

Figure 1: timing-pattern

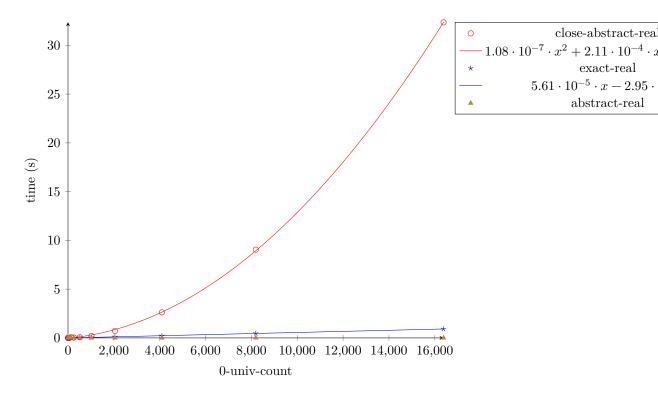
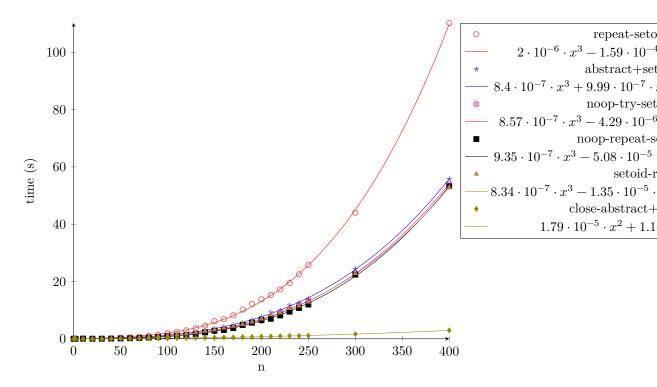
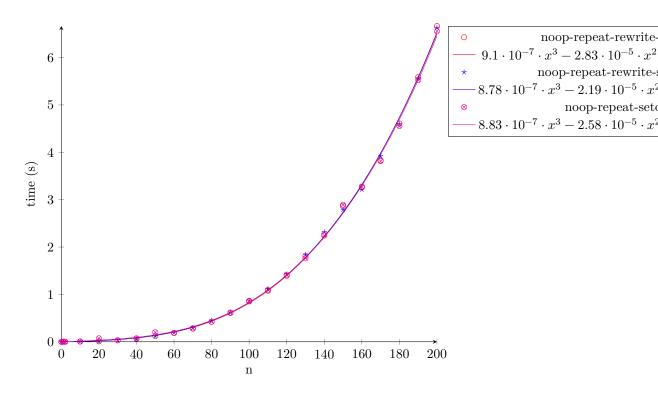


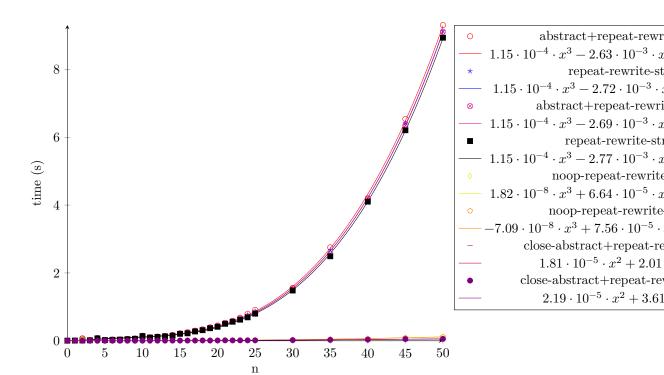
Figure 2: timing-n-polymorphic-universes param-1-n 0



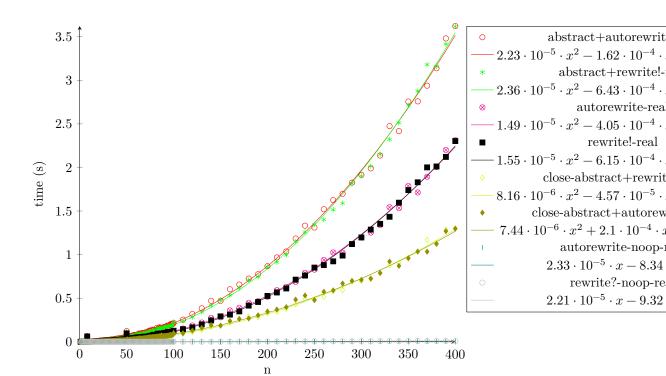
 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$



