

Figure 1: timing-pattern

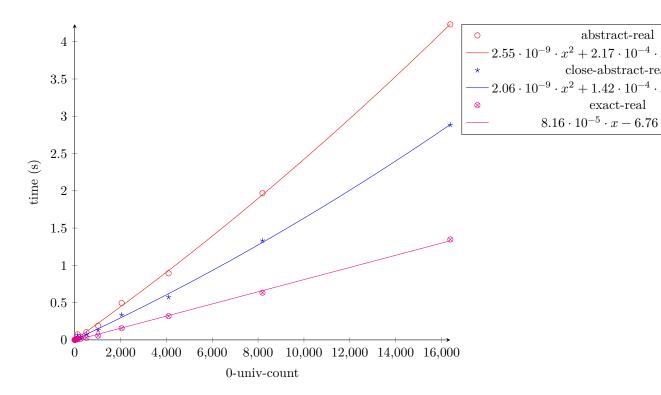
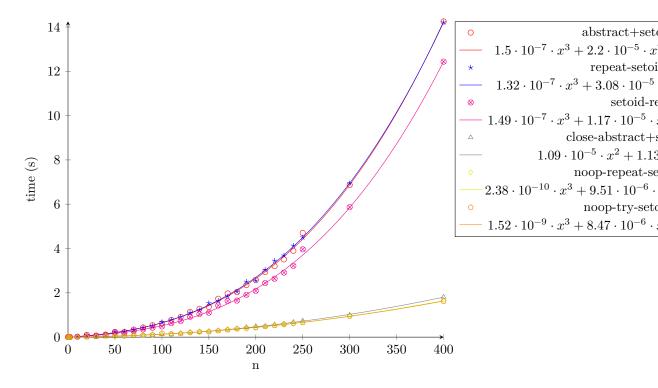
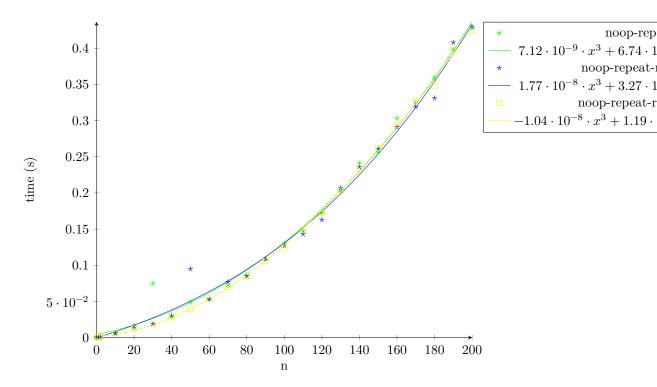


Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



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



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

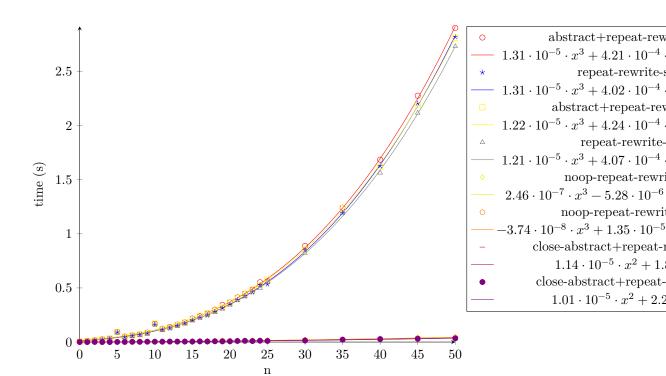
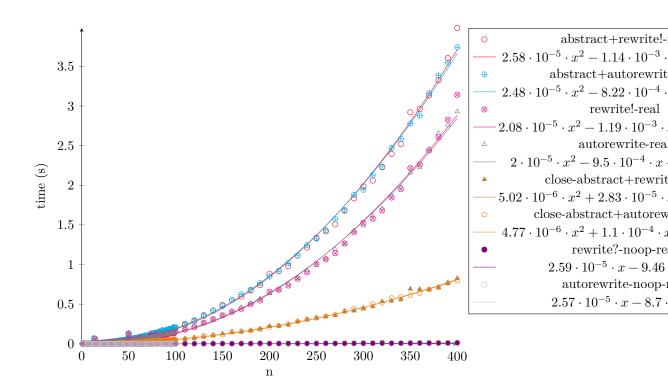


