

Figure 1: timing-pattern

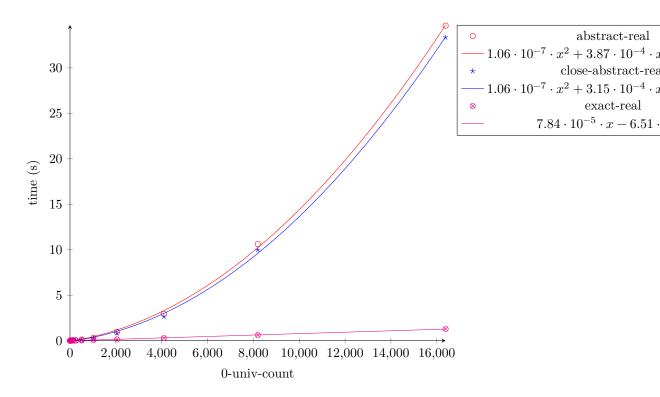
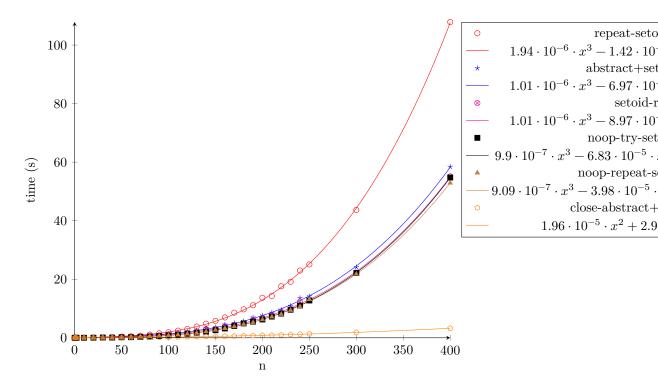


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$



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

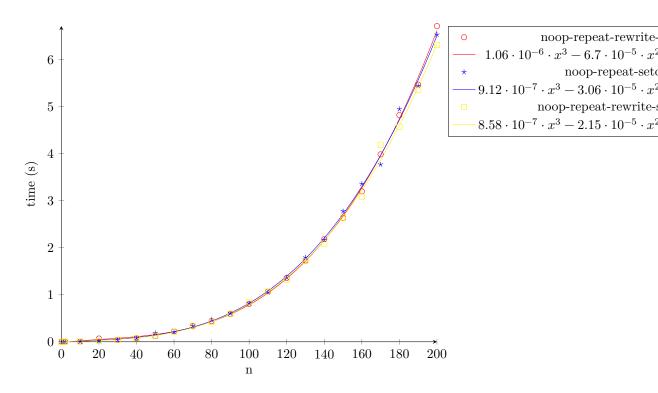
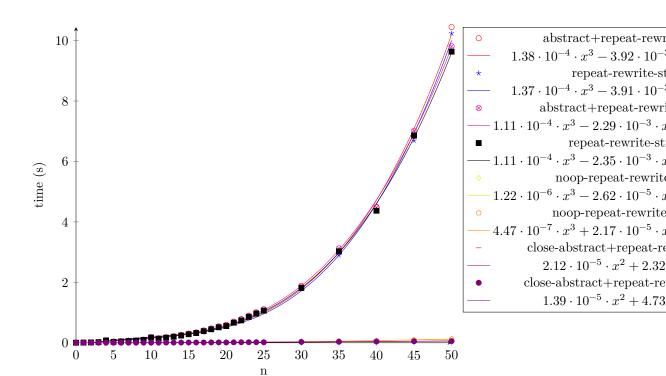
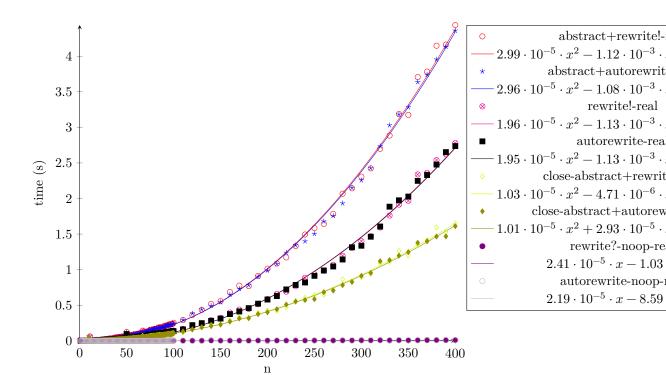


