

Figure 1: timing-pattern

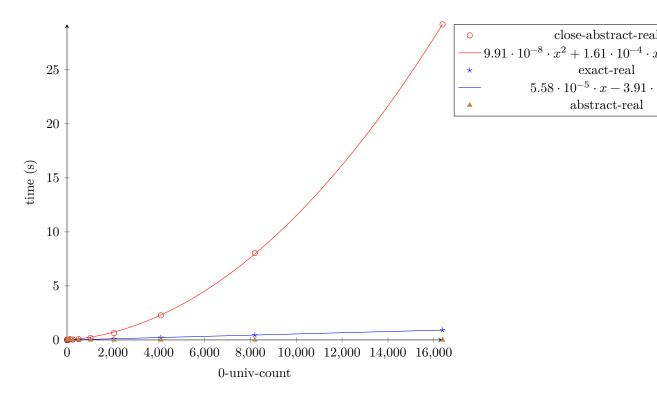
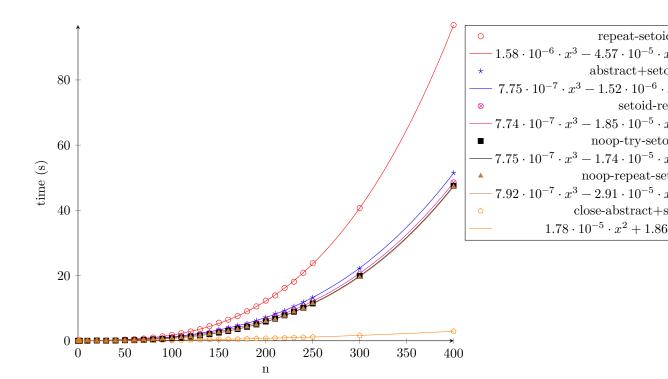
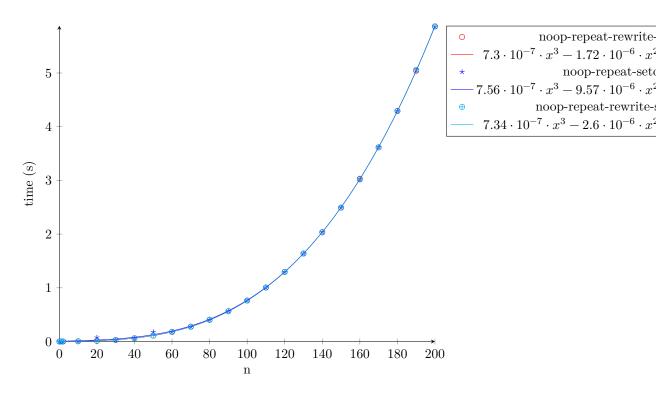


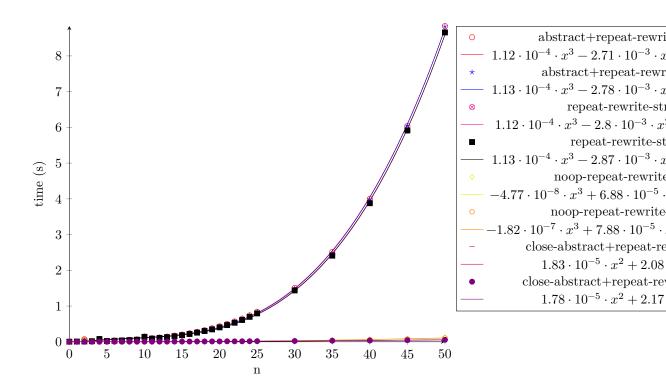
Figure 2: timing-n-polymorphic-universes param-1-n 0



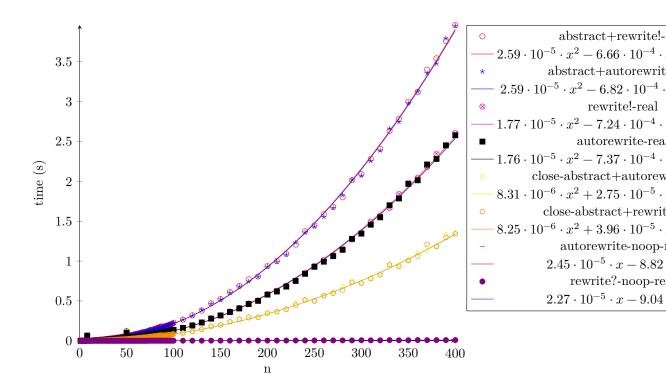
 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$



