

Figure 1: timing-pattern

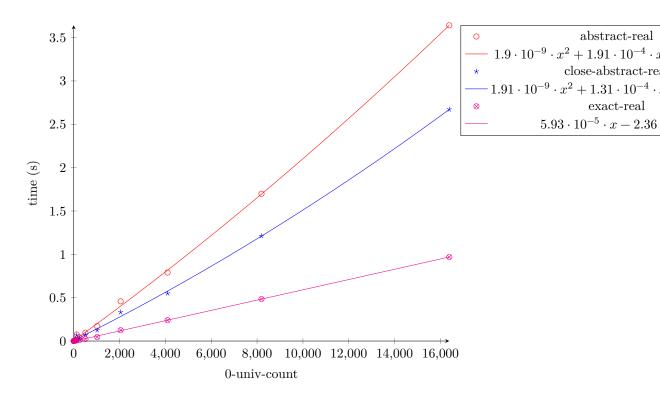
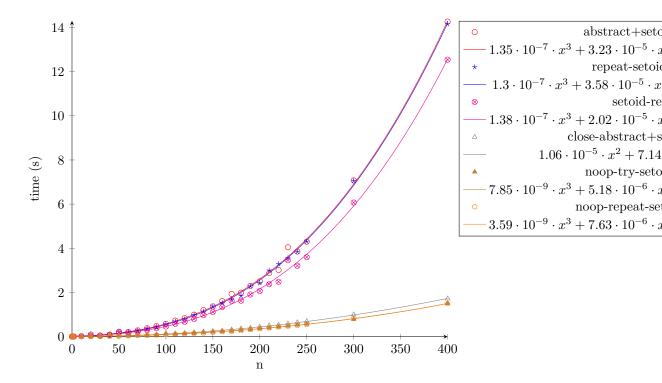


Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$ 

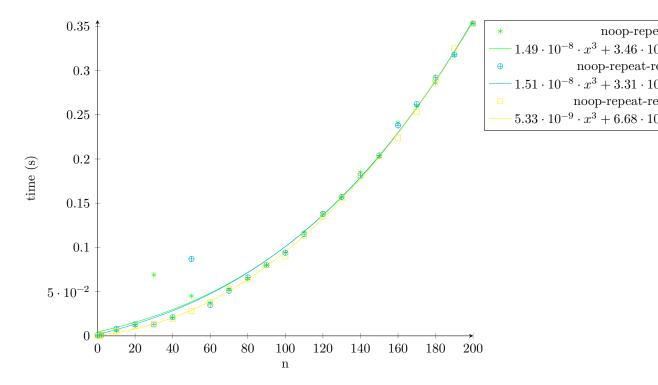


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

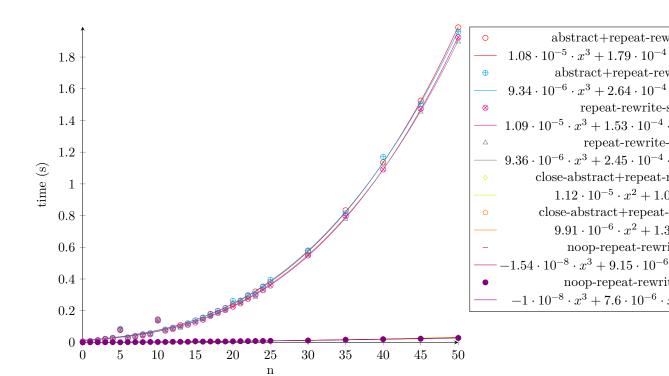
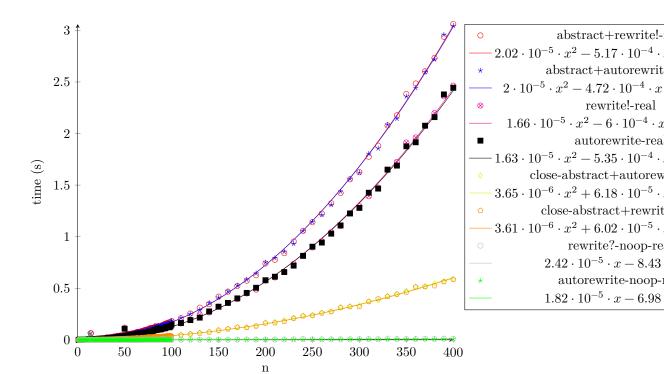


