

Figure 1: timing-pattern

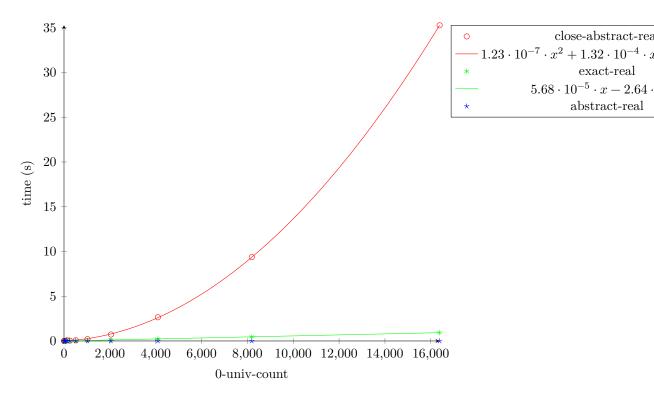
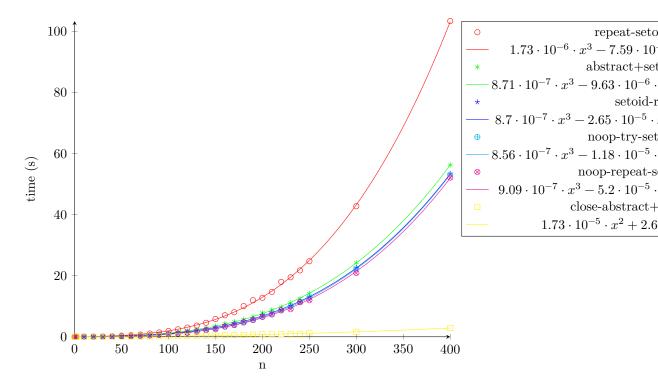


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$



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

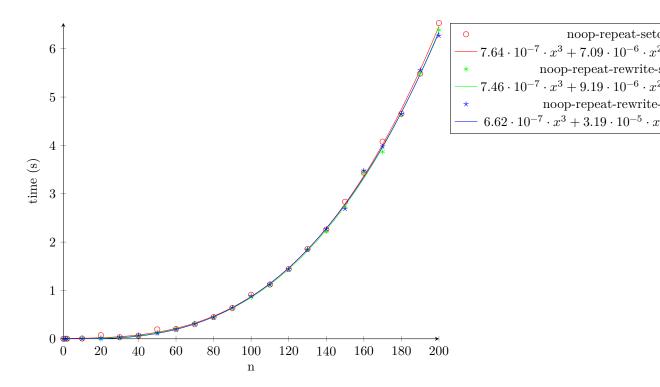
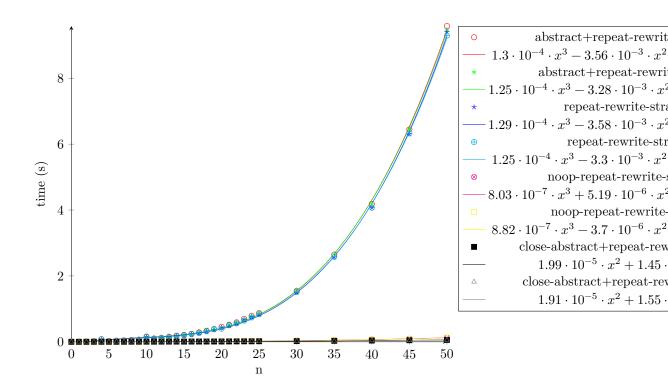


