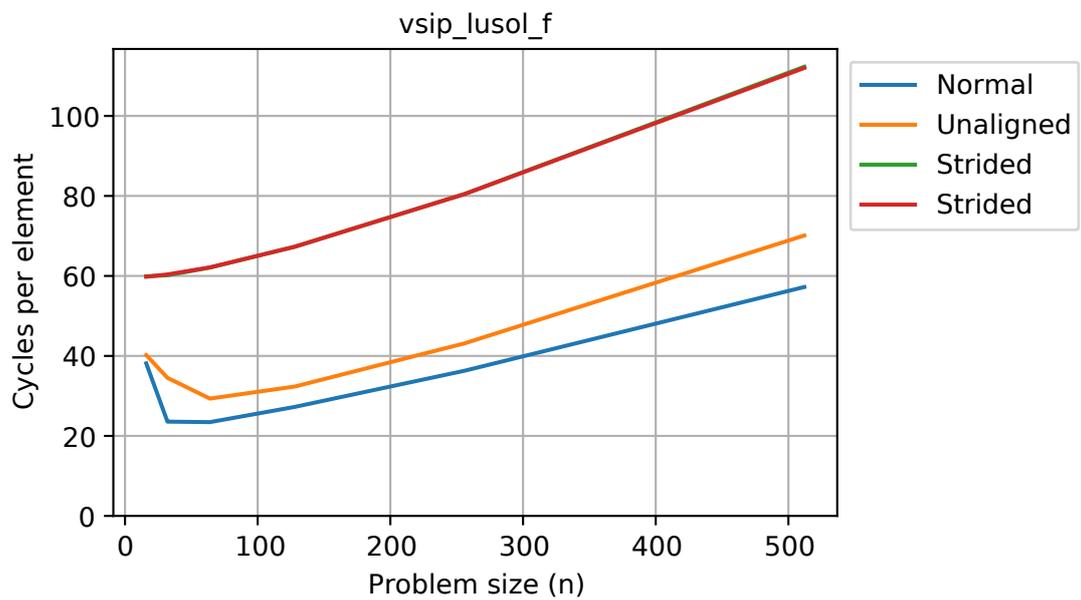


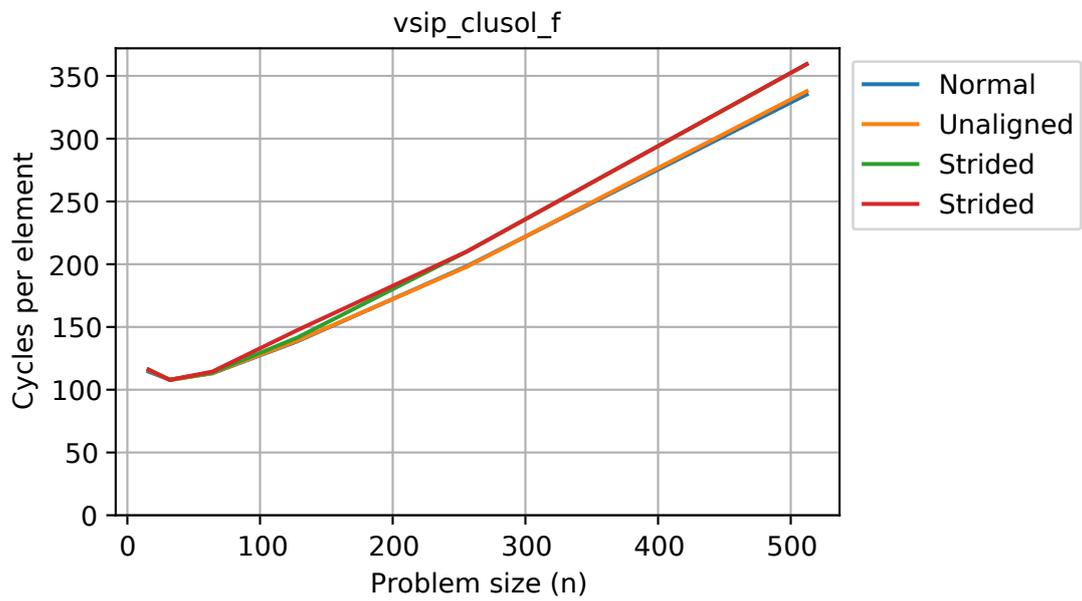
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vsip_lusol_f