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



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



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

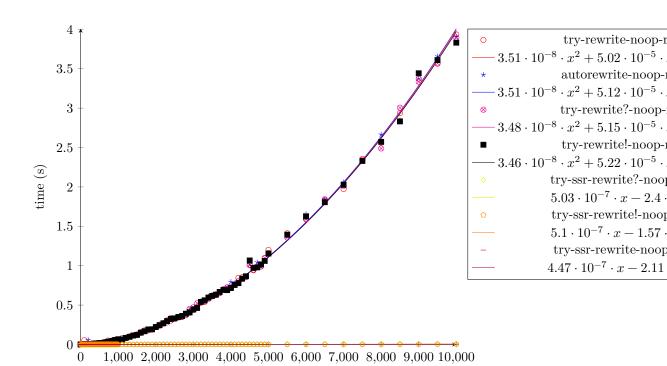
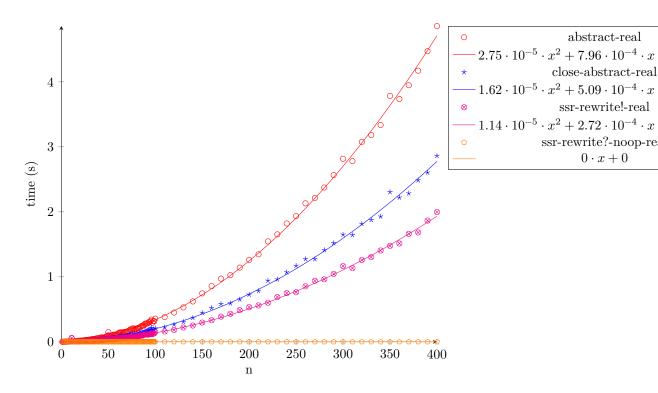
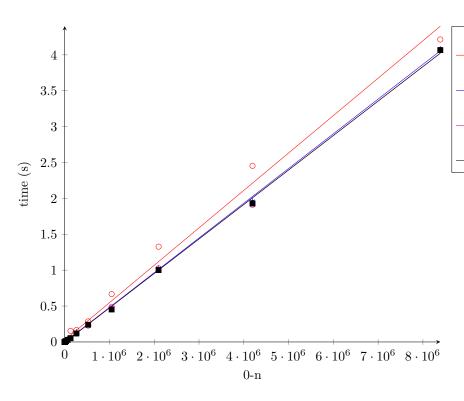


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



 ${\bf Figure~8:~timing\text{-}rewrite\text{-}repeated\text{-}app\text{-}ssrrewrite}$



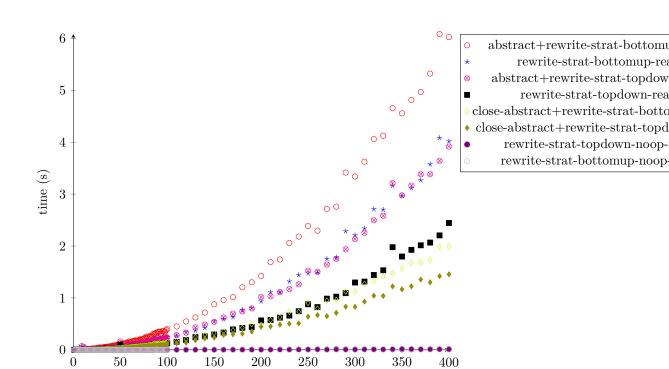
try-ssr-rewrite!-cold-noop-rea $5.21\cdot 10^{-7}\cdot x + 2.63\cdot 10^{-2}$

try-ssr-rewrite!-noop-real $4.84\cdot 10^{-7}\cdot x - 2.31\cdot 10^{-3}$

try-ssr-rewrite?-noop-real $4.8 \cdot 10^{-7} \cdot x - 4.82 \cdot 10^{-3}$

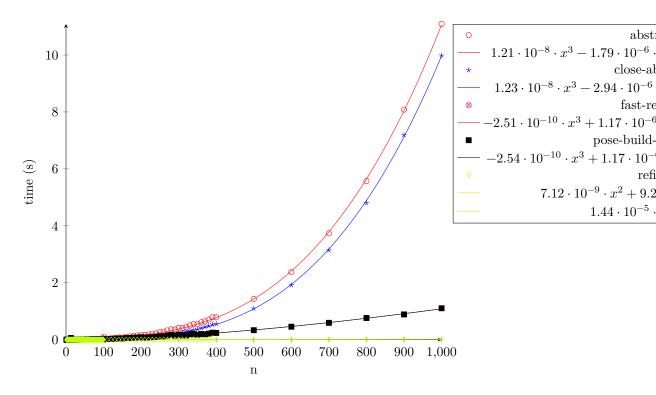
try-ssr-rewrite-noop-real $4.8\cdot 10^{-7}\cdot x - 6.22\cdot 10^{-3}$

