

Figure 1: timing-pattern

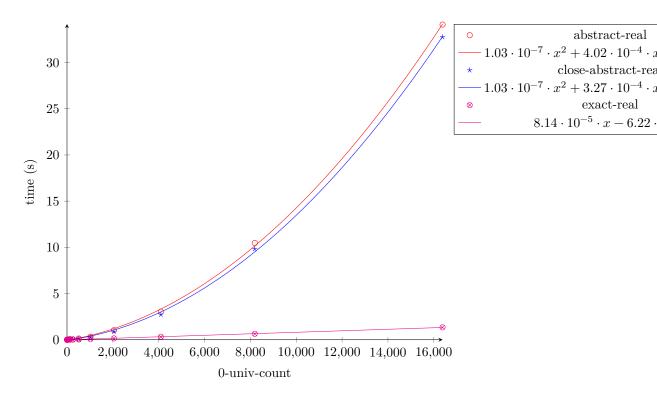
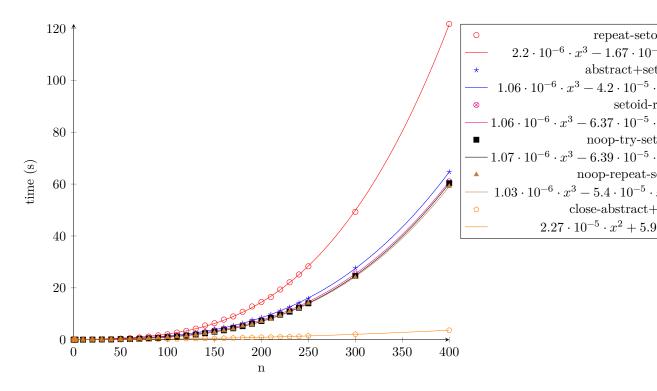


Figure 2: timing-n-polymorphic-universes param-1-n 0



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

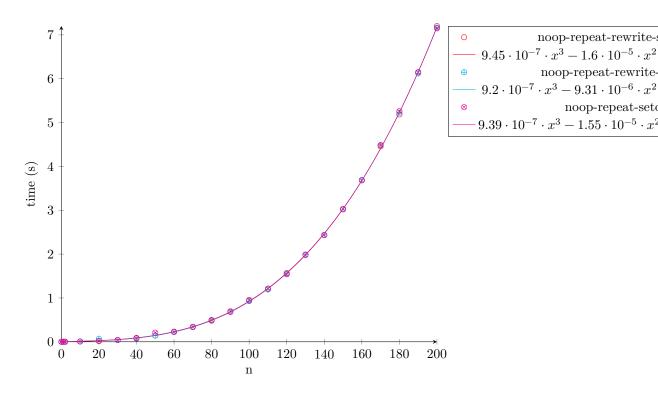
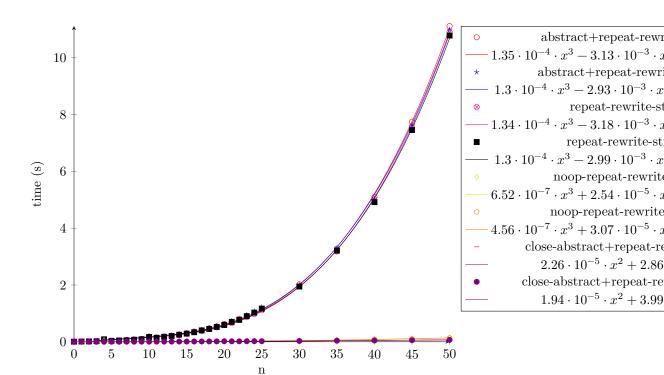
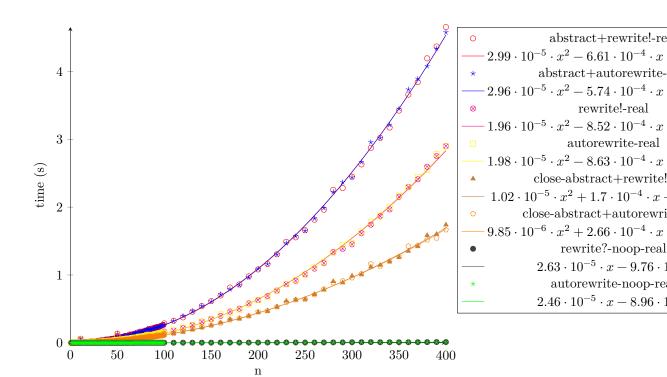