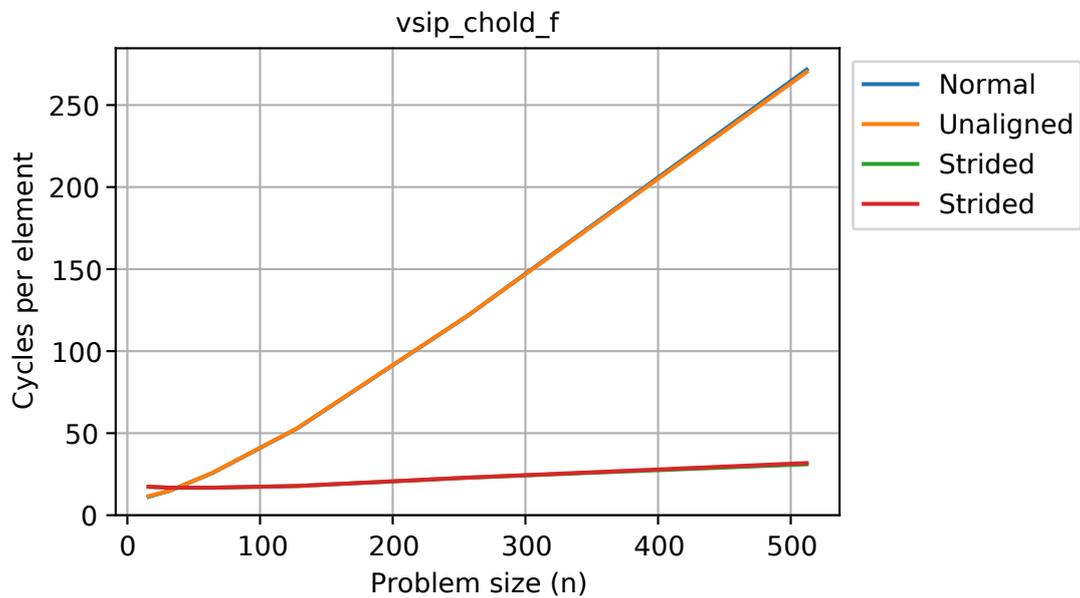


vsip_clusol_f

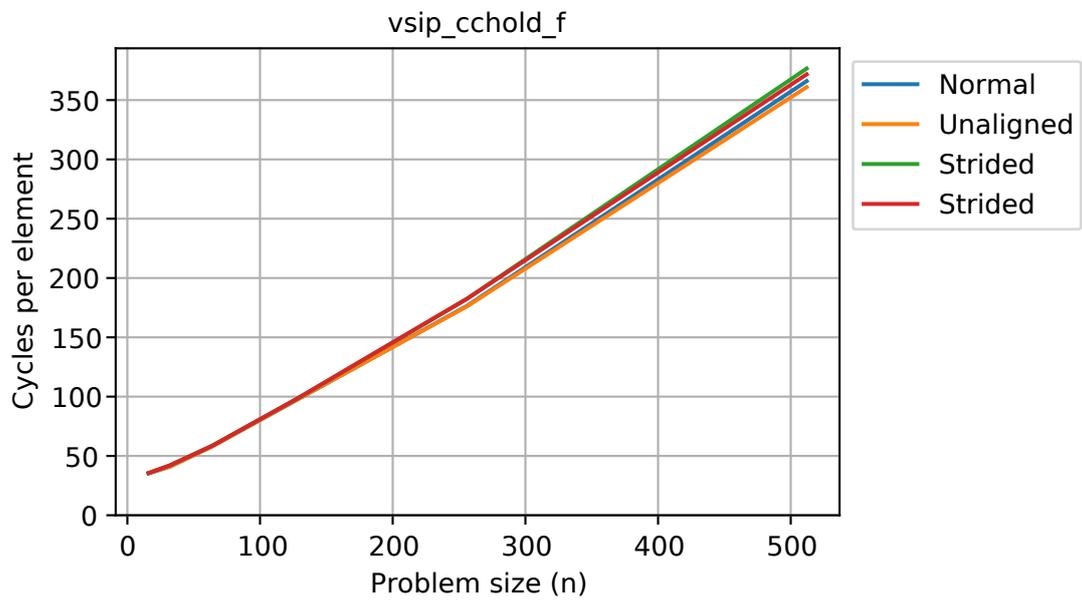
4.4 Symmetric Positive Definite Linear System Solver

- `vsip_chold_f`
- `vsip_cchold_f`
- `vsip_chold_create_f`
- `vsip_cchold_create_f`
- `vsip_Dchold_destroy_P`
- `vsip_cholsol_f`
- `vsip_ccholsol_f`

