

Figure 1: timing-pattern

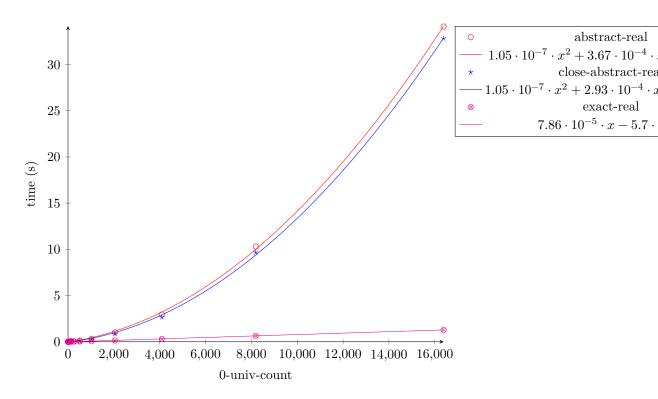
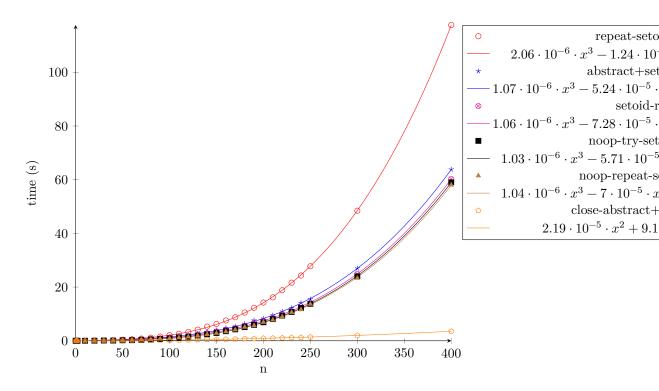
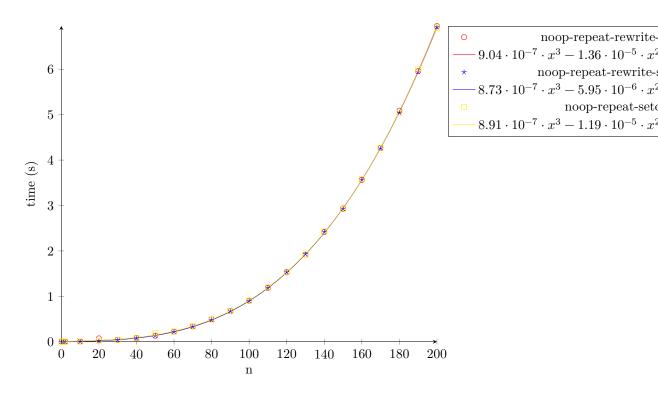


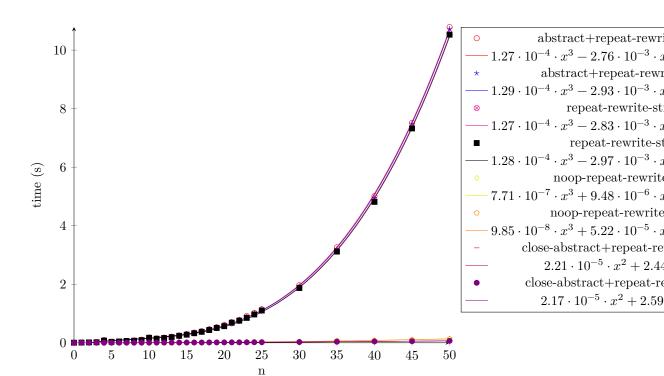
Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



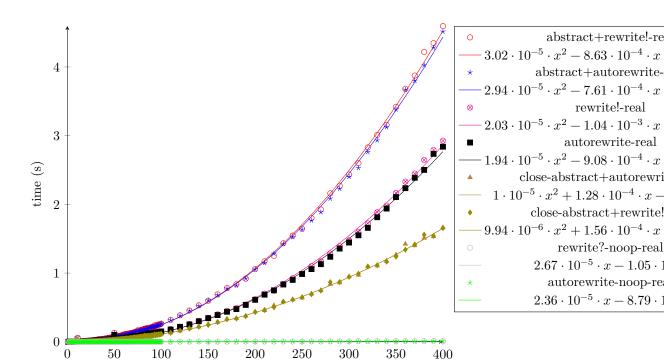
 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$ 



