

Figure 1: timing-pattern

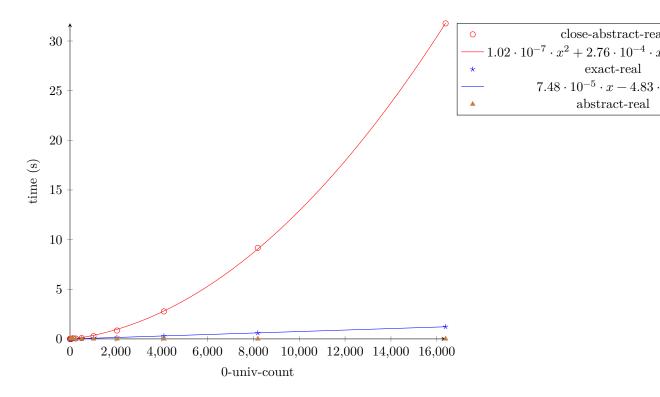
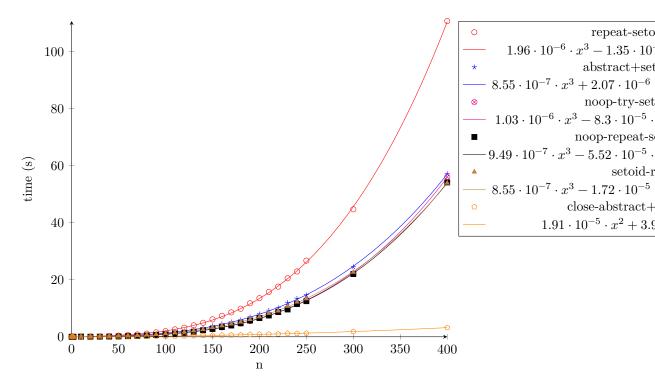
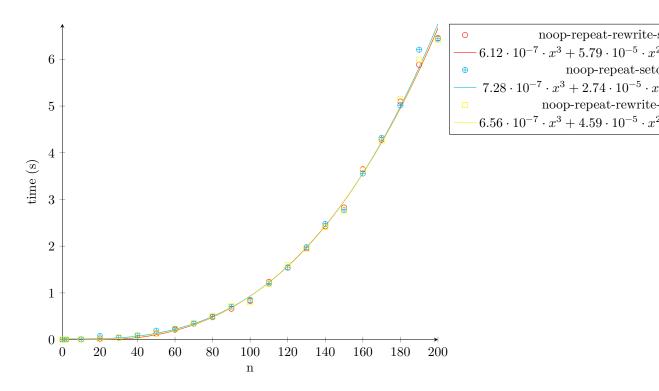


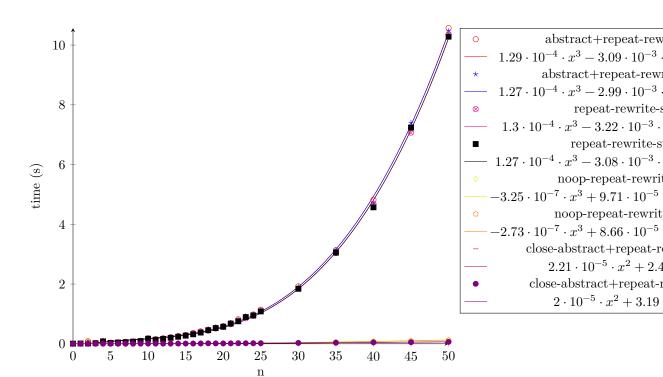
Figure 2: timing-n-polymorphic-universes param-1-n 0



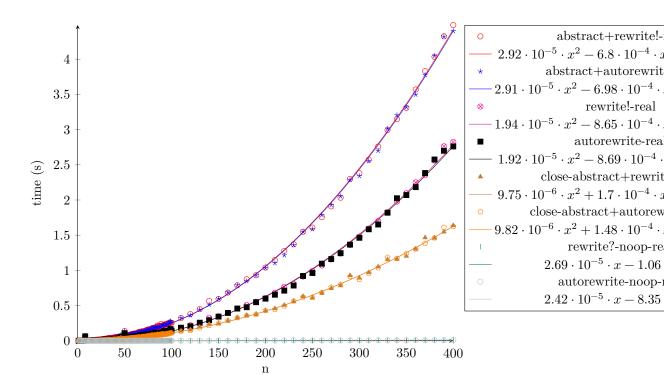
 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$ 