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



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

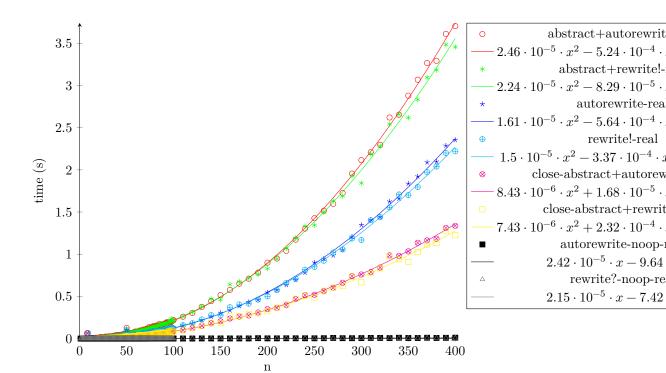
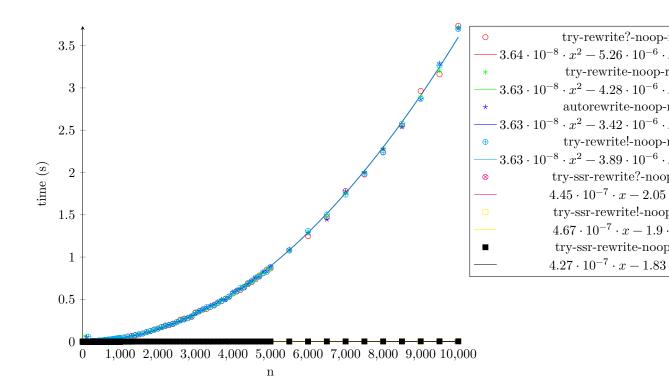


Figure 6: timing-rewrite-repeated-app-autorewrite



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

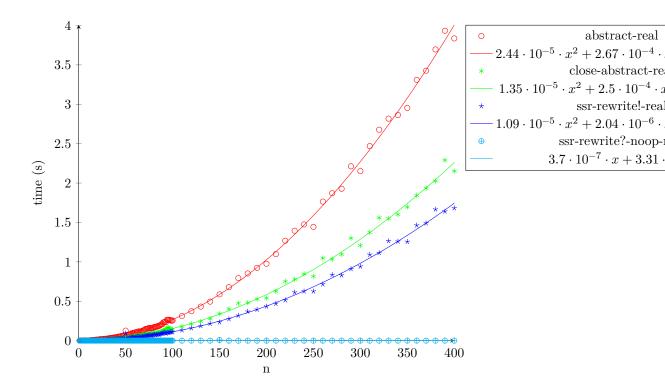
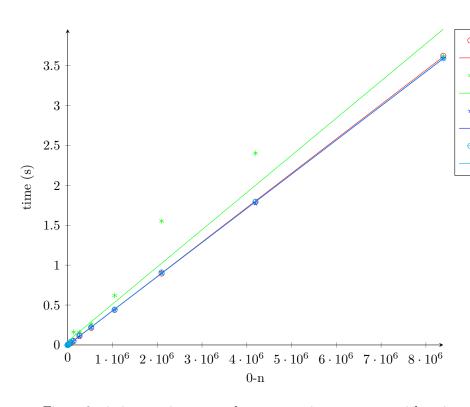


Figure 8: timing-rewrite-repeated-app-ssrrewrite



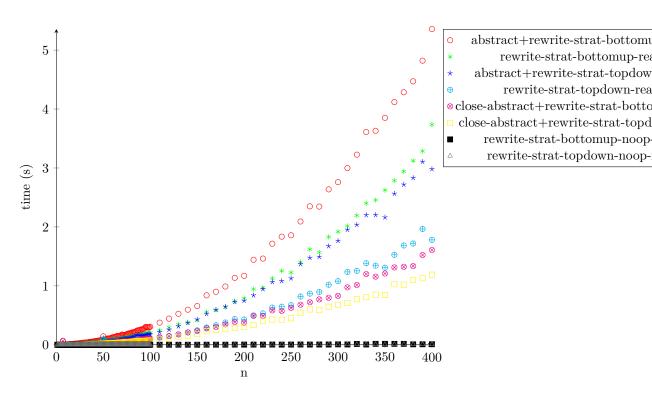
try-ssr-rewrite-noop-real $4.31\cdot 10^{-7}\cdot x - 2.92\cdot 10^{-3}$

try-ssr-rewrite!-cold-noop-rea $4.66\cdot 10^{-7}\cdot x + 4.52\cdot 10^{-2}$

try-ssr-rewrite?-noop-real $4.28\cdot 10^{-7}\cdot x - 1.5\cdot 10^{-3}$ try-ssr-rewrite!-noop-real