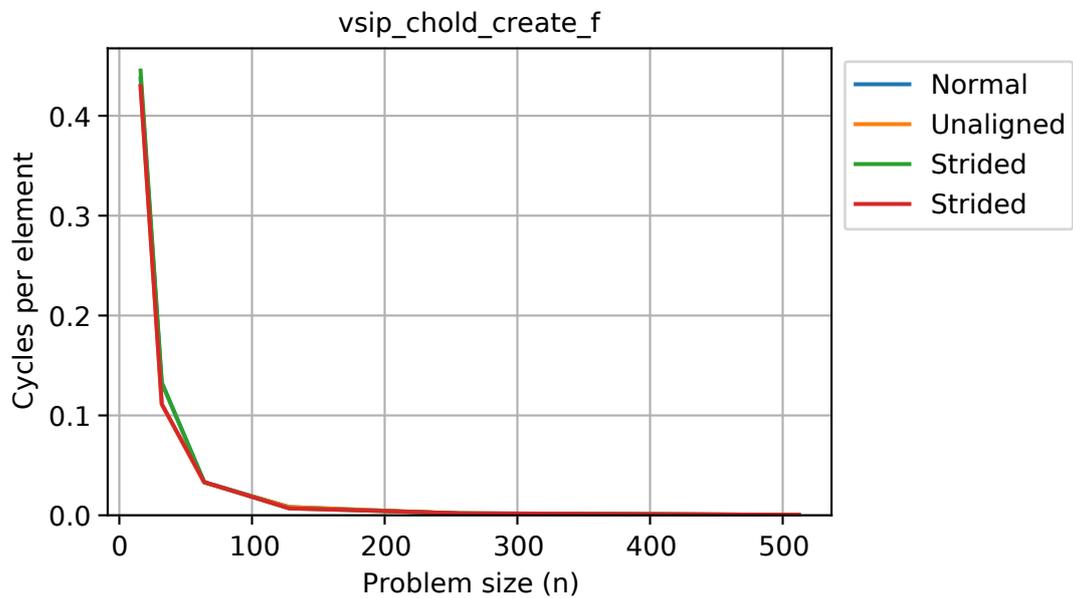
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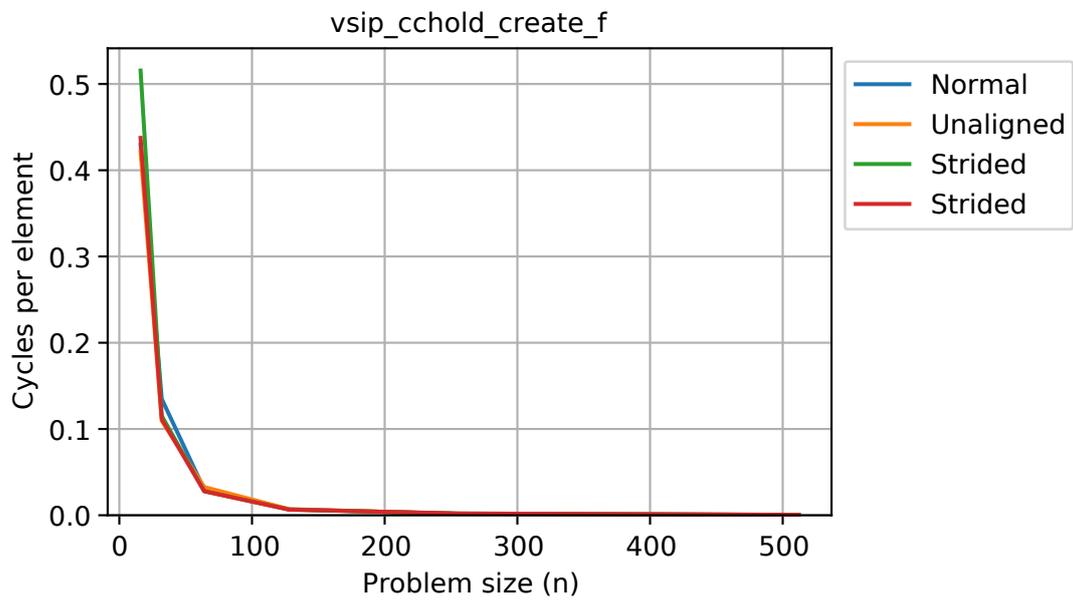
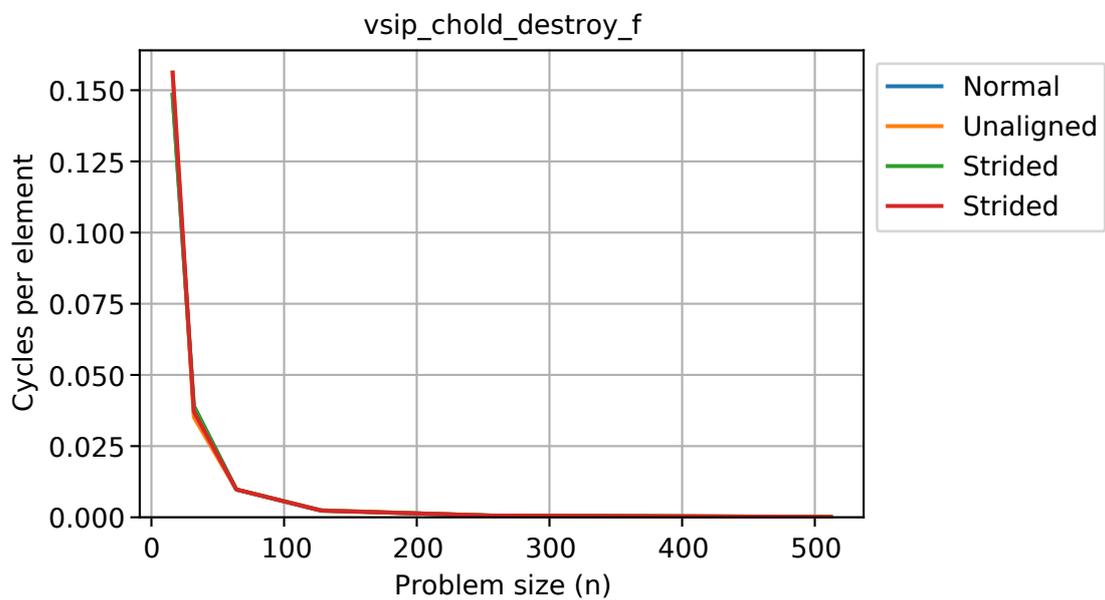