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

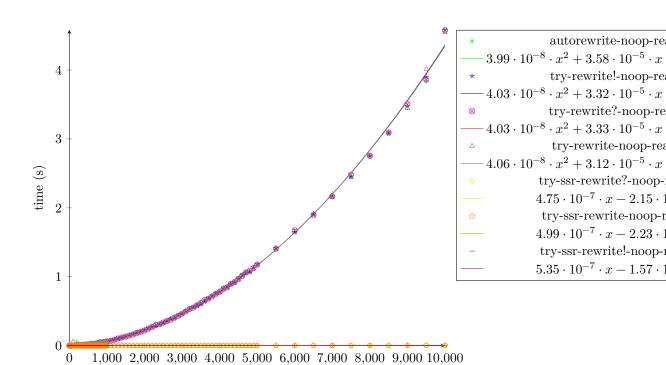


 $Figure\ 5:\ timing-rewrite-strat-under-binders$ 



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

n



 $Figure~7:~timing\mbox{-rewrite-repeated-app-autorewrite-noop}$ 

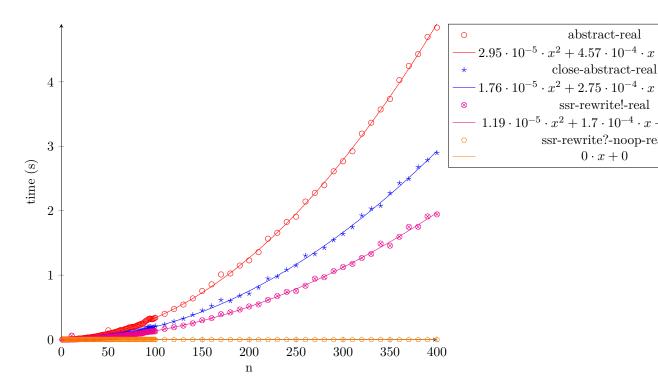
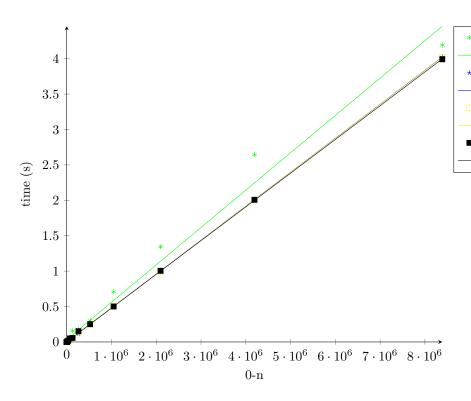


Figure 8: timing-rewrite-repeated-app-ssrrewrite



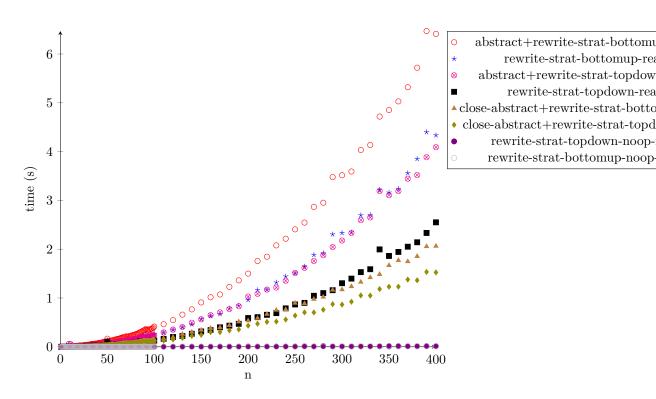
try-ssr-rewrite!-cold-noop-rea $5.27\cdot 10^{-7}\cdot x + 3.3\cdot 10^{-2}$ 

