

Figure 1: timing-pattern

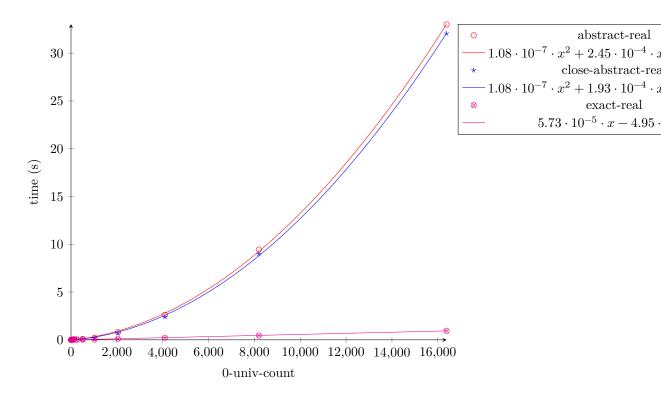


Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 

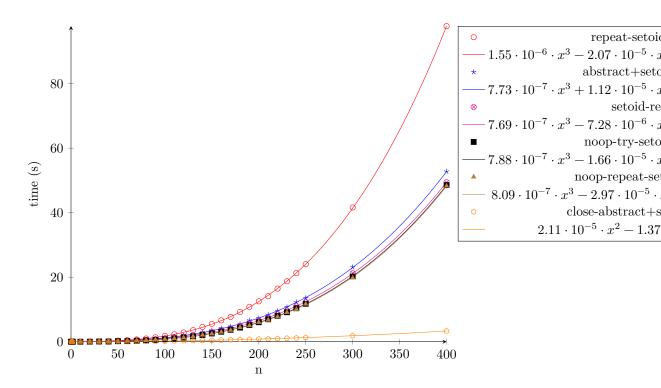


Figure 3: timing-repeat-setoid-rewrite-under-binders

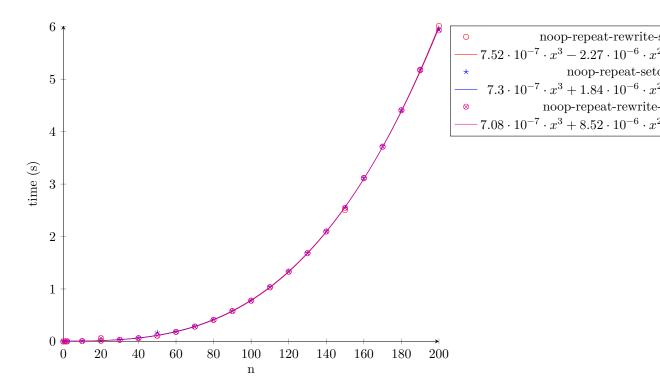


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

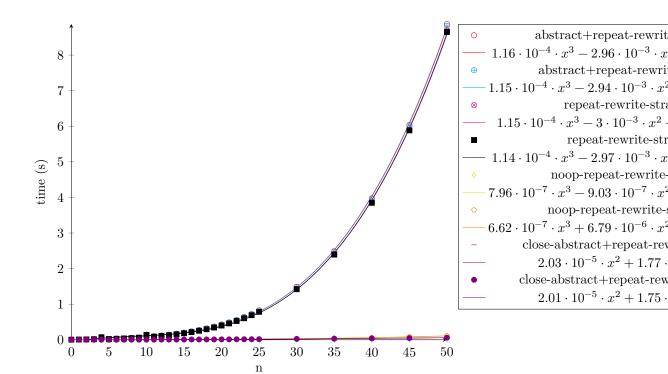
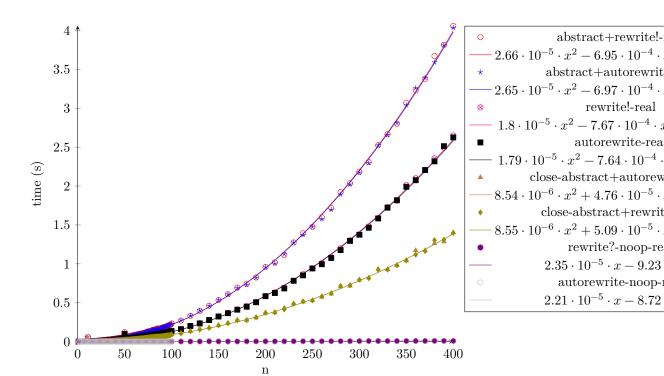
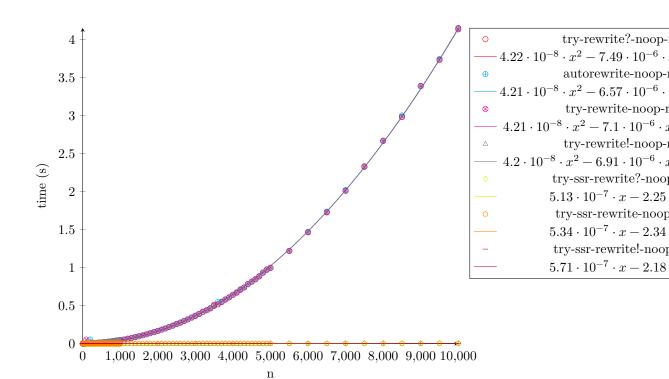