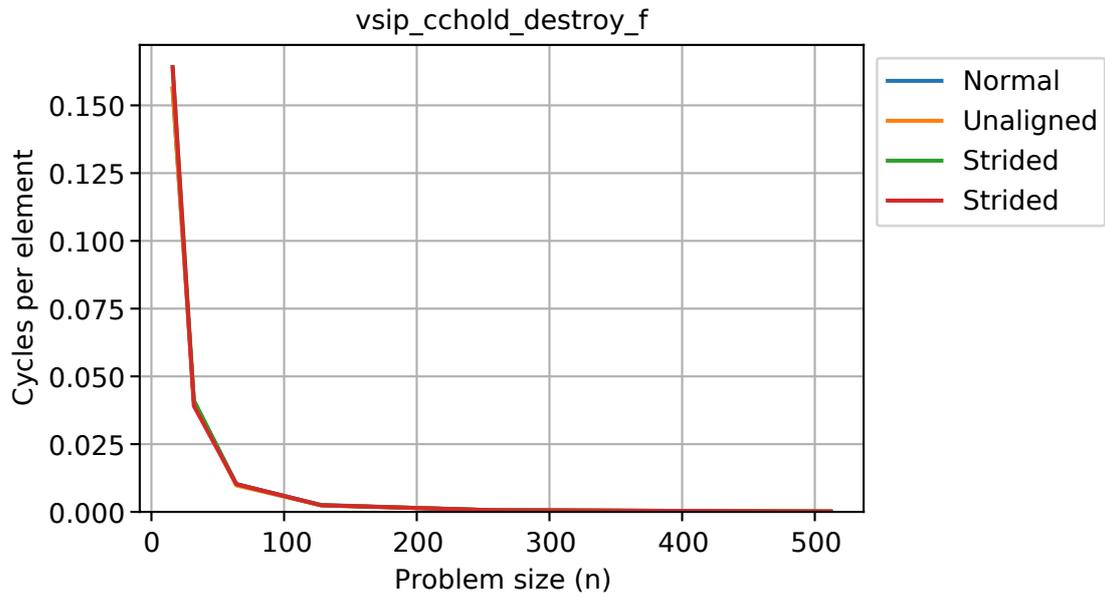
vsip_cchold_f



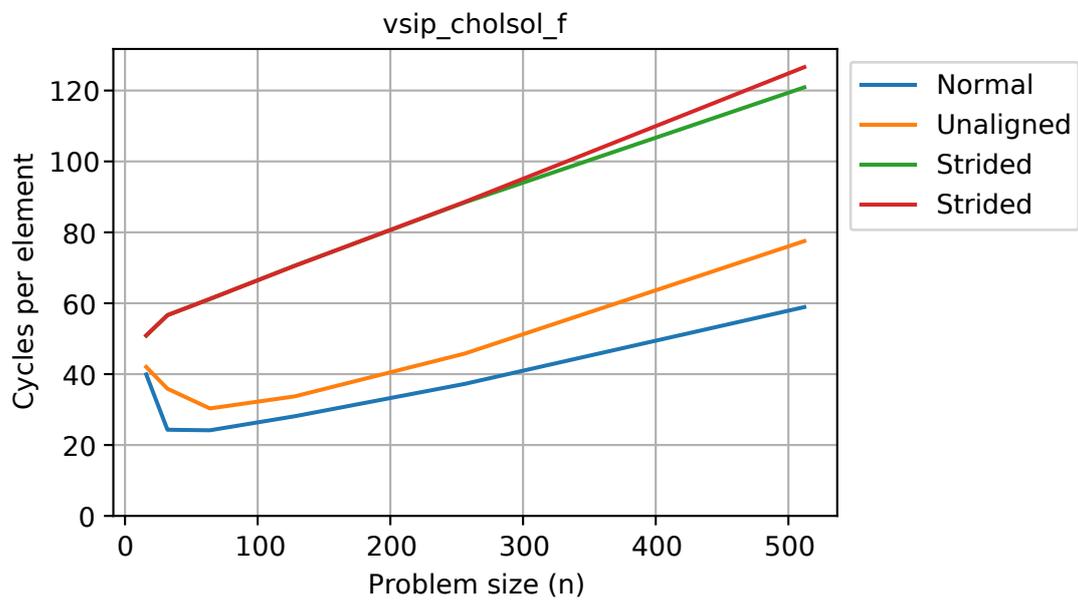
vsip_chold_create_f

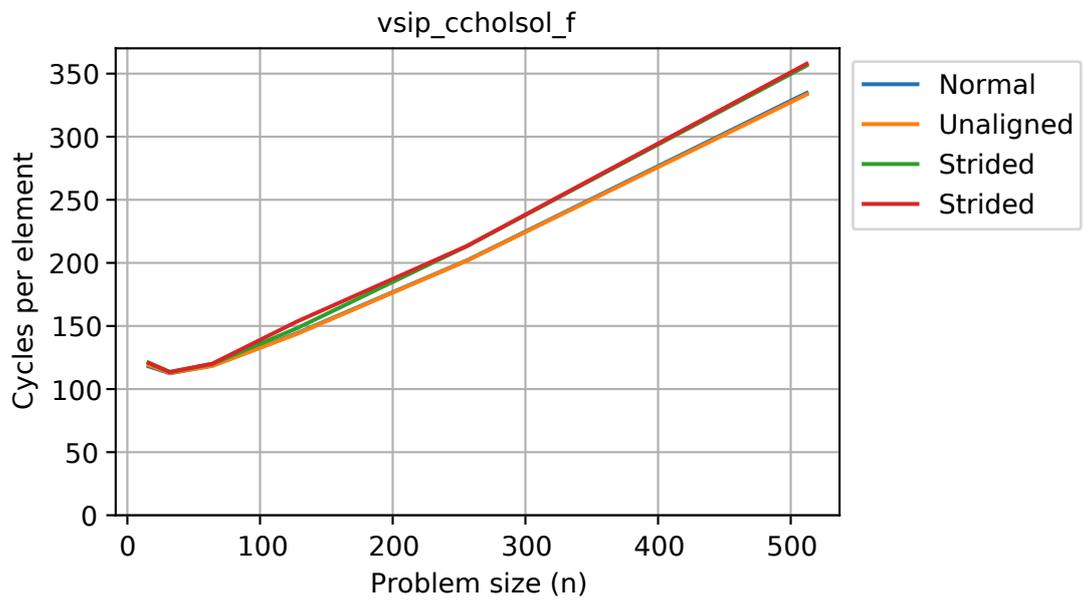


vsip_cchold_create_f**vsip_Dchold_destroy_P**



vsip_cholsol_f

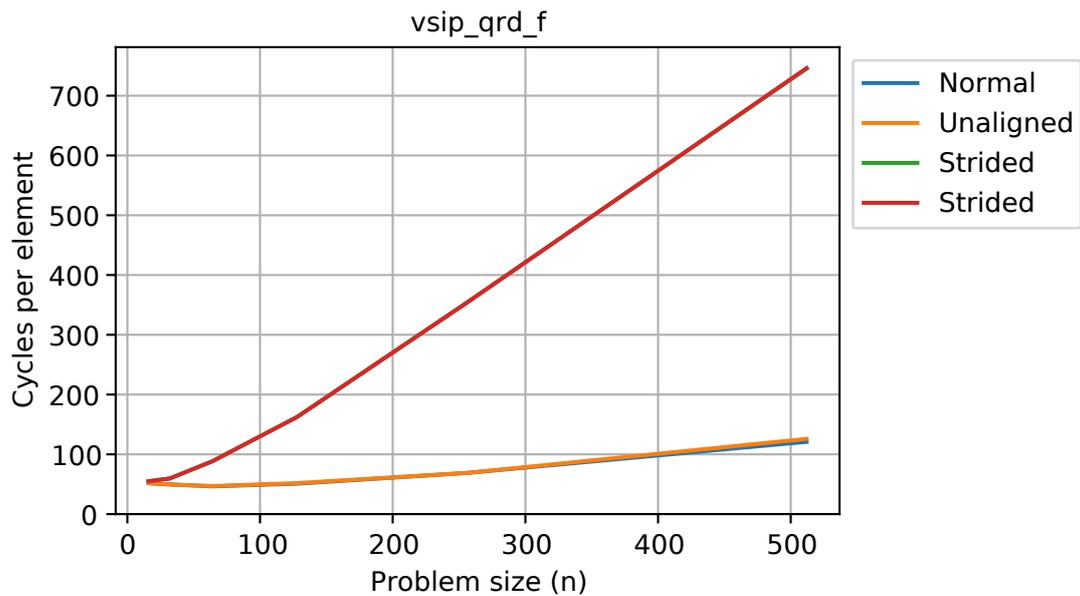


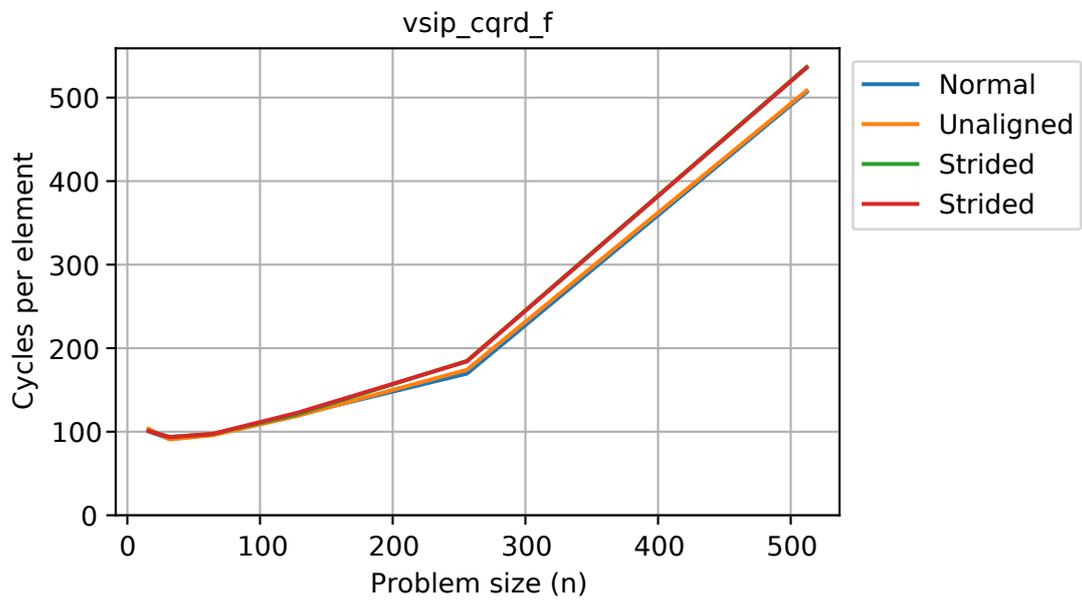
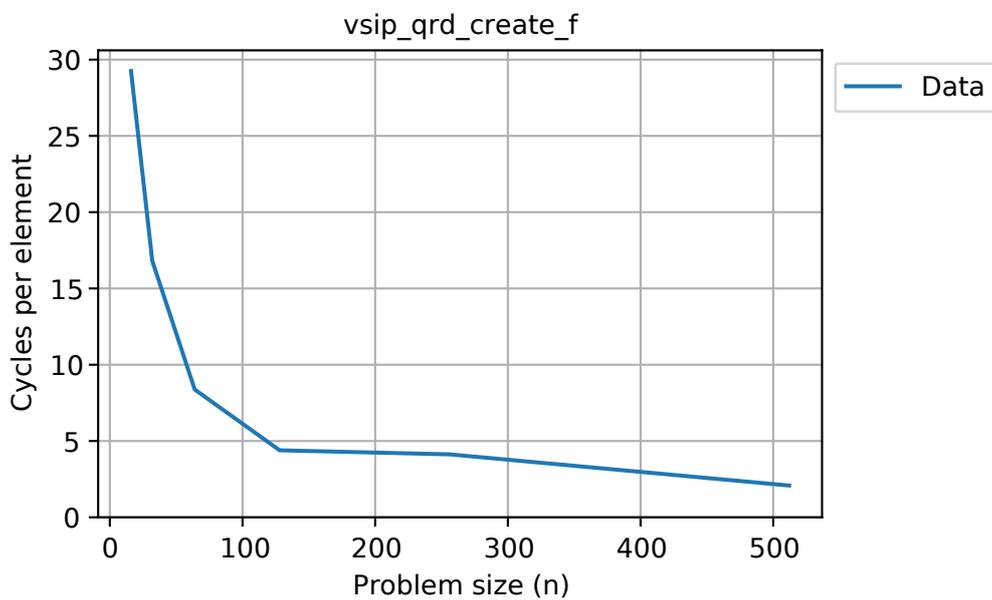