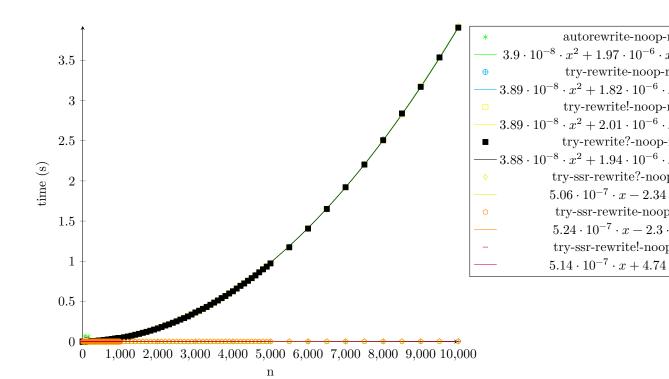
 $Figure\ 4:\ timing-repeat-setoid-rewrite-under-binders-noop$



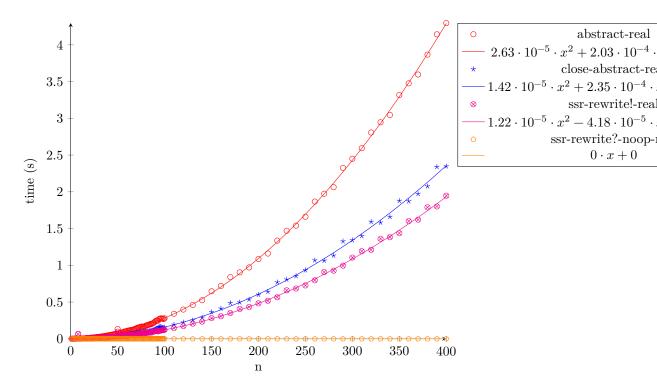
 $Figure\ 5:\ timing-rewrite-strat-under-binders$



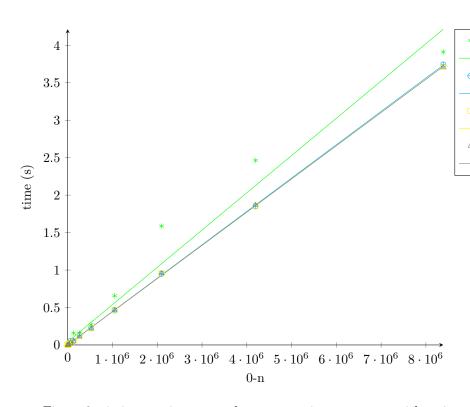
 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$



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



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



try-ssr-rewrite!-cold-noop-rea

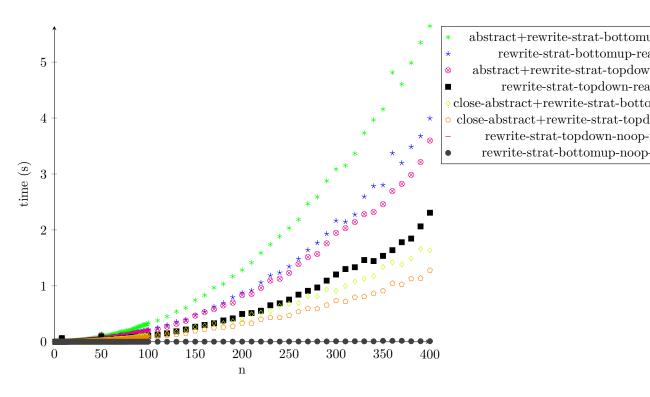
 $\begin{array}{l} 4.98 \cdot 10^{-7} \cdot x + 4.14 \cdot 10^{-2} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$

 $\begin{array}{l} 4.45 \cdot 10^{-7} \cdot x + 1.4 \cdot 10^{-3} \\ \text{try-ssr-rewrite-noop-real} \end{array}$

 $\begin{array}{l} 4.43 \cdot 10^{-7} \cdot x + 2.72 \cdot 10^{-4} \\ \text{try-ssr-rewrite?-noop-real} \end{array}$