Figure 5: timing-rewrite-strat-under-binders



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



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

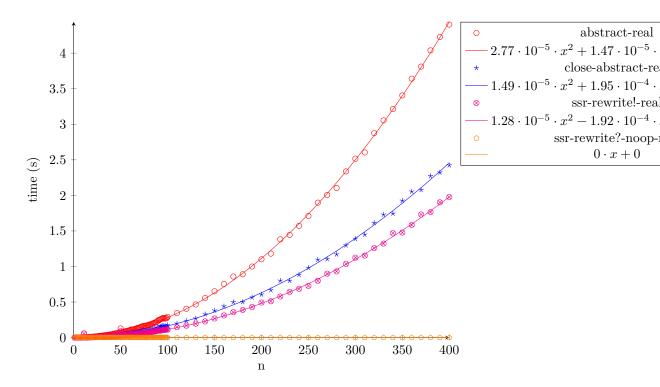
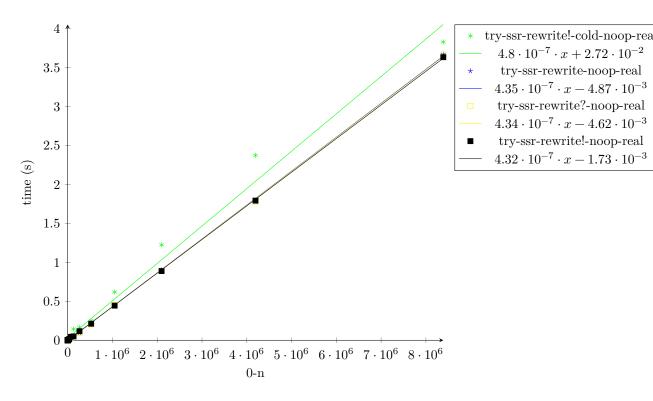


Figure 8: timing-rewrite-repeated-app-ssrrewrite



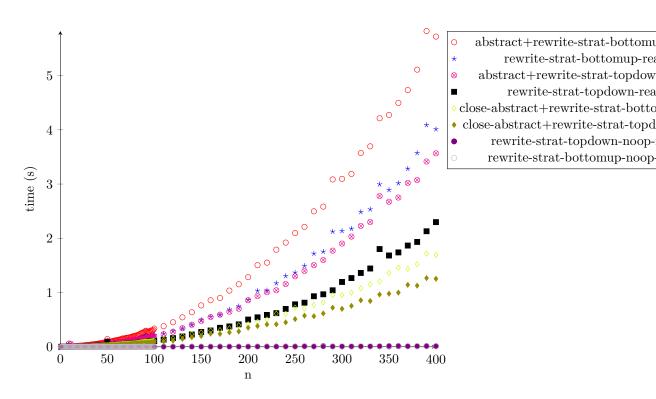
 $4.8\cdot 10^{-7}\cdot x + 2.72\cdot 10^{-2}$ 

try-ssr-rewrite-noop-real $4.35 \cdot 10^{-7} \cdot x - 4.87 \cdot 10^{-3}$ try-ssr-rewrite?-noop-real