Figure 5: timing-rewrite-strat-under-binders



 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$ 

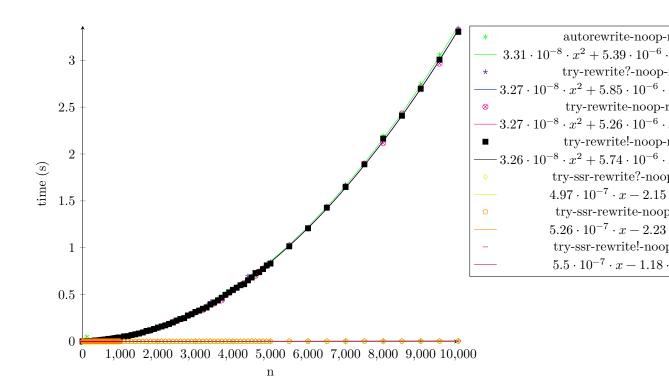
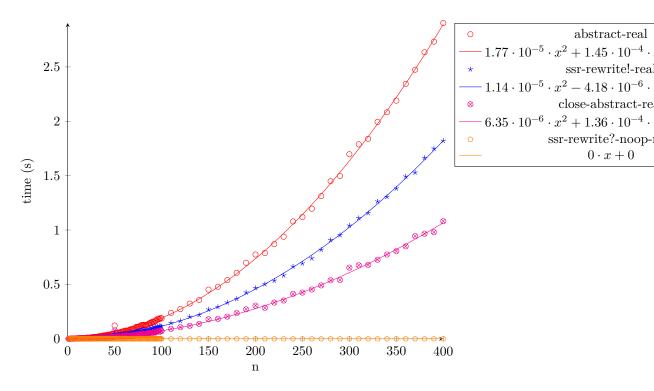
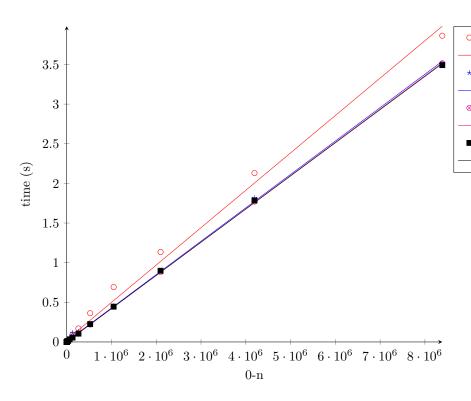


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



 $Figure \ 8: \ timing-rewrite-repeated-app-ssrrewrite \\$ 



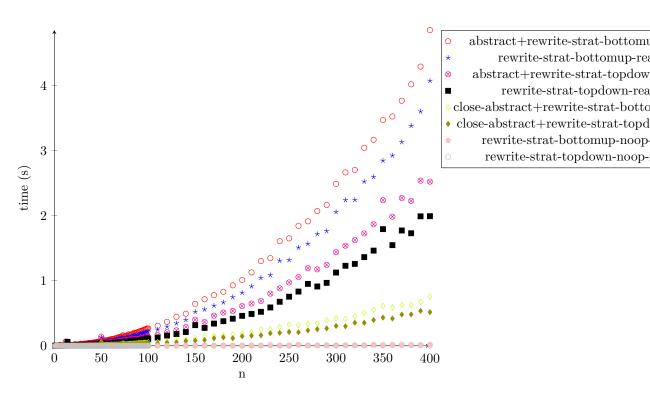
try-ssr-rewrite!-cold-noop-rea  $4.72 \cdot 10^{-7} \cdot x + 2.71 \cdot 10^{-2}$ 

try-ssr-rewrite!-noop-real  $4.21\cdot 10^{-7}\cdot x + 7.39\cdot 10^{-3}$ 

try-ssr-rewrite-noop-real  $4.2\cdot 10^{-7}\cdot x + 8.58\cdot 10^{-4}$  try-ssr-rewrite?-noop-real

 $4.18\cdot 10^{-7}\cdot x + 2.43\cdot 10^{-3}$ 

Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\,1\,$ 



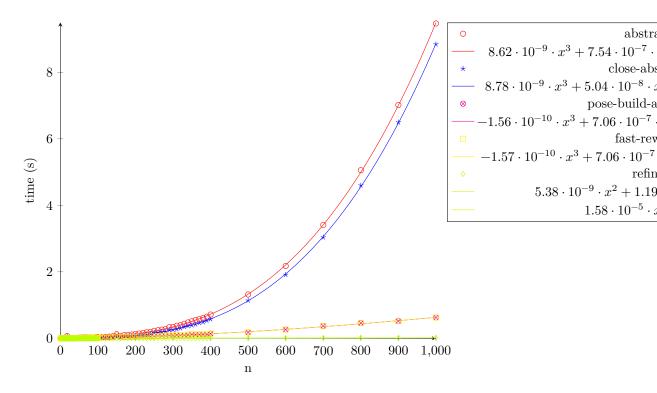
 $abstract + rewrite - strat - bottom \\ \\$ rewrite-strat-bottomup-realabstract + rewrite - strat - topdow