vsip_ccholsol_f

4.5 Overdetermined Linear System Solver

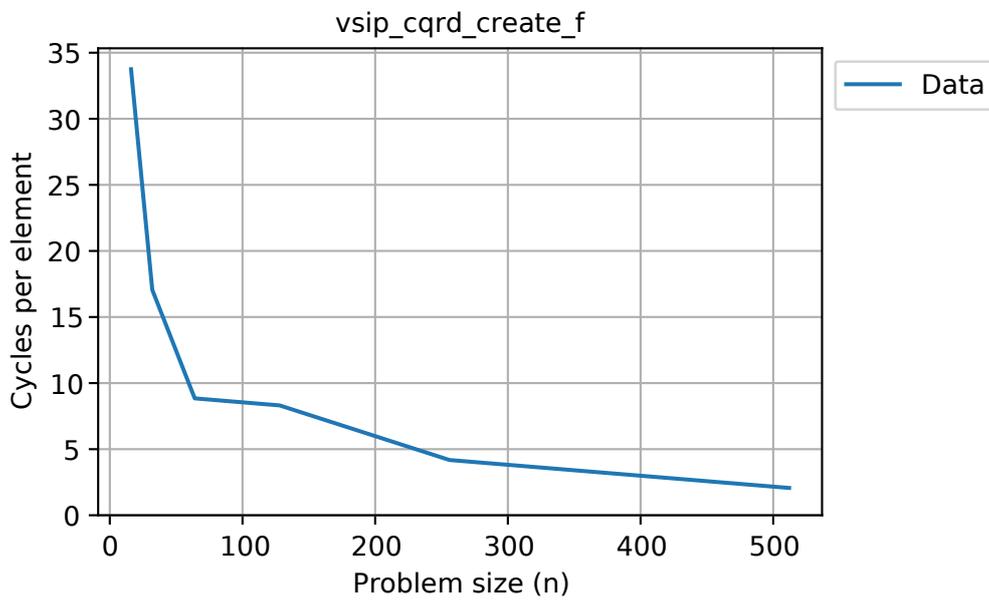
- `vsip_qrd_f`
- `vsip_cqrd_f`
- `vsip_qrd_create_f`
- `vsip_cqrd_create_f`
- `vsip_Dqrd_destroy_P`
- `vsip_qrdprodq_f`
- `vsip_cqrdprodq_f`
- `vsip_qrdsolr_f`
- `vsip_cqrdsolr_f`
- `vsip_qrsol_f`
- `vsip_cqrsol_f`