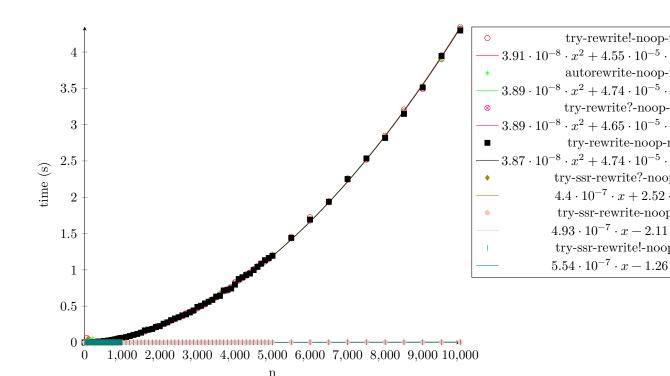
Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



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



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



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

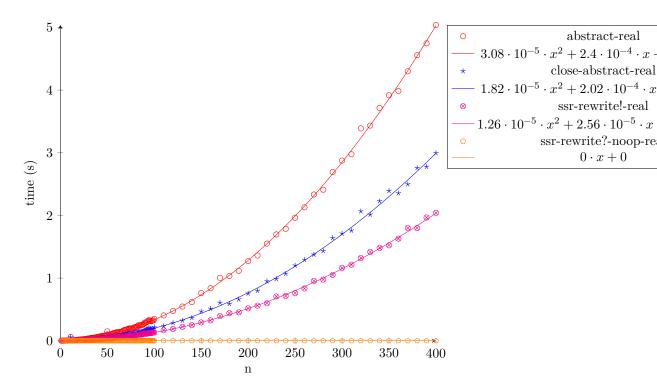
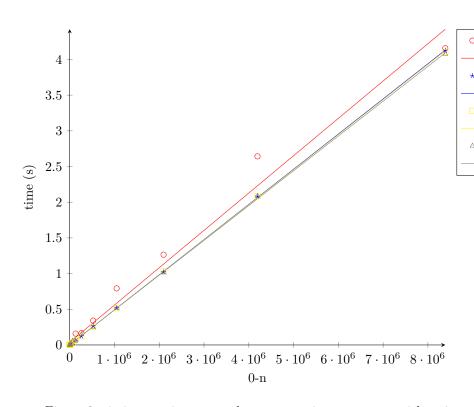


Figure 8: timing-rewrite-repeated-app-ssrrewrite



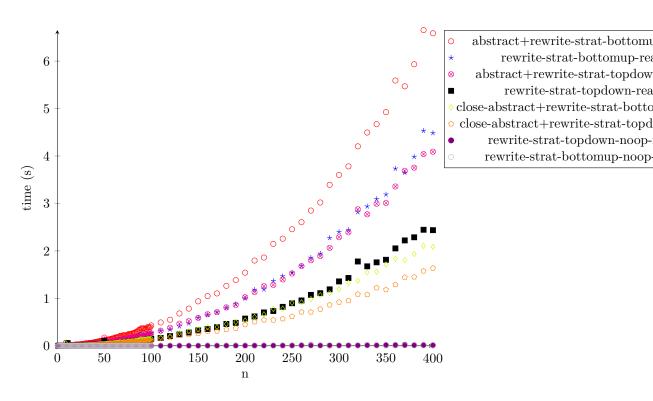
try-ssr-rewrite!-cold-noop-rea $5.23 \cdot 10^{-7} \cdot x + 3.67 \cdot 10^{-2}$