Figure 5: timing-rewrite-strat-under-binders



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

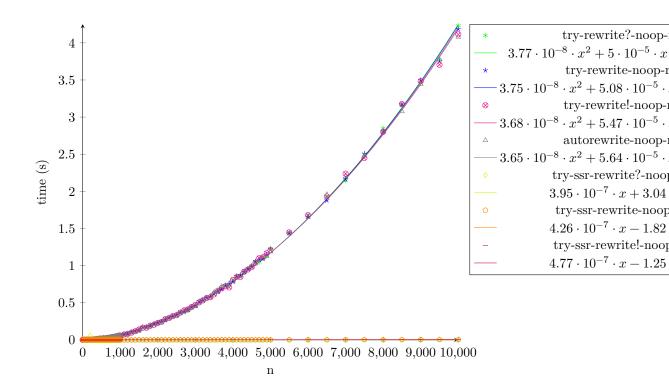


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

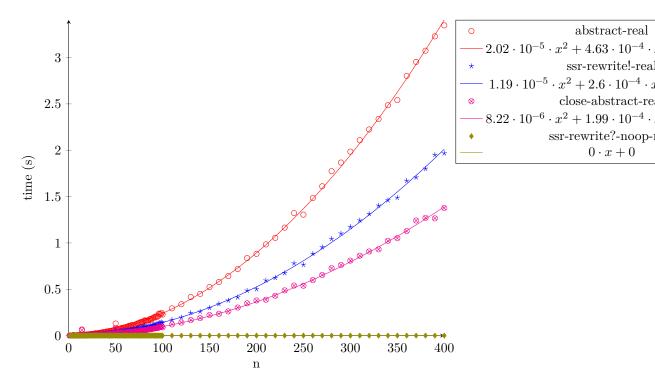
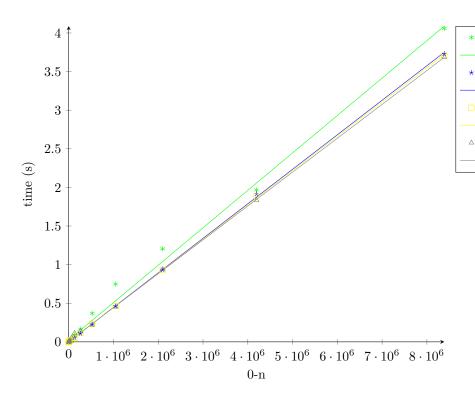


Figure 8: timing-rewrite-repeated-app-ssrrewrite



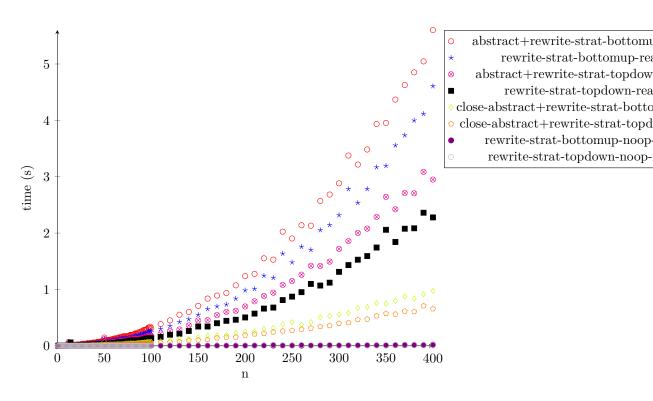
try-ssr-rewrite!-cold-noop-rea  $4.84 \cdot 10^{-7} \cdot x + 2.46 \cdot 10^{-2}$ try-ssr-rewrite?-noop-real

 $\begin{array}{l} 4.47 \cdot 10^{-7} \cdot x - 3.99 \cdot 10^{-4} \\ \text{try-ssr-rewrite-noop-real} \end{array}$ 

 $\begin{array}{l} 4.44 \cdot 10^{-7} \cdot x - 2.2 \cdot 10^{-4} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$ 