`vsip_qrd_f`

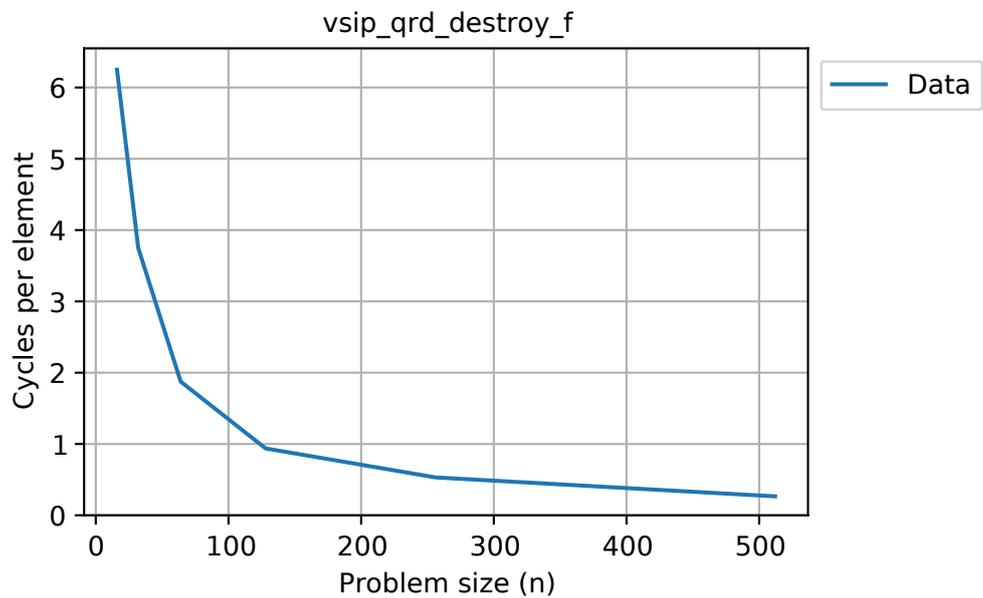


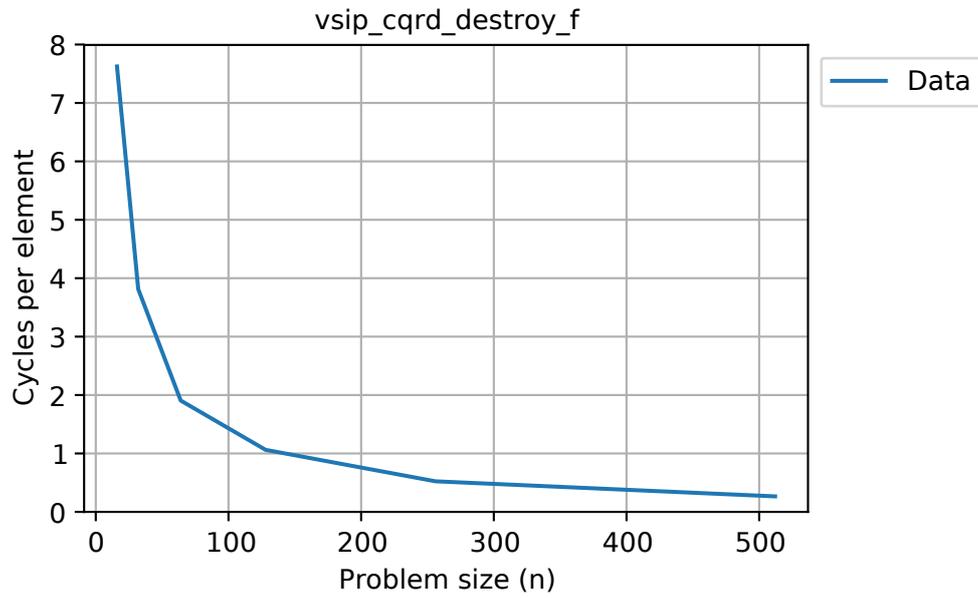
vsip_cqrd_f**vsip_qrd_create_f**

vsip_cqrd_create_f