try-ssr-rewrite?-noop-real $4.93\cdot 10^{-7}\cdot x - 5.01\cdot 10^{-4}$

try-ssr-rewrite-noop-real $4.91\cdot 10^{-7}\cdot x - 9.9\cdot 10^{-5}$

try-ssr-rewrite!-noop-real $4.88\cdot 10^{-7}\cdot x + 2.57\cdot 10^{-3}$

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



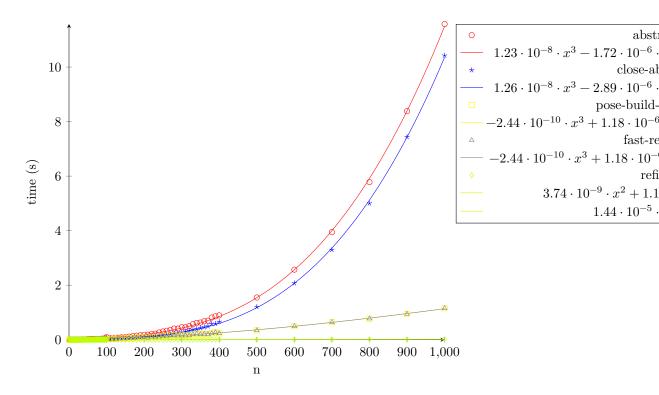
rewrite-strat-bottomup-rea

rewrite-strat-topdown-rea

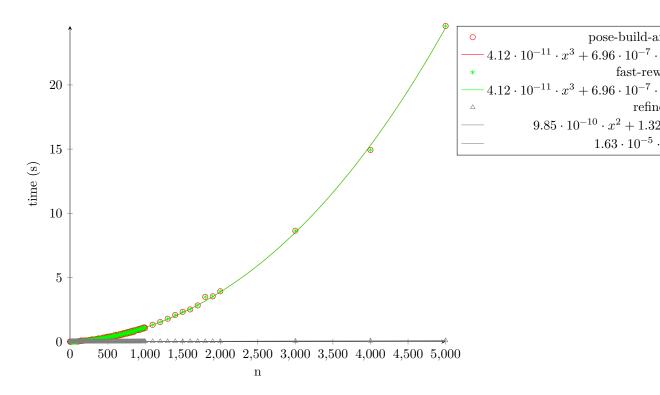
rewrite-strat-topdown-noop-

rewrite-strat-bottomup-noop-

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



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



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

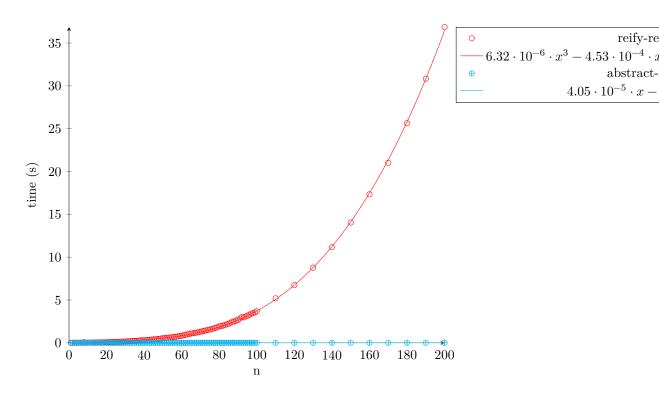


Figure 13: timing-typeclass-reification-let-in-HOAS

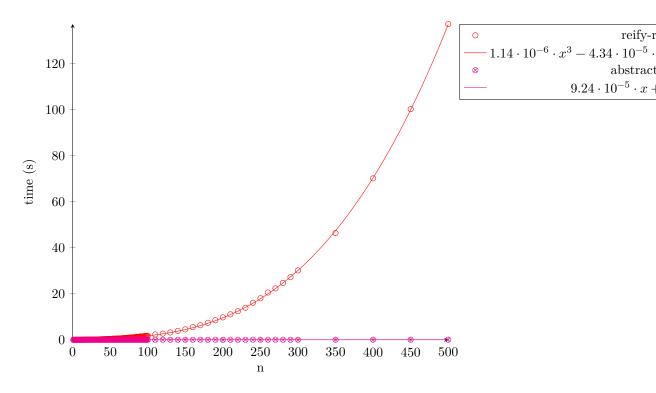