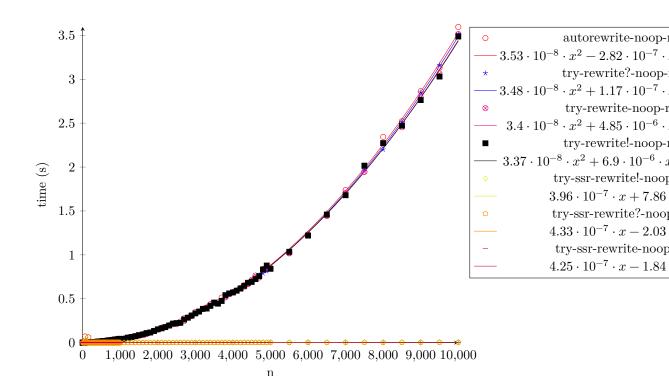
 $Figure\ 4:\ timing-repeat-setoid-rewrite-under-binders-noop$



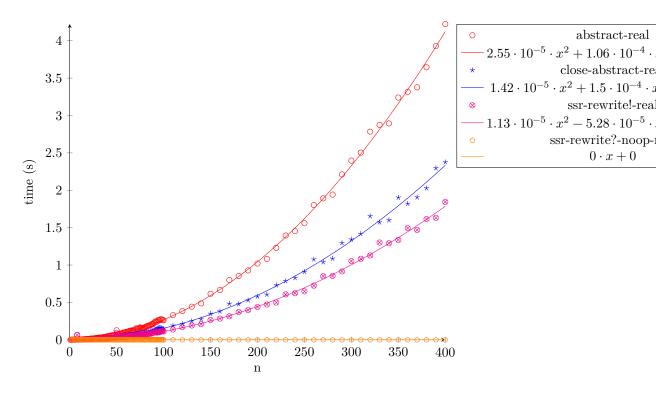
 $Figure\ 5:\ timing-rewrite-strat-under-binders$



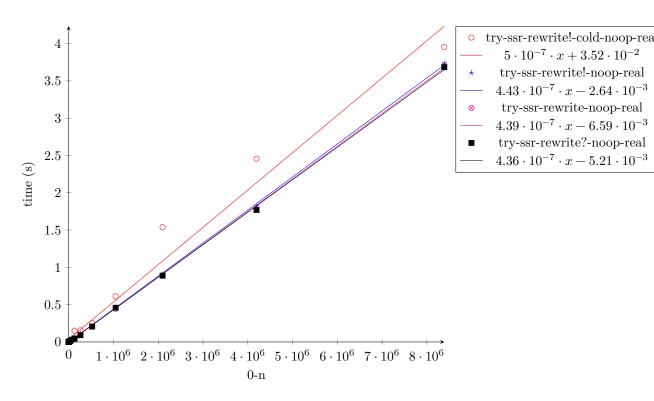
 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$



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



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



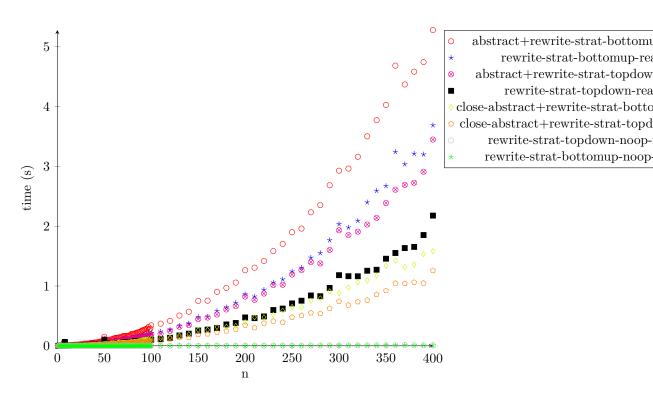
 $5\cdot 10^{-7}\cdot x + 3.52\cdot 10^{-2}$ try-ssr-rewrite!-noop-real