 $4.28\cdot 10^{-7}\cdot x + 1.14\cdot 10^{-3}$

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

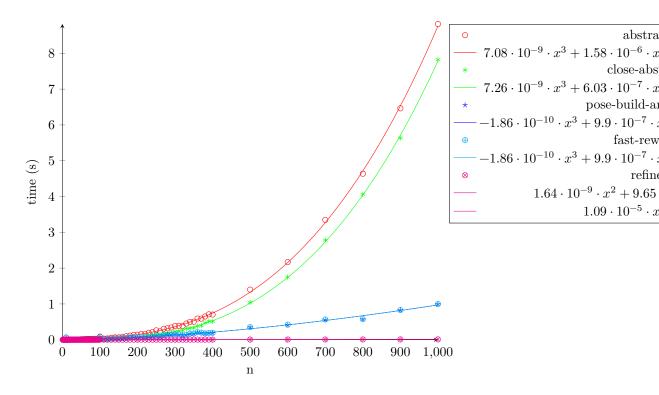


rewrite-strat-bottomup-real

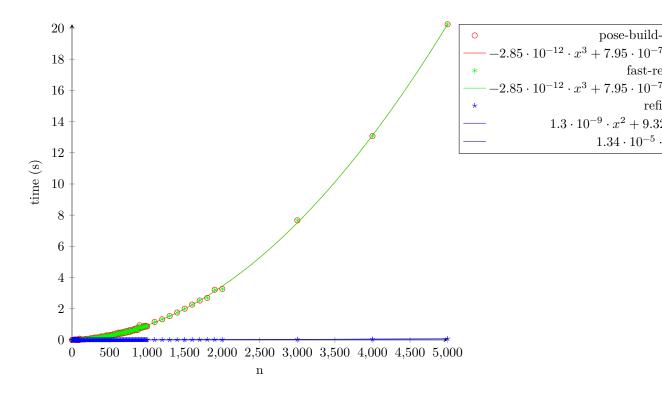
rewrite-strat-topdown-rea

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

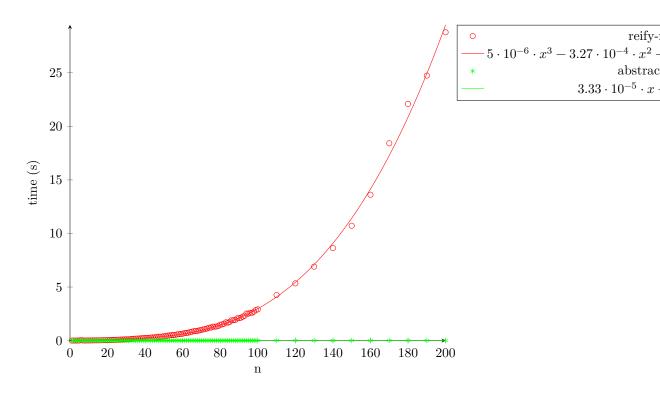
 $Figure\ 10:\ timing-rewrite-repeated-app-rewrite-strat$



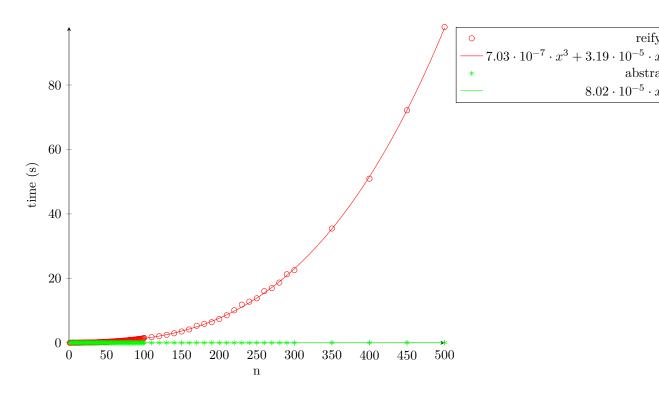
 $Figure~11:~timing\mbox{-rewrite-repeated-app-fast-rewrite}$