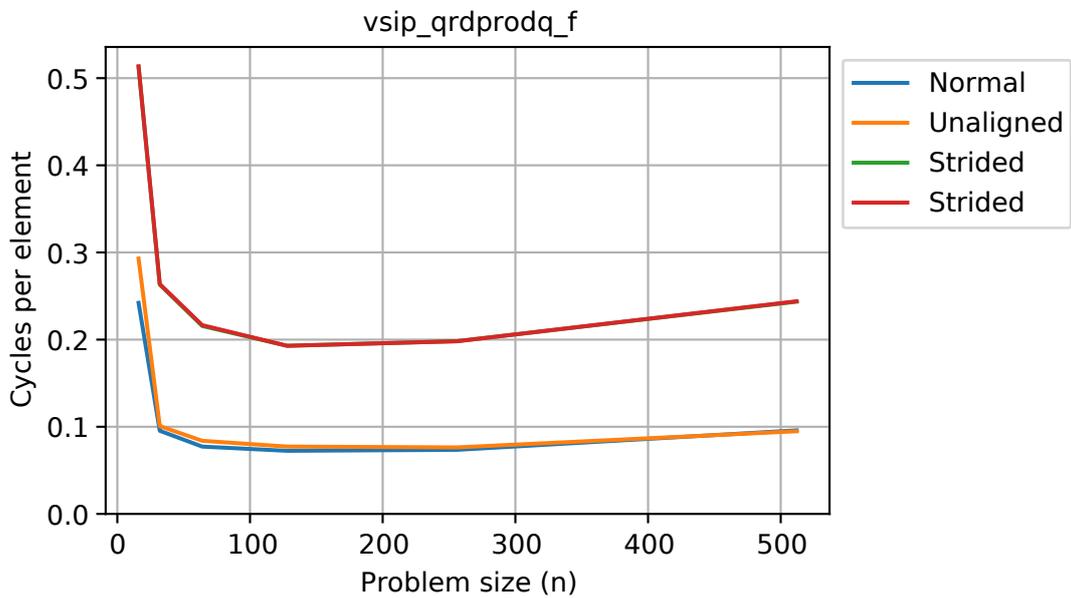


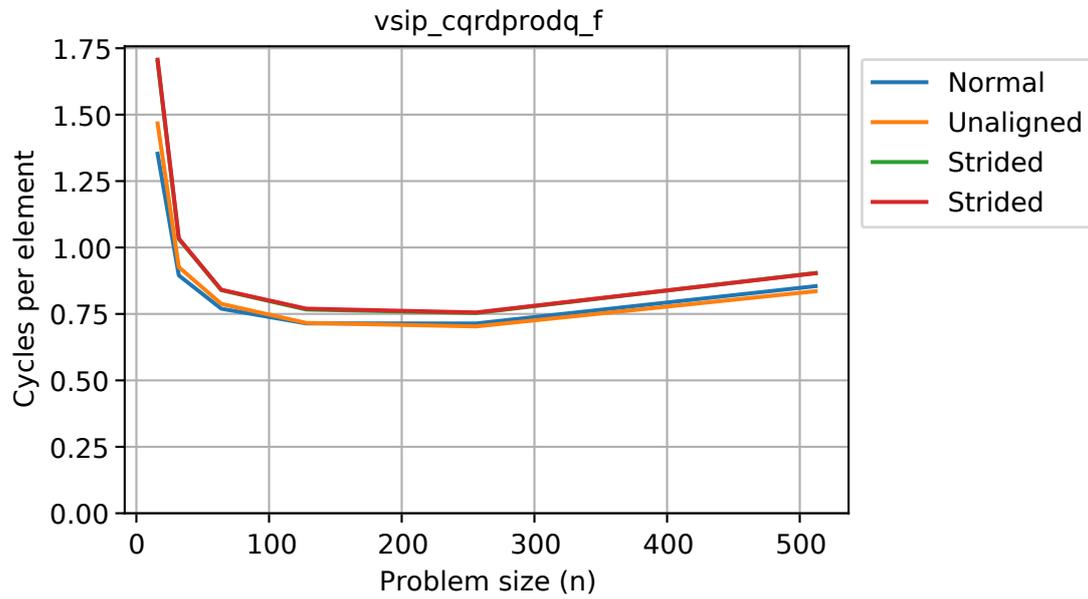
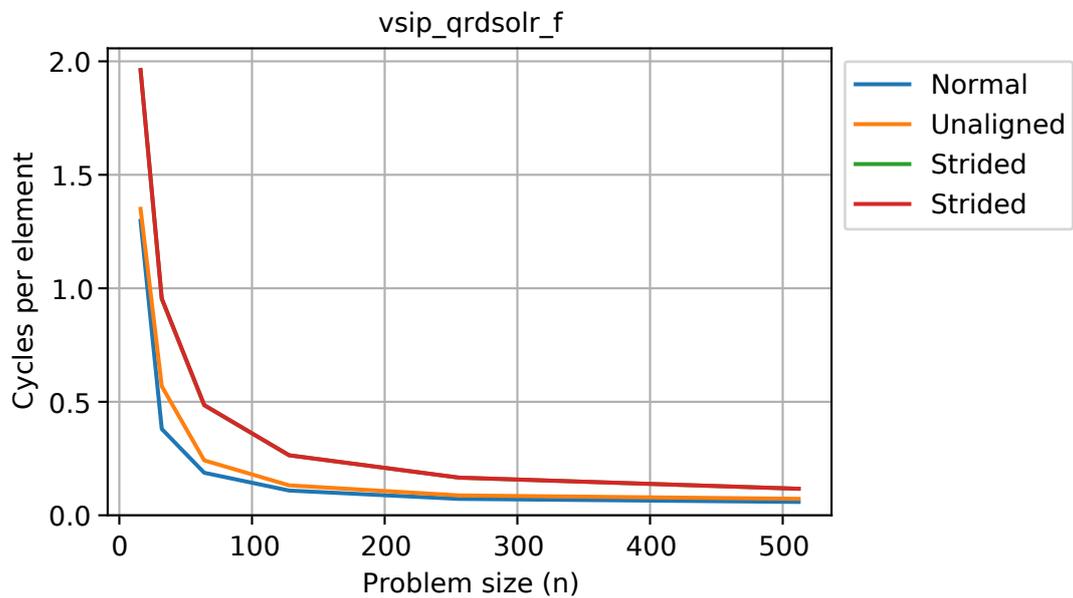
vsip_Dqrd_destroy_P