 $4.43\cdot 10^{-7}\cdot x - 2.64\cdot 10^{-3}$ try-ssr-rewrite-noop-real

 $4.39 \cdot 10^{-7} \cdot x - 6.59 \cdot 10^{-3}$ try-ssr-rewrite?-noop-real

 $4.36\cdot 10^{-7}\cdot x - 5.21\cdot 10^{-3}$

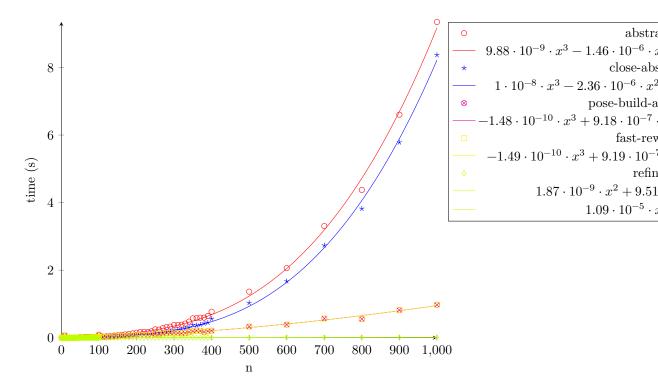
Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn 1



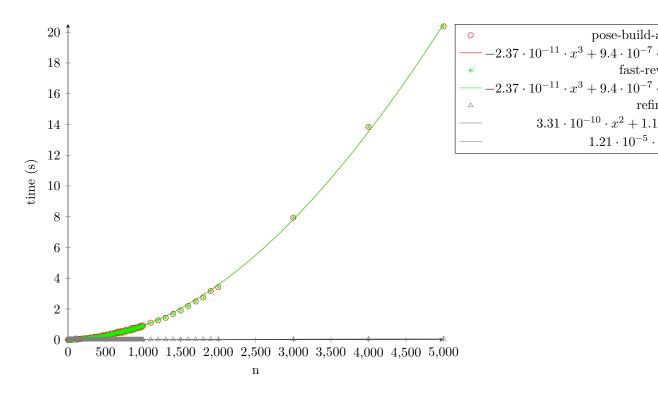
rewrite-strat-bottomup-rea abstract + rewrite - strat - topdowrewrite-strat-topdown-rea