 $4.43\cdot 10^{-7}\cdot x - 1.28\cdot 10^{-4}$

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

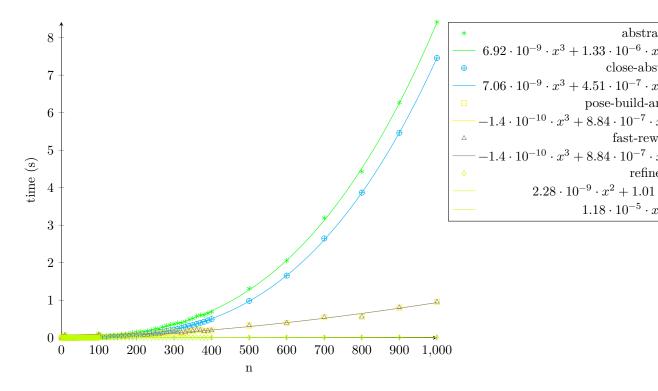


rewrite-strat-bottomup-real

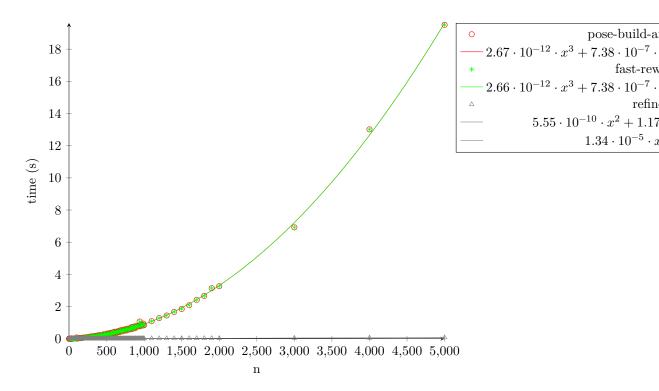
abstract + rewrite - strat - topdowrewrite-strat-topdown-rea

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

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



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



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

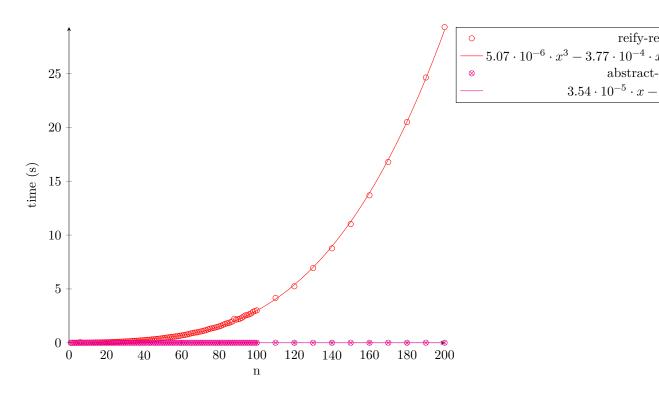
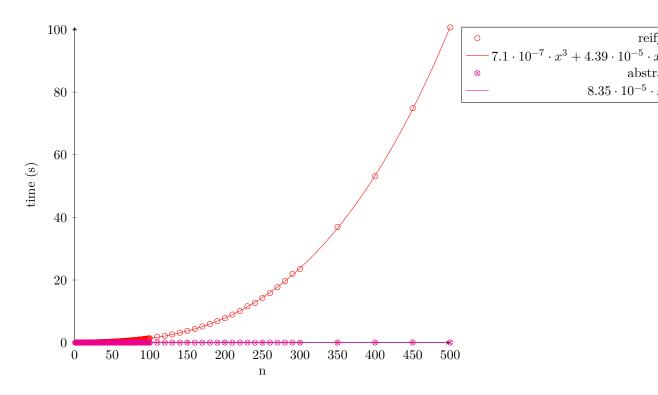
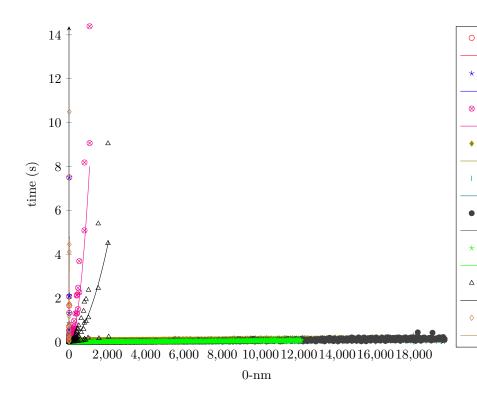