 $4.39 \cdot 10^{-7} \cdot x + 5.12 \cdot 10^{-3}$ 

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

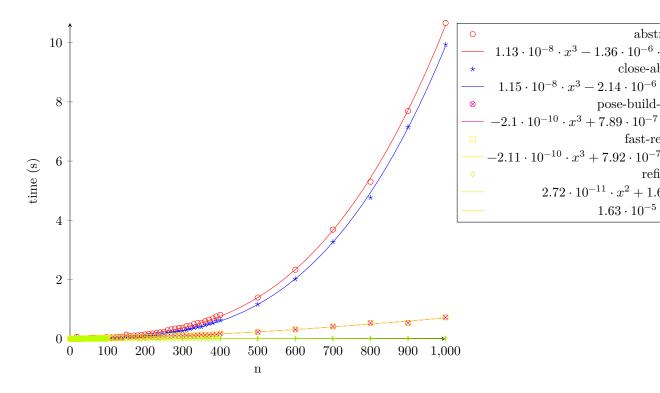


 $abstract + rewrite - strat - bottom \\ \\$ rewrite-strat-bottomup-rea

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

rewrite-strat-bottomup-nooprewrite-strat-topdown-noop-

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



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

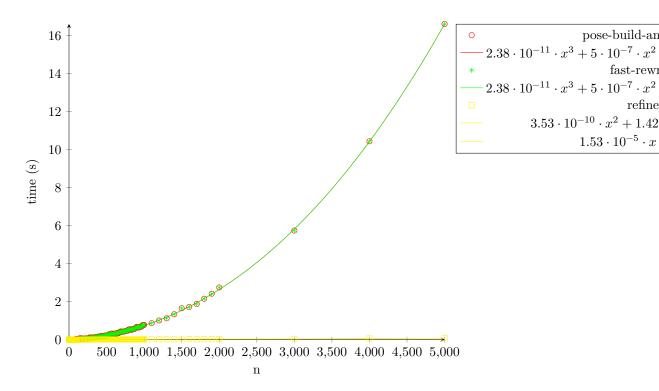
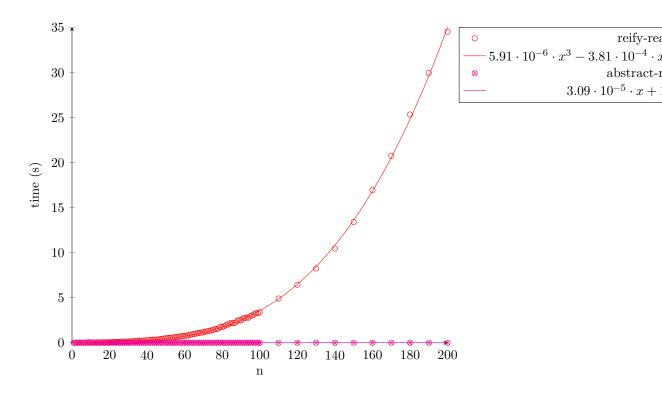
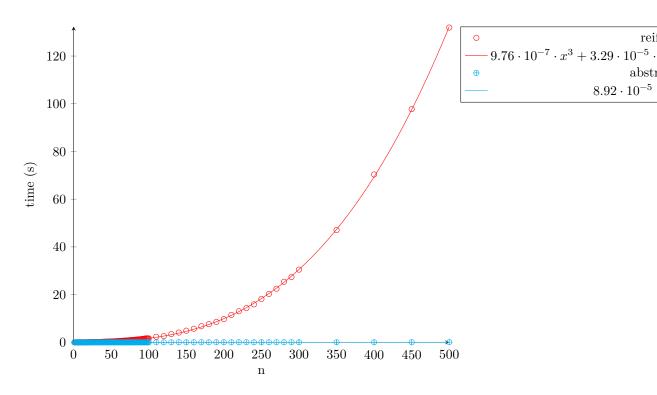