 $4.34 \cdot 10^{-7} \cdot x - 4.62 \cdot 10^{-3}$ try-ssr-rewrite!-noop-real

 $4.32\cdot 10^{-7}\cdot x - 1.73\cdot 10^{-3}$ 

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

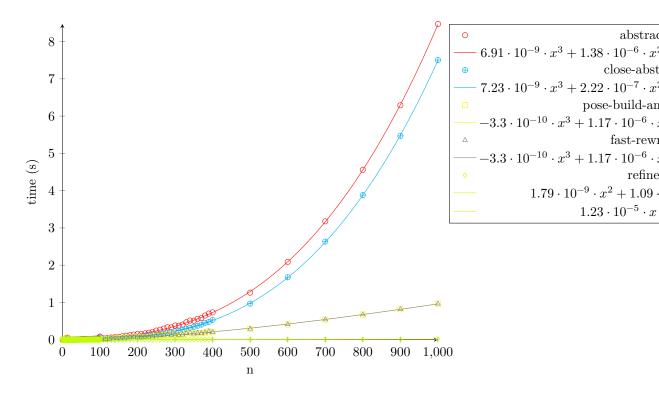


rewrite-strat-bottomup-rea

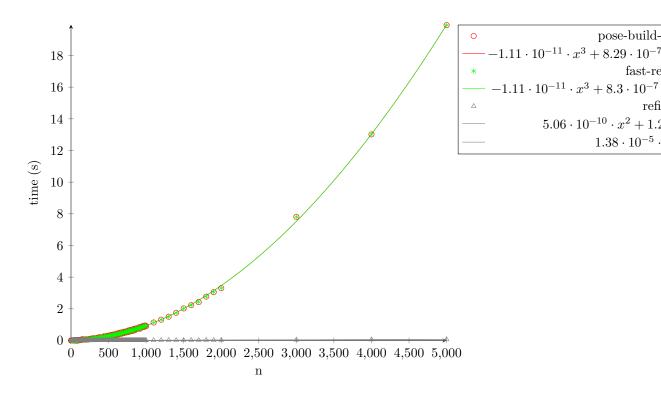
rewrite-strat-topdown-rea

rewrite-strat-topdown-noop-

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



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



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

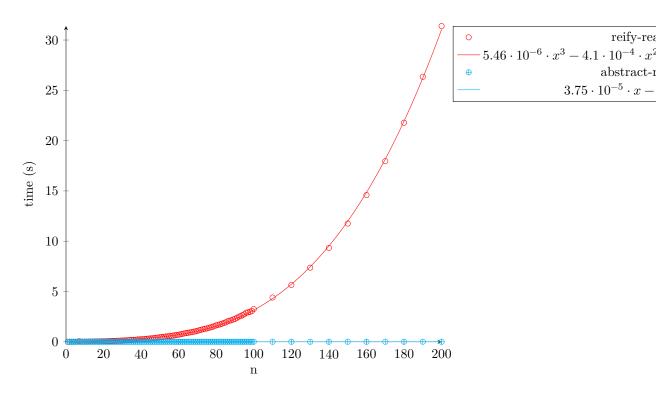


Figure 13: timing-typeclass-reification-let-in-HOAS

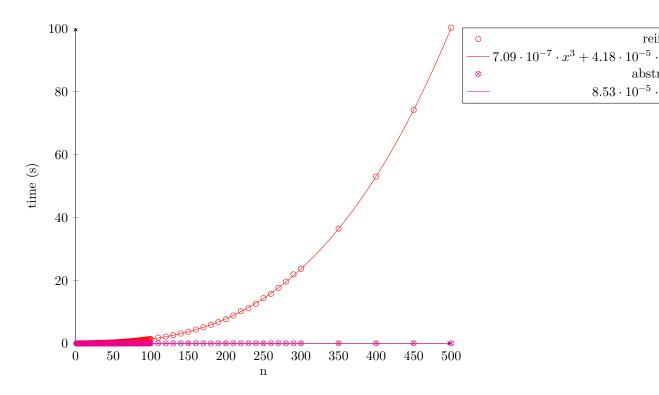


Figure 14: timing-typeclass-reification-let-in-PHOAS

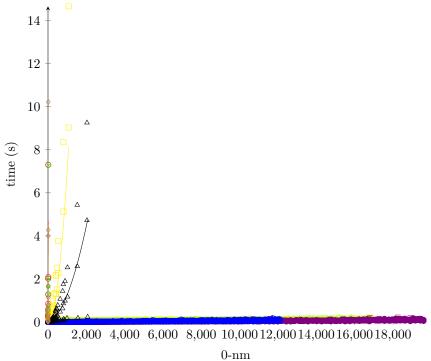