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



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



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

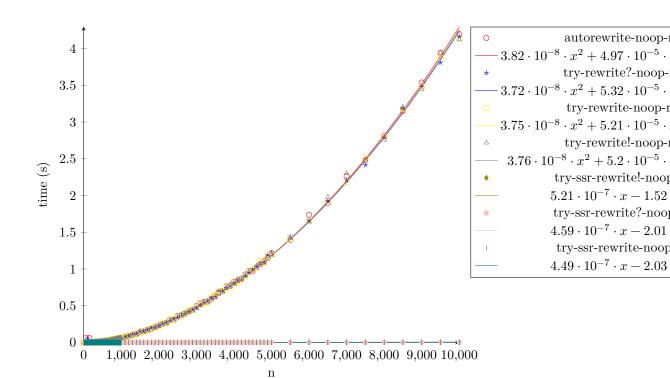


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

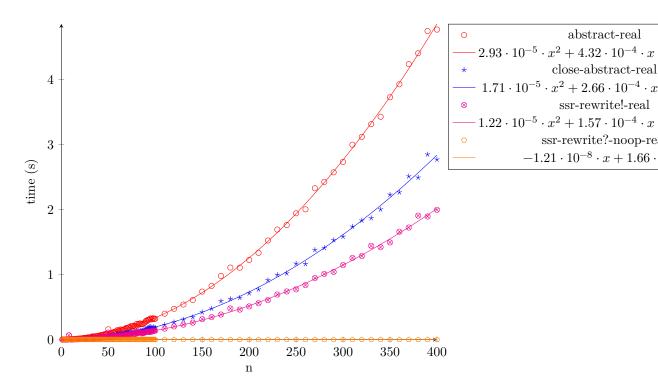
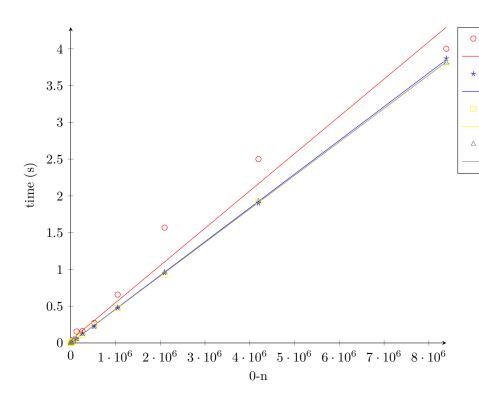


Figure 8: timing-rewrite-repeated-app-ssrrewrite



try-ssr-rewrite!-cold-noop-rea

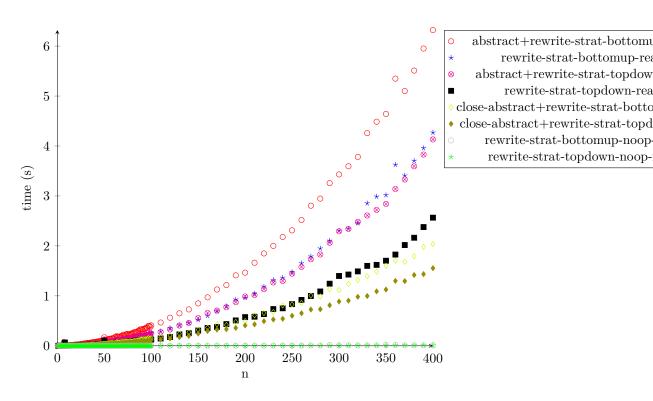
 $5.07 \cdot 10^{-7} \cdot x + 3.9 \cdot 10^{-2}$  try-ssr-rewrite!-noop-real