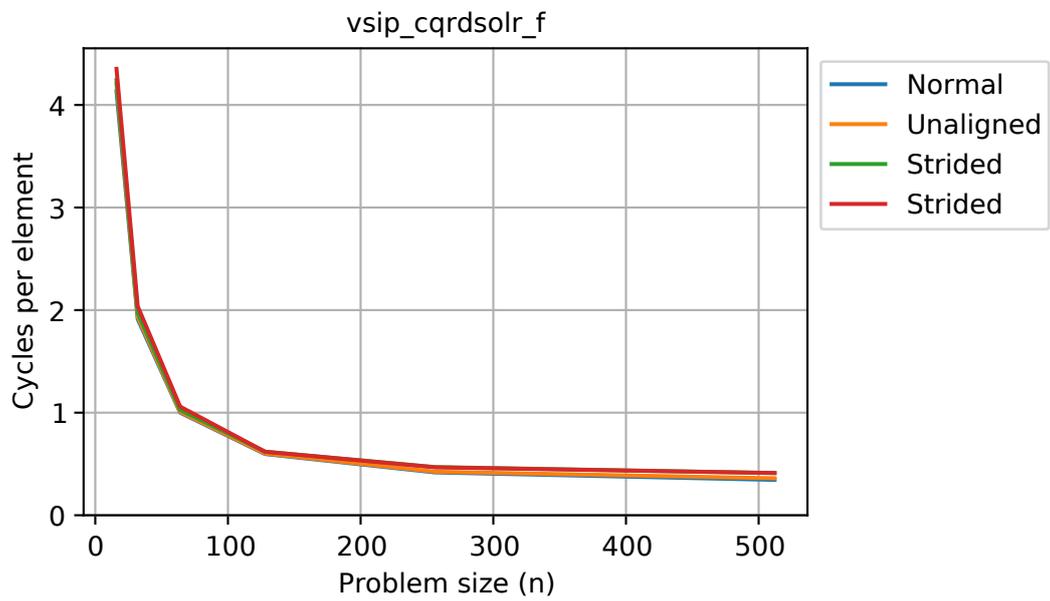
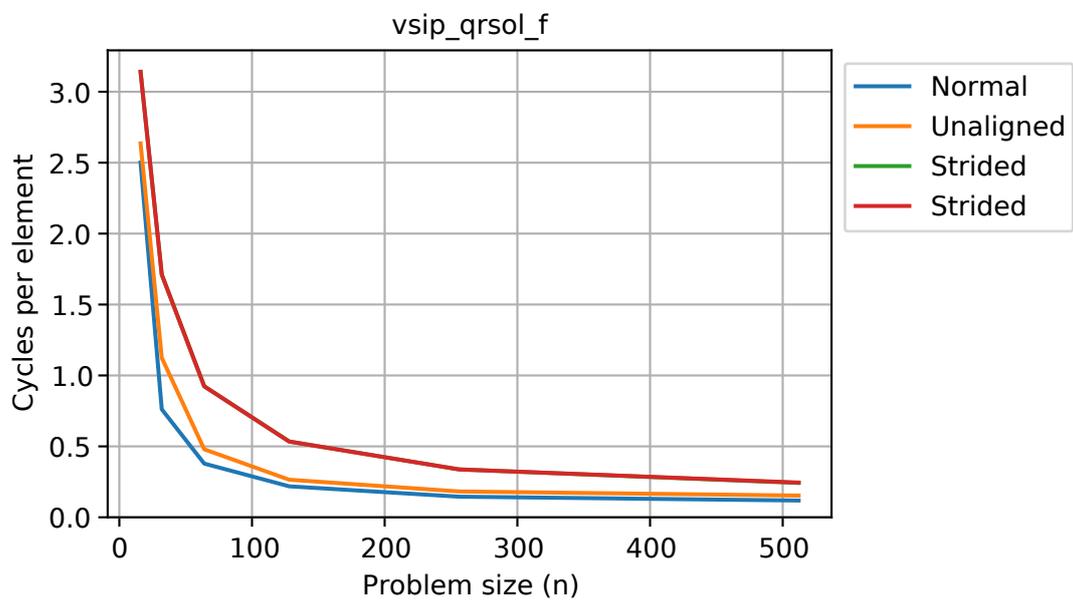


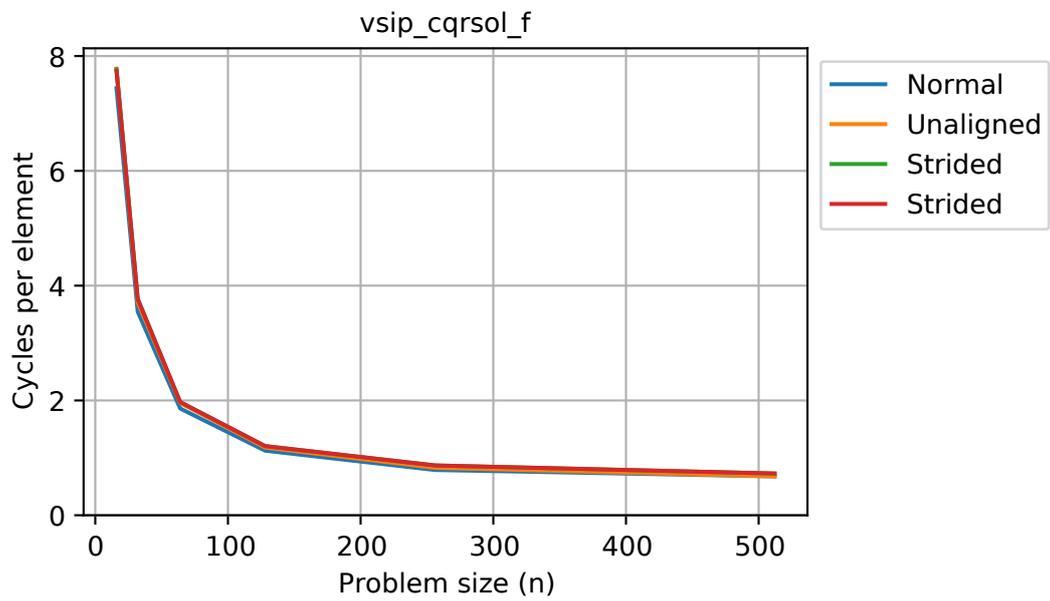


vsip_qrdprodq_f



vsip_cqrdprodq_f**vsip_qrdsolr_f**

vsip_cqrdsolr_f**vsip_qrsol_f**

vsip_cqrsol_f

4.6 Extensions

- `vsip_Dminvlu_P`

`vsip_Dminvlu_P`