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

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



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



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

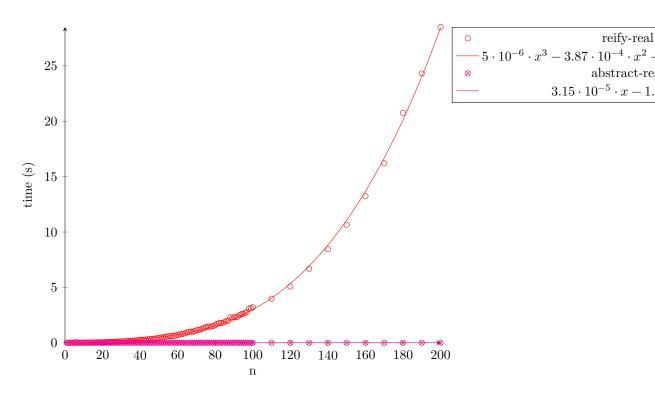


Figure 13: timing-typeclass-reification-let-in-HOAS

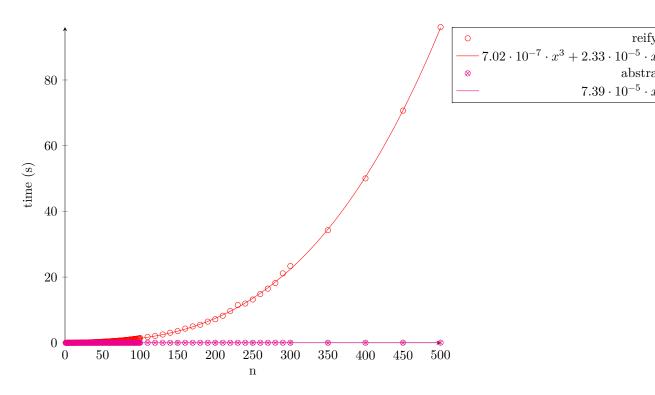


Figure 14: timing-typeclass-reification-let-in-PHOAS

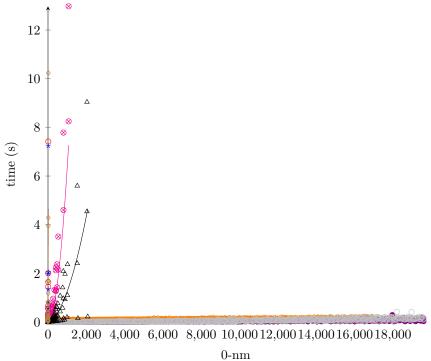
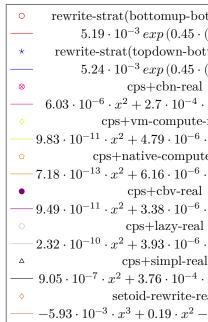


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1



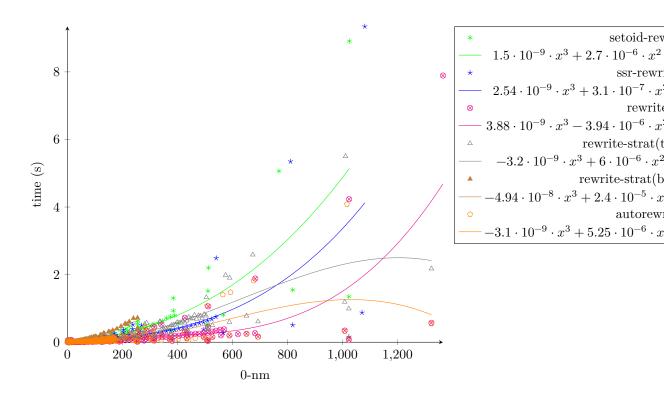
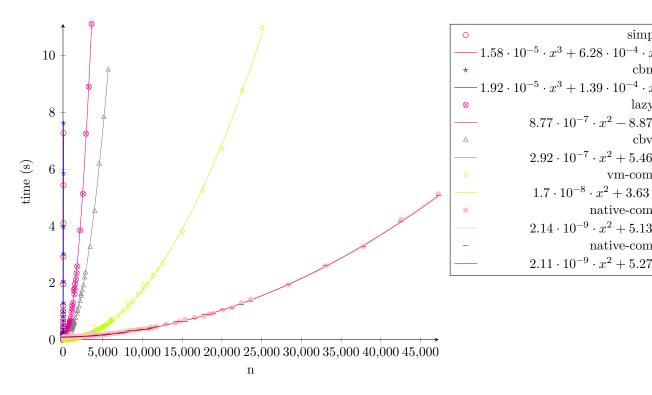


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



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 $8.77 \cdot 10^{-7} \cdot x^2 - 8.87$

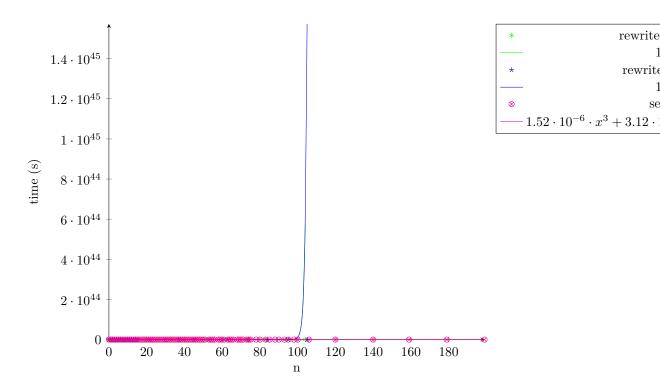
 $2.92 \cdot 10^{-7} \cdot x^2 + 5.46$

 $1.7 \cdot 10^{-8} \cdot x^2 + 3.63$

 $2.14 \cdot 10^{-9} \cdot x^2 + 5.13$

 $2.11 \cdot 10^{-9} \cdot x^2 + 5.27$

Figure 17: timing-sieve-of-eratosthenes



rewrite

rewrite

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