 $\begin{aligned} &4.59 \cdot 10^{-7} \cdot x - 1.5 \cdot 10^{-4} \\ &\text{try-ssr-rewrite-noop-real} \\ &4.55 \cdot 10^{-7} \cdot x - 1.37 \cdot 10^{-3} \end{aligned}$ 

try-ssr-rewrite?-noop-real

 $4.56\cdot 10^{-7}\cdot x - 4.8\cdot 10^{-4}$ 

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



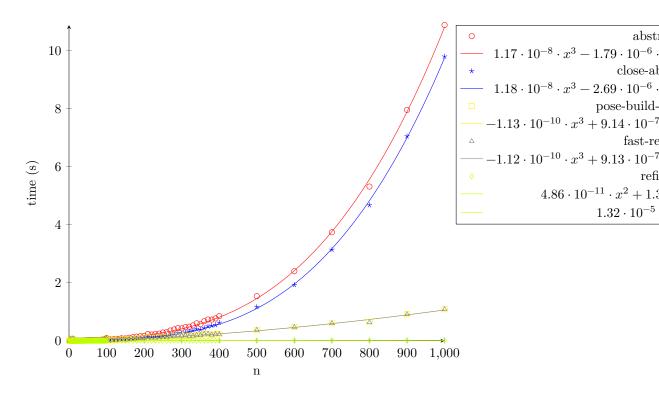
 $abstract + rewrite - strat - bottom \\ \\$ 

rewrite-strat-bottomup-rea abstract + rewrite - strat - topdowrewrite-strat-topdown-rea