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

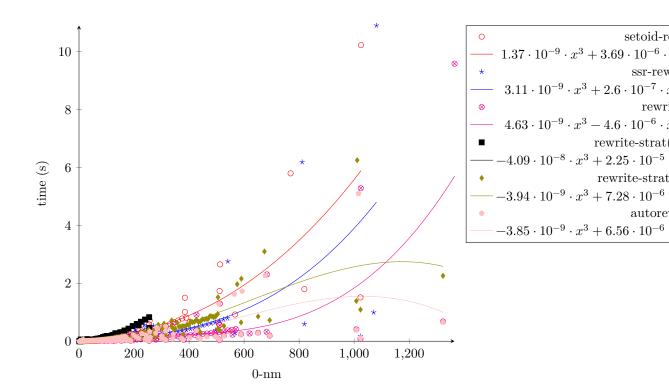
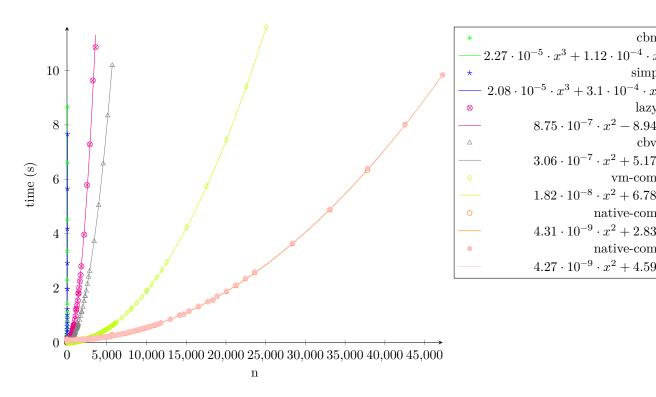


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



cbn

vm-com

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 $8.75 \cdot 10^{-7} \cdot x^2 - 8.94$ 

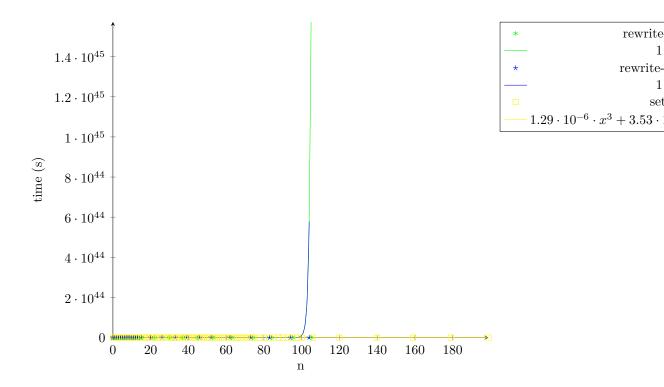
 $3.06 \cdot 10^{-7} \cdot x^2 + 5.17$ 

 $1.82 \cdot 10^{-8} \cdot x^2 + 6.78$ 

 $4.31 \cdot 10^{-9} \cdot x^2 + 2.83$ 

 $4.27 \cdot 10^{-9} \cdot x^2 + 4.59$ 

Figure 17: timing-sieve-of-eratosthenes



rewrite

rewrite-

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

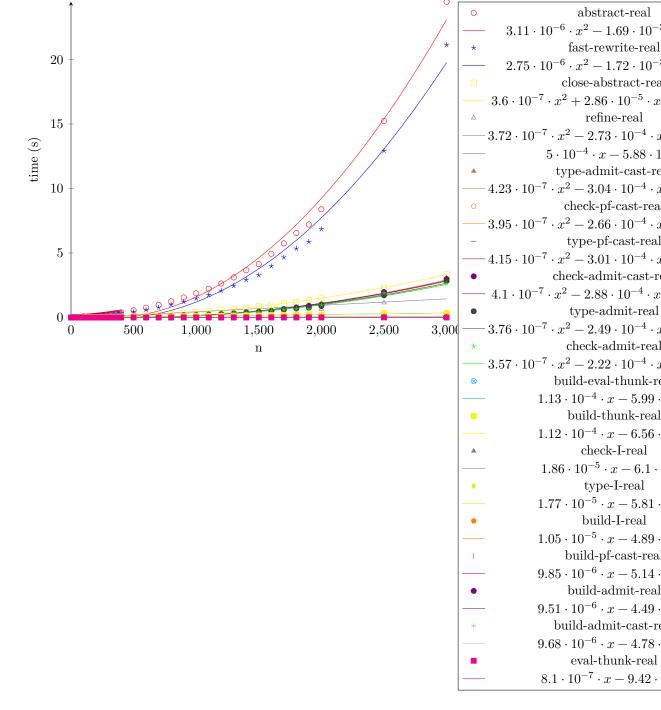


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2