rewrite-strat-topdown-rea

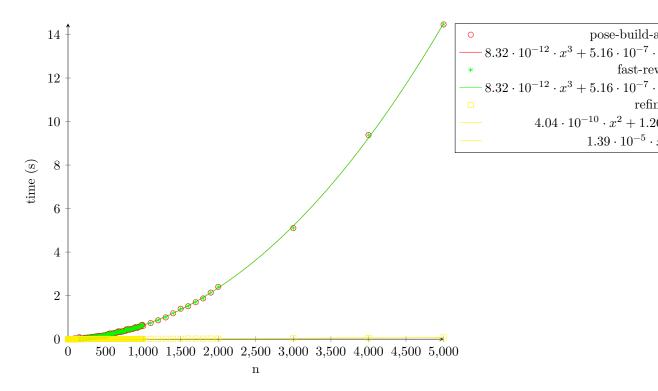
rewrite-strat-bottomup-noop-

rewrite-strat-topdown-noop-

 $Figure\ 10:\ timing-rewrite-repeated-app-rewrite-strat$ 



 ${\bf Figure~11:~timing\text{-}rewrite\text{-}repeated\text{-}app\text{-}fast\text{-}rewrite}$ 



 ${\bf Figure~12:~timing\text{-}rewrite\text{-}repeated\text{-}app\text{-}fast\text{-}rewrite\text{-}no\text{-}abstract}}$ 

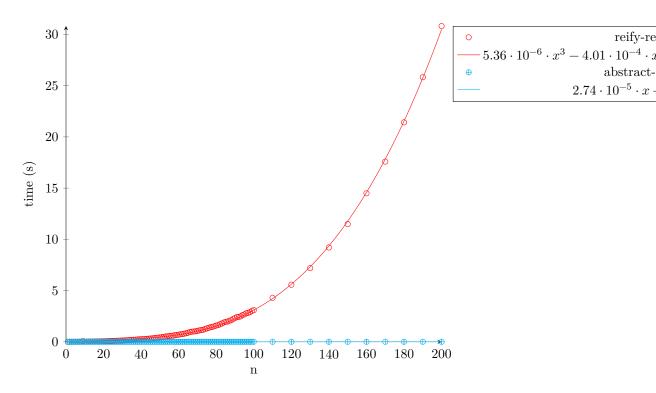
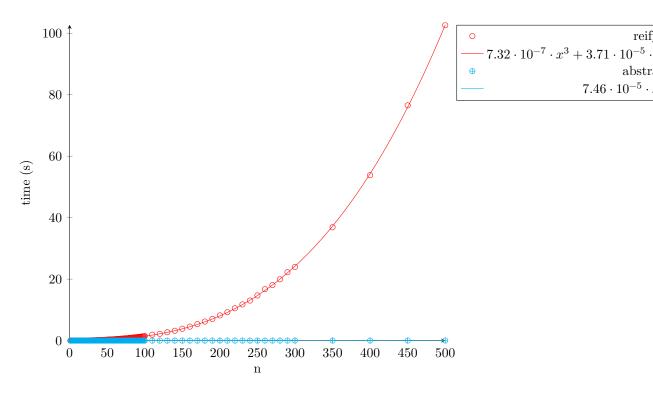