Figure 12: timing-rewrite-repeated-app-fast-rewrite-no-abstract



 $Figure \ 13: \ timing-type class-reification-let-in-HOAS$ 



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

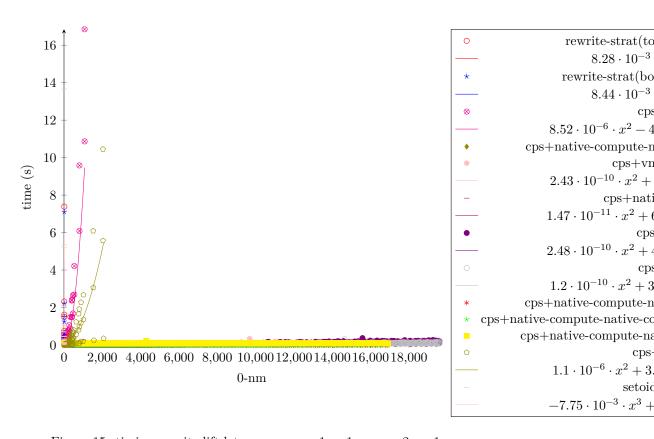


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1  $\,$ 

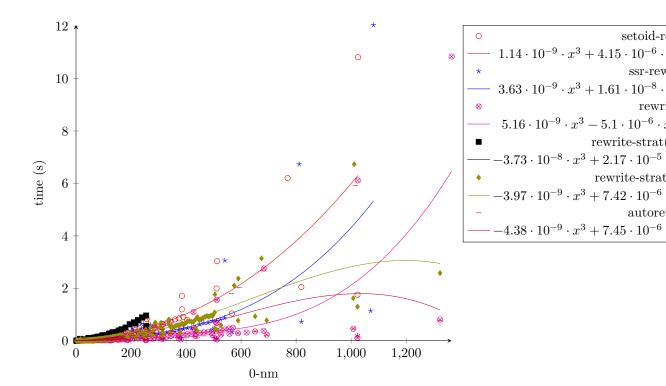


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1

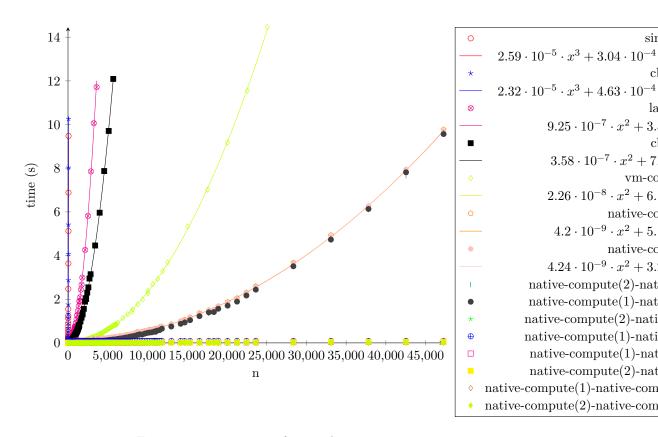
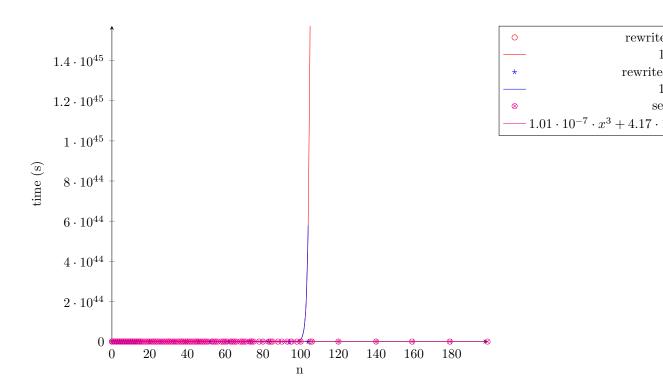


Figure 17: timing-sieve-of-eratosthenes



rewrite

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

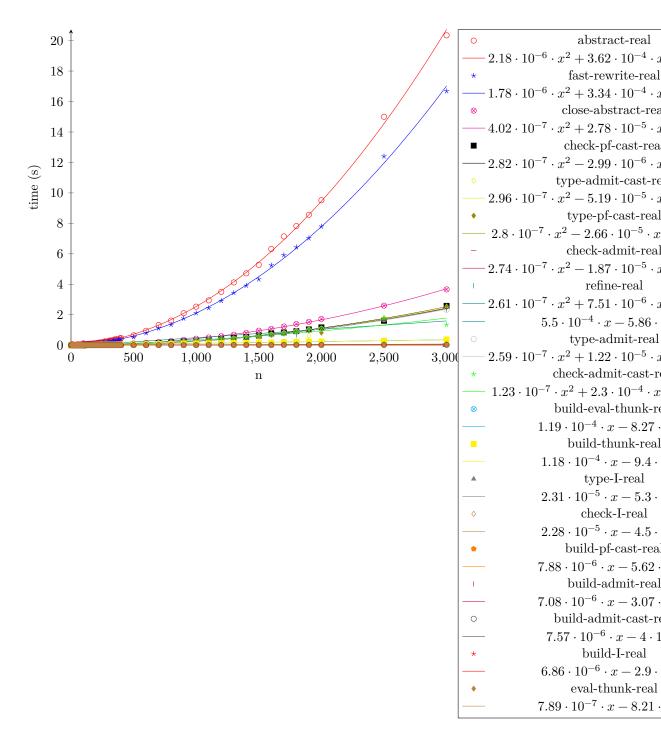


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2