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

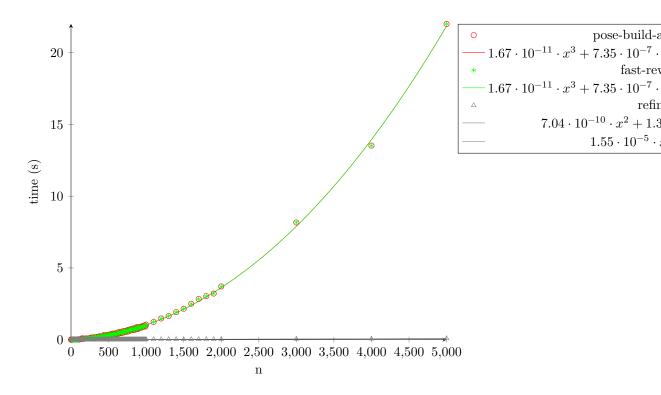


 $Figure~10:~timing\mbox{-rewrite-repeated-app-rewrite-strat}$

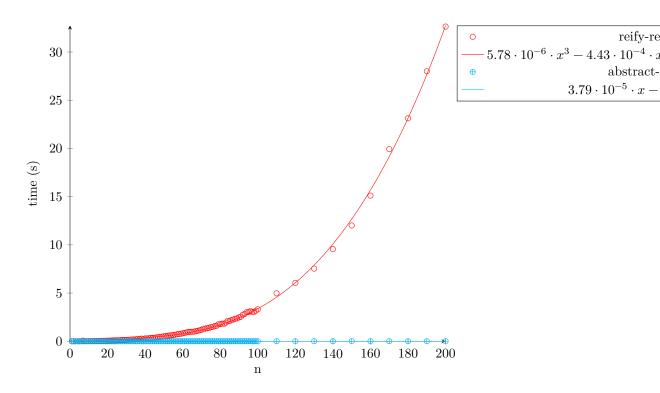
n



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



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



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

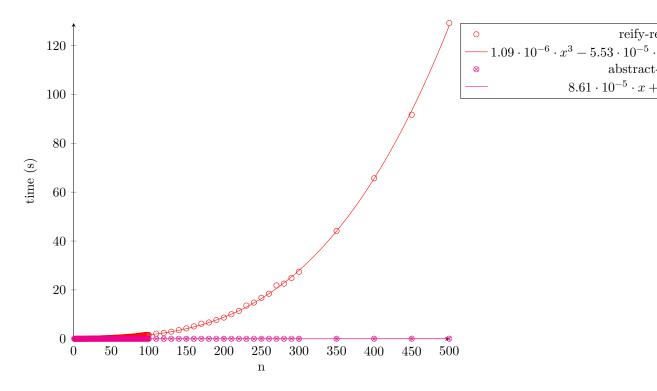


Figure 14: timing-typeclass-reification-let-in-PHOAS

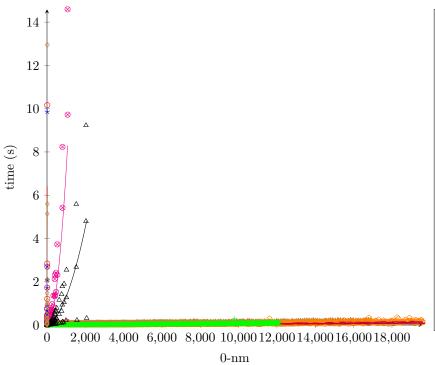


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

rewrite-strat (top down-bot

 $7.33 \cdot 10^{-6} \cdot x^2 - 2 \cdot 10^{-4} \cdot x$

 $5.84 \cdot 10^{-11} \cdot x^2 + 5.66 \cdot 10^{-6} \cdot$

 $2.66 \cdot 10^{-10} \cdot x^2 + 3.85 \cdot 10^{-6} \cdot$

 $1.09 \cdot 10^{-10} \cdot x^2 + 3.49 \cdot 10^{-6} \cdot$

 $1.98 \cdot 10^{-10} \cdot x^2 + 5.52 \cdot 10^{-6} \cdot$