Figure 13: timing-typeclass-reification-let-in-HOAS



 ${\bf Figure~14:~timing-type class-reification-let-in-PHOAS}$ 

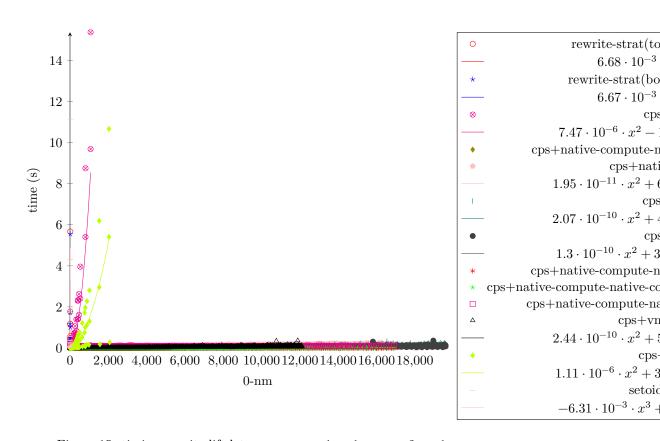


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1  $\,$ 

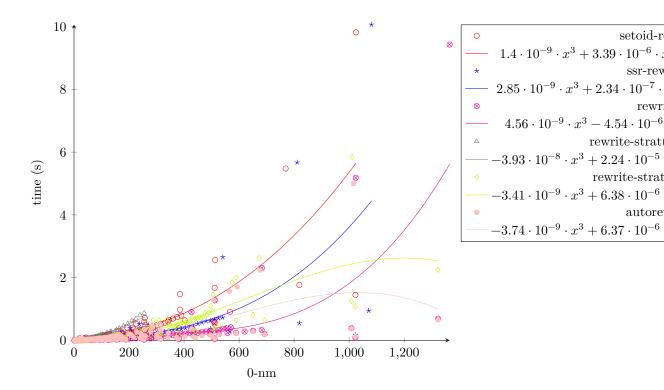


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1

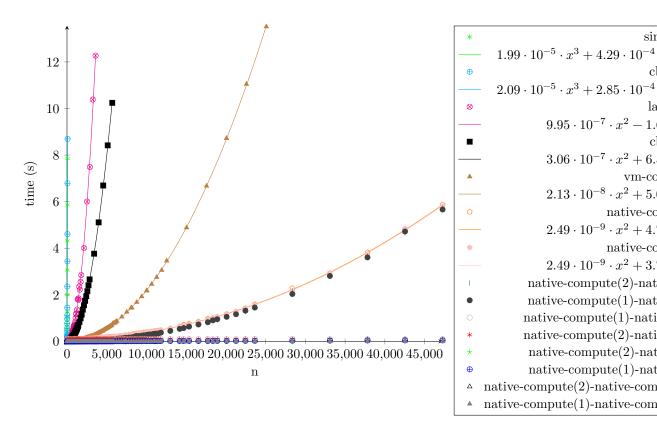
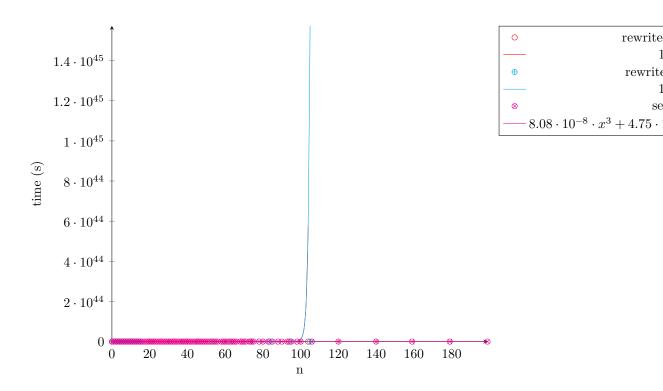


Figure 17: timing-sieve-of-eratosthenes



rewrite

rewrite

Figure 18: timing-rewrite-under-lets-plus-0  $\,$ 

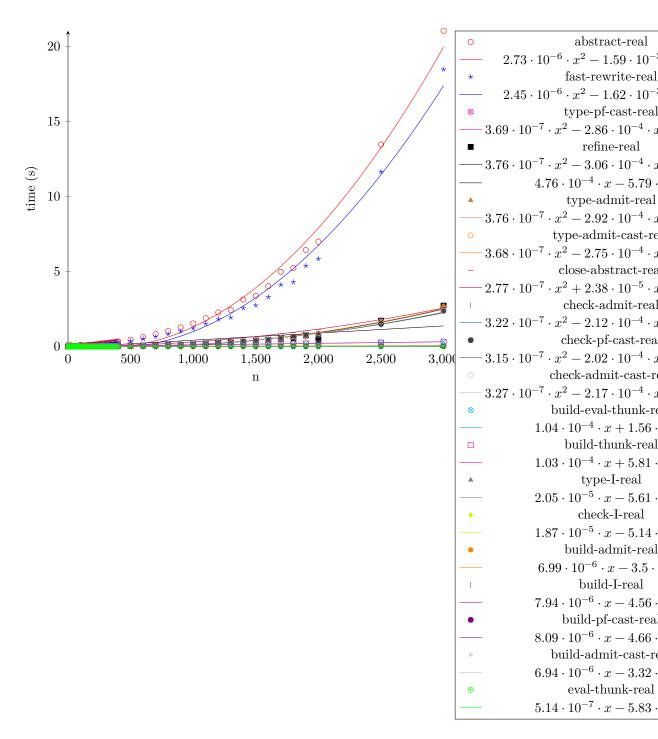


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2