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



 ${\bf Figure~13:~timing-type class-reification-let-in-HOAS}$



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

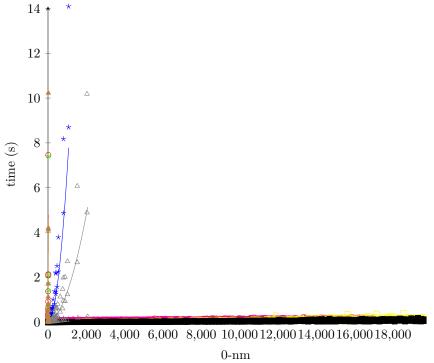


Figure 15: timing-rewrite-lift-lets-map param-1-n $\,$ 1, param-2-m $\,$ 1

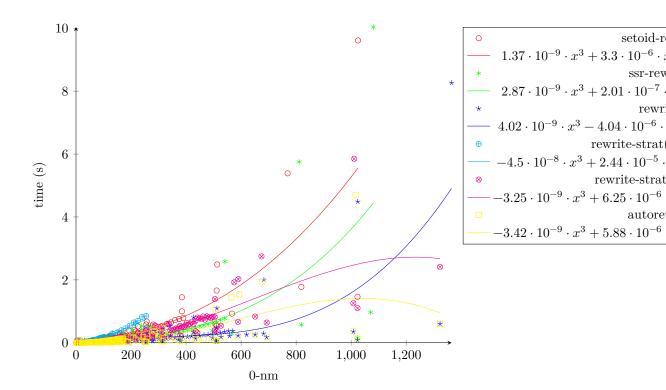
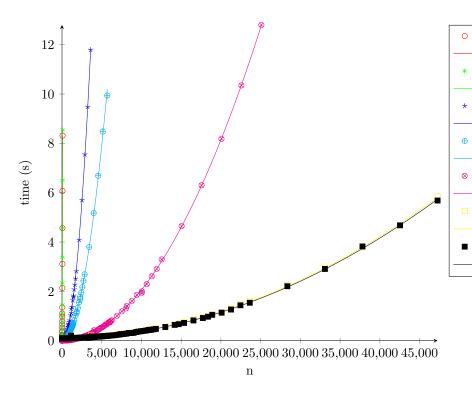


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



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 $2.29 \cdot 10^{-5} \cdot x^3 + 2.7 \cdot 10^{-4} \cdot x^3$

 $2.01 \cdot 10^{-5} \cdot x^3 + 2.85 \cdot 10^{-4} \cdot x^3$

 $9.32 \cdot 10^{-7} \cdot x^2 - 9.29$

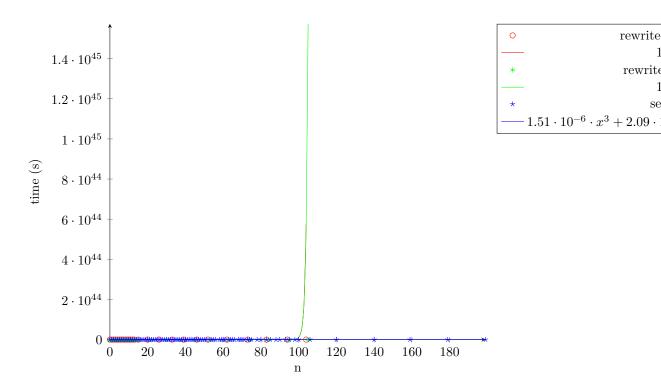
 $3.01 \cdot 10^{-7} \cdot x^2 + 8.08$

 $2.02 \cdot 10^{-8} \cdot x^2 + 3.97$

 $2.44 \cdot 10^{-9} \cdot x^2 + 5.54$

 $2.44 \cdot 10^{-9} \cdot x^2 + 3.92$

Figure 17: timing-sieve-of-eratosthenes



rewrite

rewrite

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