try-ssr-rewrite?-noop-real  $4.79\cdot 10^{-7}\cdot x - 6.58\cdot 10^{-4}$ 

try-ssr-rewrite-noop-real  $4.79\cdot 10^{-7}\cdot x - 1.36\cdot 10^{-3}$ 

try-ssr-rewrite!-noop-real  $4.76\cdot 10^{-7}\cdot x + 2.43\cdot 10^{-3}$ 

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

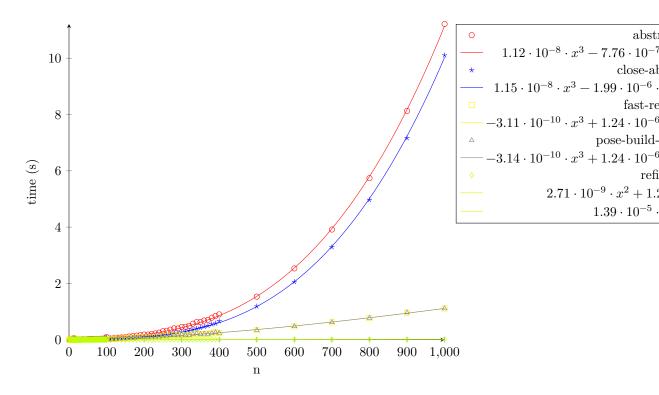


rewrite-strat-bottomup-rea

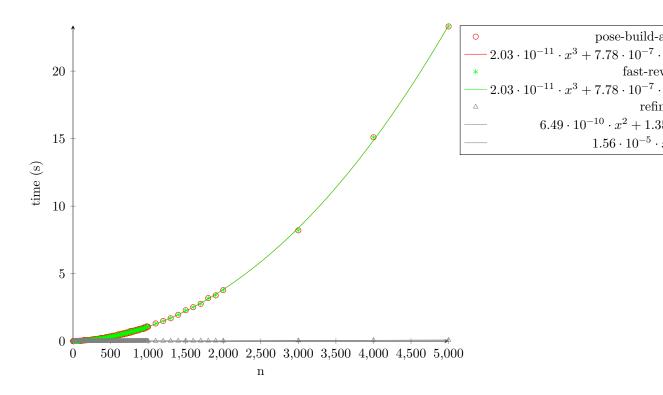
rewrite-strat-topdown-rea

rewrite-strat-topdown-noop-

 $Figure~10:~timing\mbox{-rewrite-repeated-app-rewrite-strat}$ 



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



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

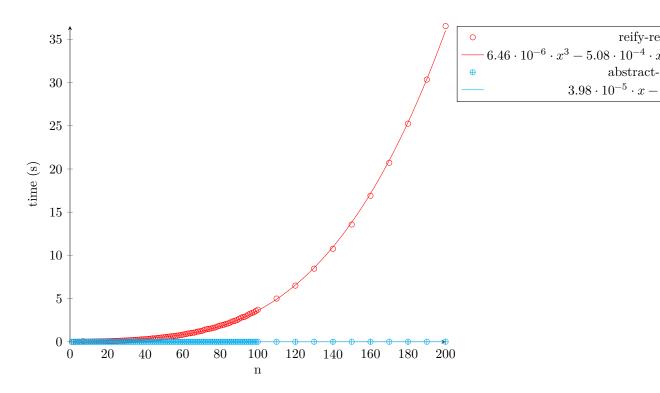


Figure 13: timing-typeclass-reification-let-in-HOAS

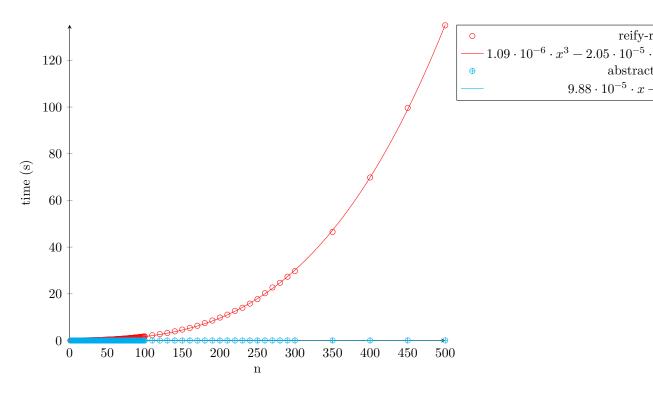