Figure 13: timing-typeclass-reification-let-in-HOAS



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



 $7.04 \cdot 10^{-6} \cdot x^2 - 1.5 \cdot 10^{-4} \cdot x^2$

 $5.38 \cdot 10^{-11} \cdot x^2 + 5.38 \cdot 10^{-6} \cdot$

 $9.97 \cdot 10^{-11} \cdot x^2 + 3.68 \cdot 10^{-6} \cdot$

 $2.19 \cdot 10^{-10} \cdot x^2 + 4.65 \cdot 10^{-6} \cdot \\$

 $1.21 \cdot 10^{-10} \cdot x^2 + 4.7 \cdot 10^{-6} \cdot x^2$

 $9.2 \cdot 10^{-7} \cdot x^2 + 3.34 \cdot 10^{-4} \cdot x^2$

 $-6.14 \cdot 10^{-3} \cdot x^3 + 0.2 \cdot x^2 -$

 $5.15 \cdot 10^{-3} exp (0.46 \cdot ($

cps+native-compute

cps+cbn-real

cps+cbv-real

cps+lazy-real

cps+simpl-real

setoid-rewrite-re

cps+vm-compute-

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

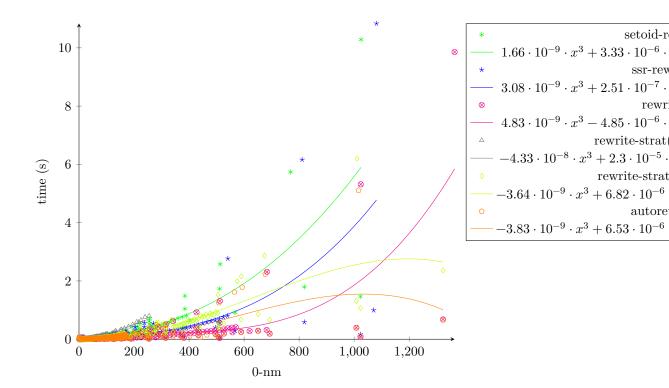
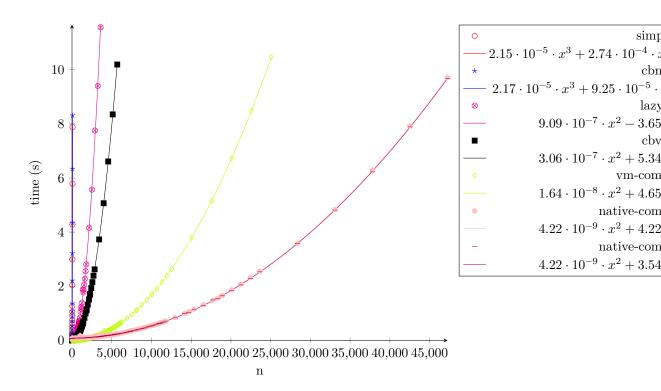


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

lazy

vm-com

native-com

native-com

 $Figure\ 17:\ timing\mbox{-sieve-of-eratos} thenes$

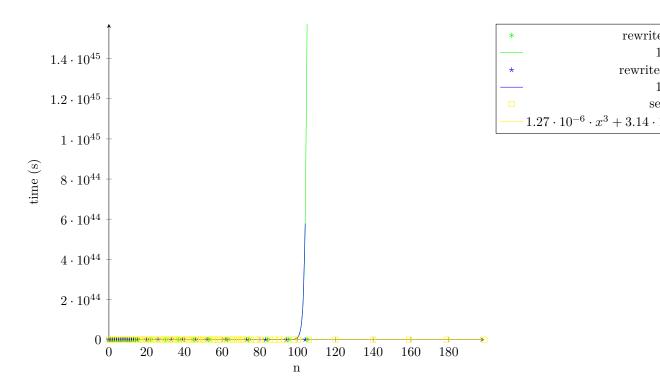


Figure 18: timing-rewrite-under-lets-plus-0 $\,$