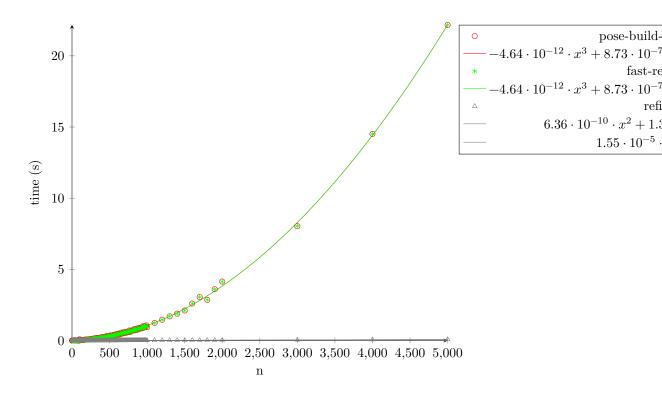
rewrite-strat-bottomup-noop-

rewrite-strat-topdown-noop-

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



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



Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract

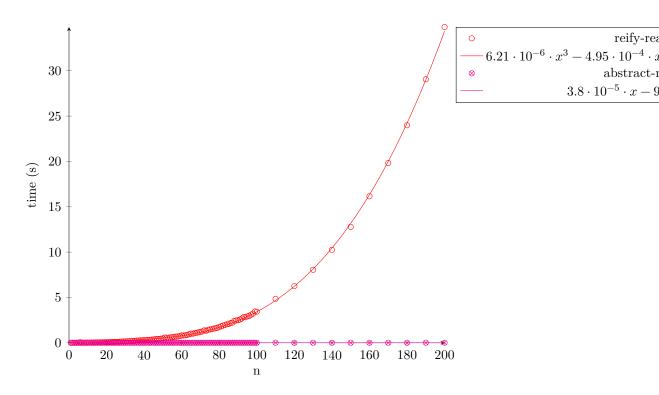


Figure 13: timing-typeclass-reification-let-in-HOAS

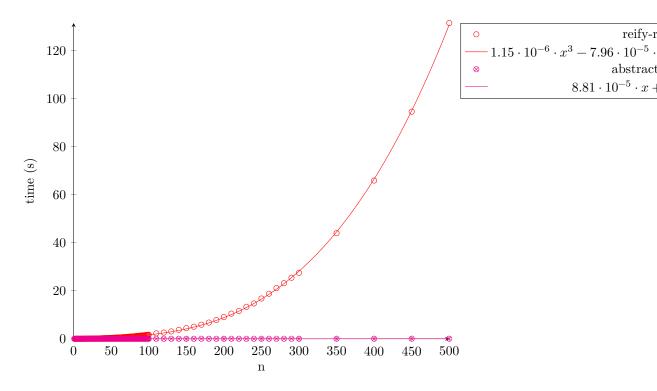


Figure 14: timing-typeclass-reification-let-in-PHOAS

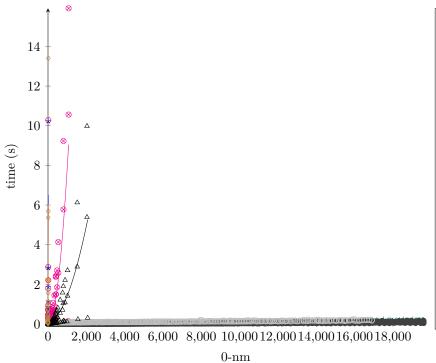


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

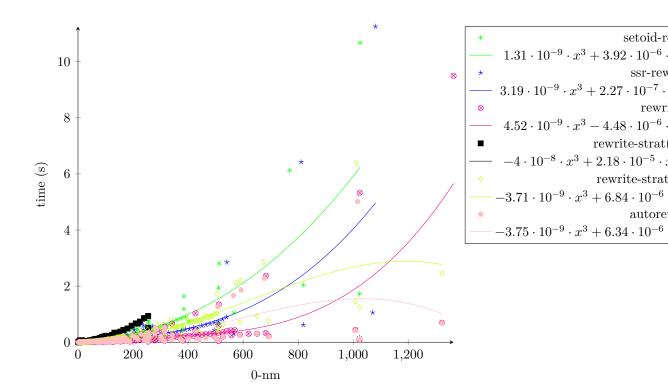
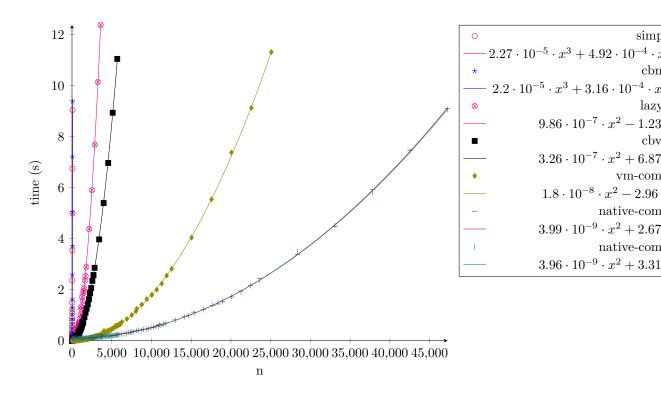


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



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 $9.86 \cdot 10^{-7} \cdot x^2 - 1.23$ 

 $3.26 \cdot 10^{-7} \cdot x^2 + 6.87$ 

 $1.8 \cdot 10^{-8} \cdot x^2 - 2.96$ 

 $3.99 \cdot 10^{-9} \cdot x^2 + 2.67$ 

 $3.96 \cdot 10^{-9} \cdot x^2 + 3.31$ 

Figure 17: timing-sieve-of-eratosthenes

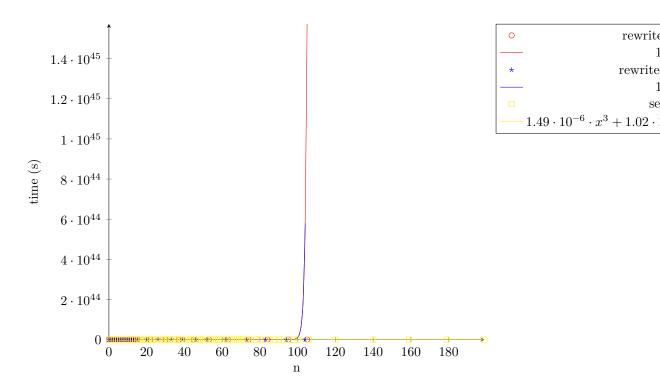


Figure 18: timing-rewrite-under-lets-plus-0  $\,$