Figure 14: timing-typeclass-reification-let-in-PHOAS

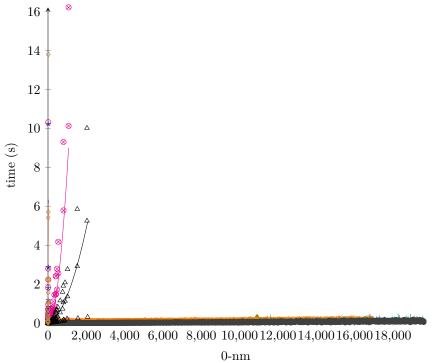


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

rewrite-strat(bottomup-bot

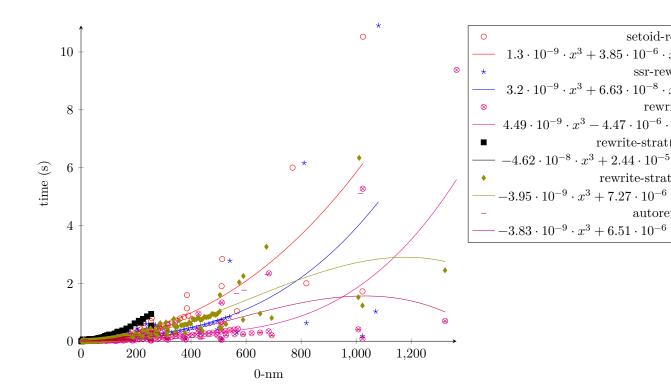
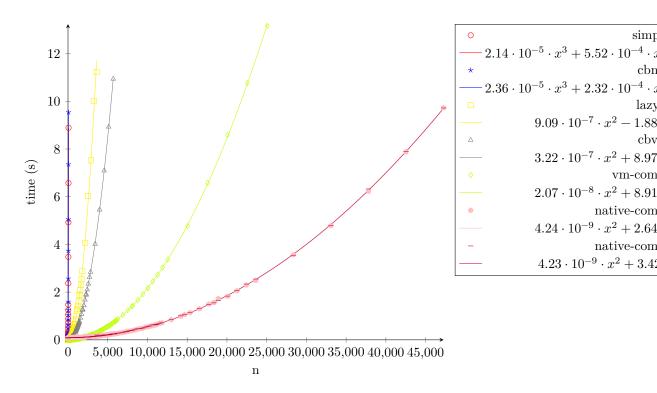


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

vm-com

native-com

native-com

 $9.09 \cdot 10^{-7} \cdot x^2 - 1.88$ 

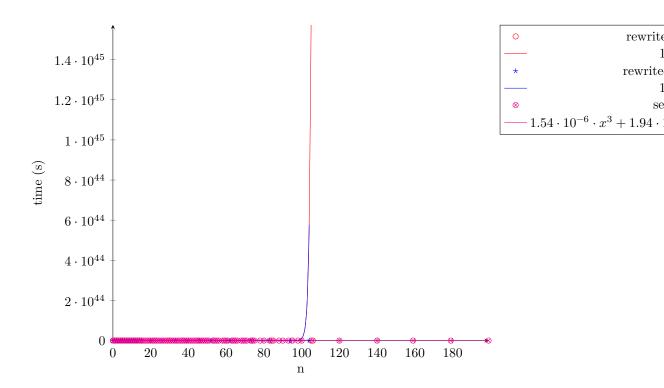
 $3.22 \cdot 10^{-7} \cdot x^2 + 8.97$ 

 $2.07 \cdot 10^{-8} \cdot x^2 + 8.91$ 

 $4.24 \cdot 10^{-9} \cdot x^2 + 2.64$ 

 $4.23 \cdot 10^{-9} \cdot x^2 + 3.42$ 

Figure 17: timing-sieve-of-eratosthenes



rewrite

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

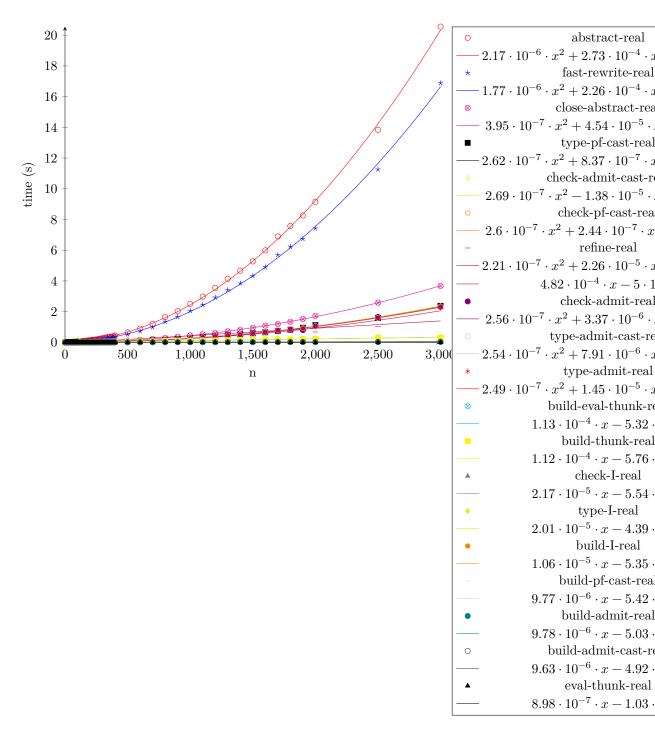


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2