Figure 14: timing-typeclass-reification-let-in-PHOAS

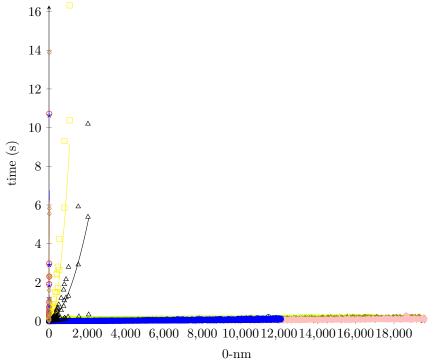


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

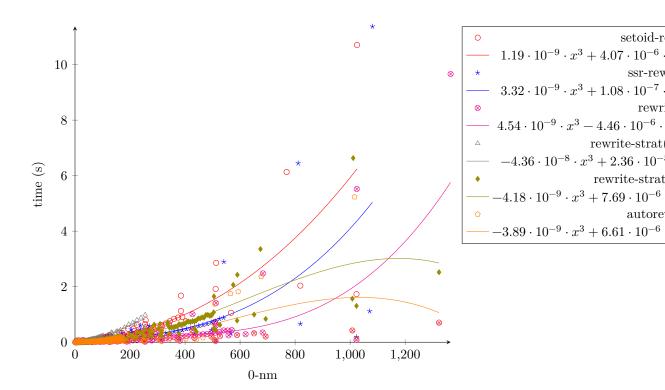
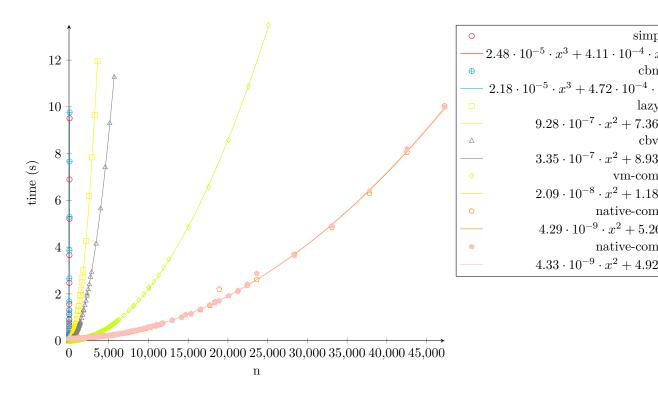


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



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 $9.28 \cdot 10^{-7} \cdot x^2 + 7.36$

 $3.35 \cdot 10^{-7} \cdot x^2 + 8.93$

 $2.09 \cdot 10^{-8} \cdot x^2 + 1.18$

 $4.29 \cdot 10^{-9} \cdot x^2 + 5.26$

 $4.33 \cdot 10^{-9} \cdot x^2 + 4.92$

Figure 17: timing-sieve-of-eratosthenes

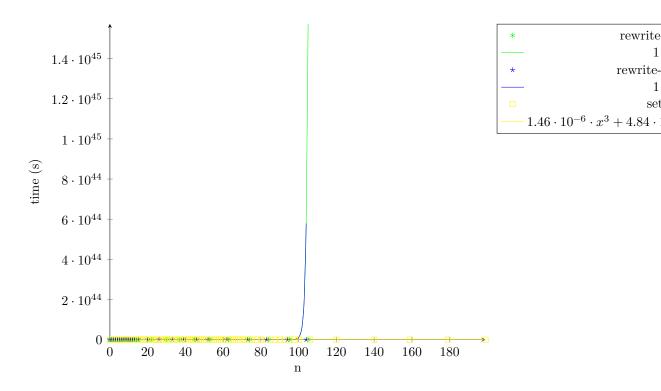


Figure 18: timing-rewrite-under-lets-plus-0 $\,$

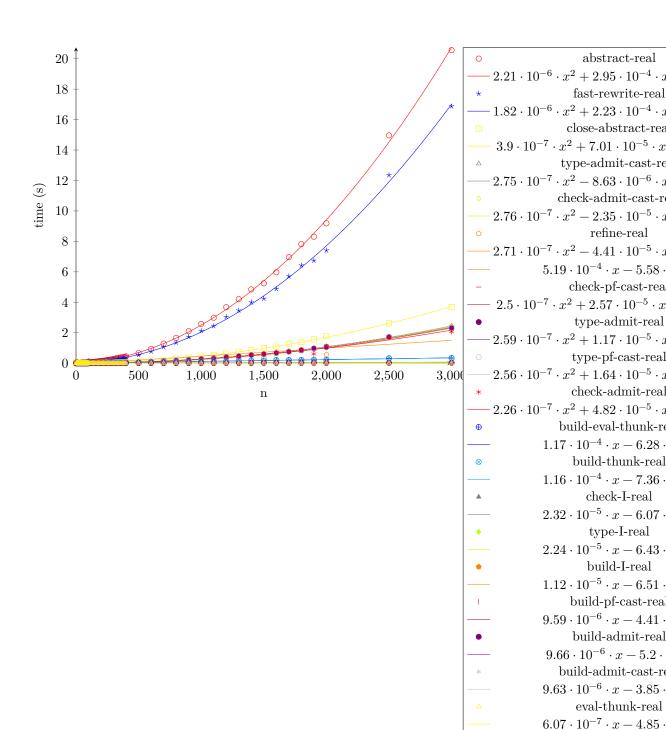


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2