 $6.98 \cdot 10^{-3} \exp{(0.45 \cdot ($ rewrite-strat(bottomup-bot

 $4.24 \cdot 10^{-3} exp (0.48 \cdot ($

cps+native-compute

cps+cbn-real

cps+lazy-real

 $_{\rm cps+cbv\text{-}real}$

cps+simpl-real

cps+vm-compute-

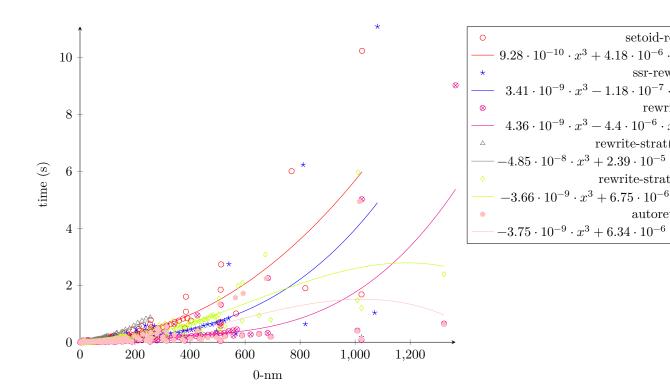
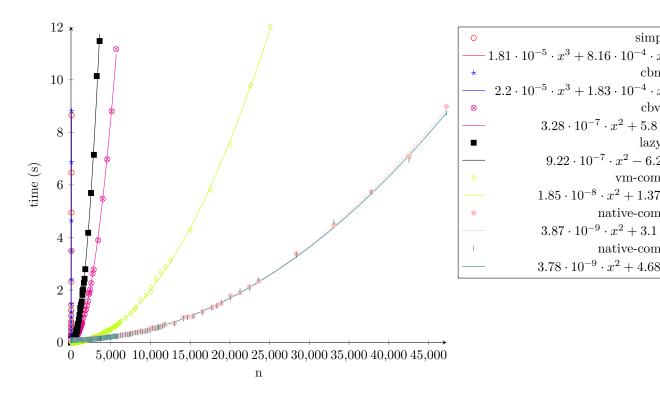


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

vm-com

native-com

 $3.28 \cdot 10^{-7} \cdot x^2 + 5.8$

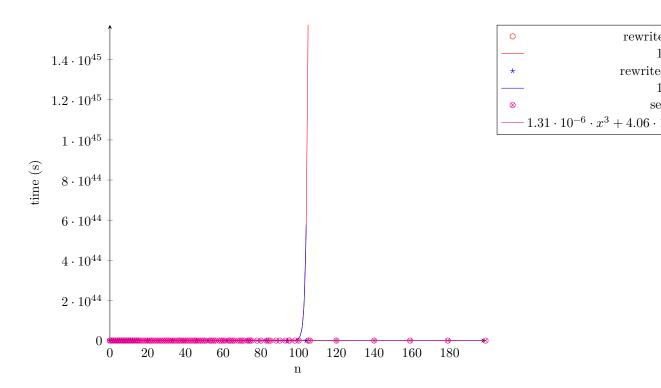
 $\begin{array}{c}
\text{lazy} \\
9.22 \cdot 10^{-7} \cdot x^2 - 6.2
\end{array}$

 $1.85 \cdot 10^{-8} \cdot x^2 + 1.37$

 $3.87 \cdot 10^{-9} \cdot x^2 + 3.1$

native-com $3.78 \cdot 10^{-9} \cdot x^2 + 4.68$

Figure 17: timing-sieve-of-eratosthenes



rewrite

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

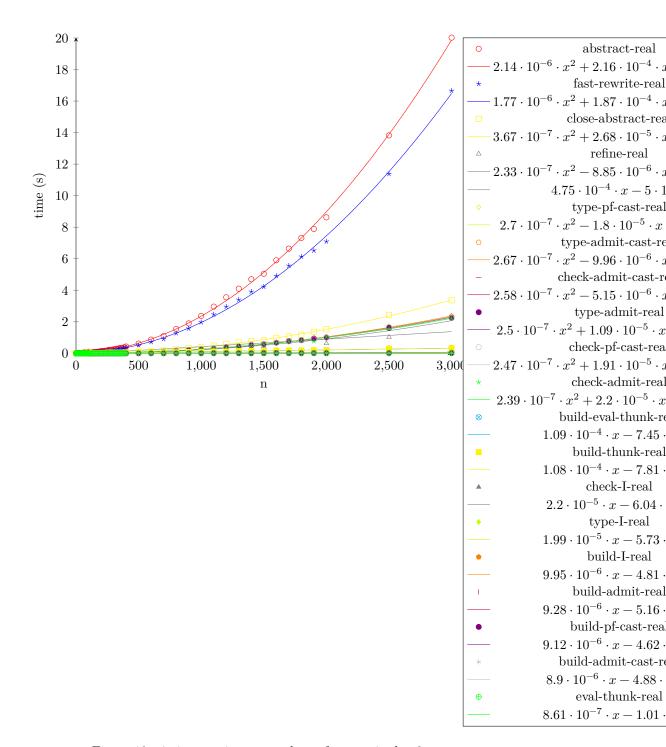


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2