

Figure 1: timing-pattern

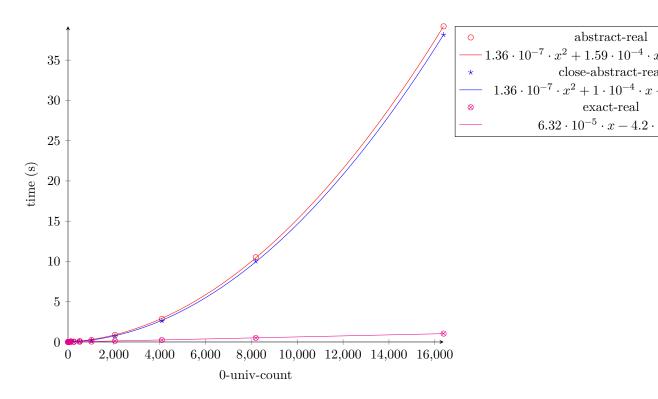


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$

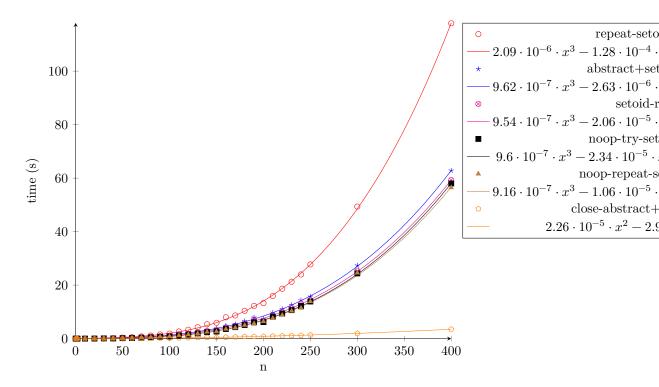
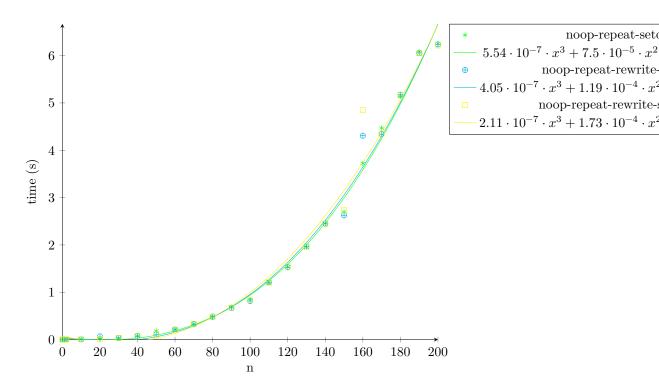
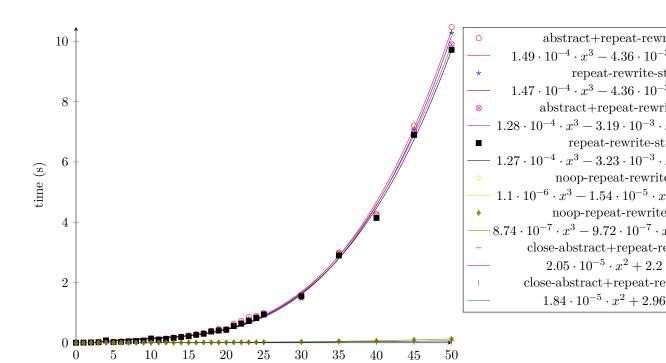


Figure 3: timing-repeat-setoid-rewrite-under-binders

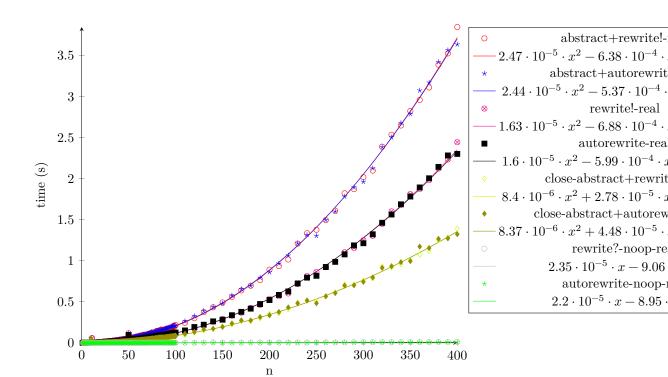


 $Figure \ 4: \ timing-repeat-setoid-rewrite-under-binders-noop \\$

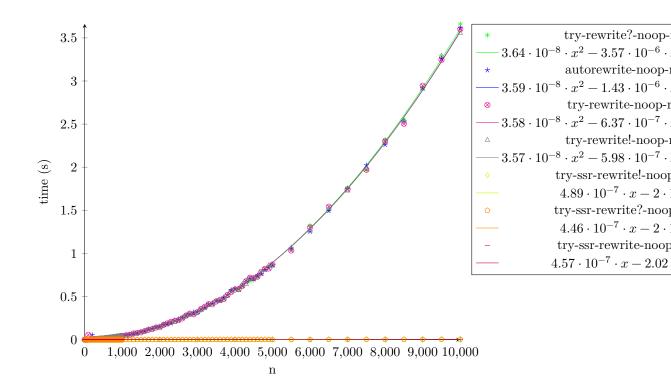


 $Figure\ 5:\ timing-rewrite-strat-under-binders$

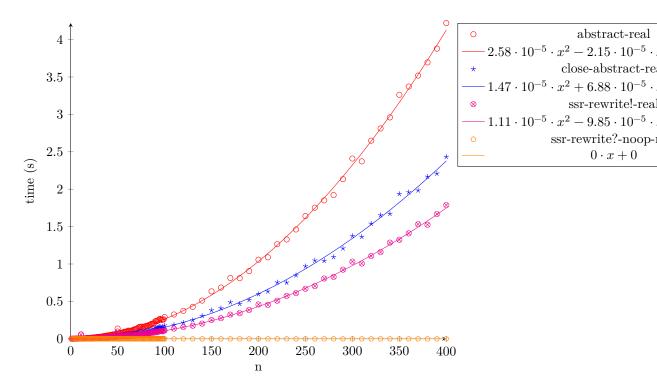
n



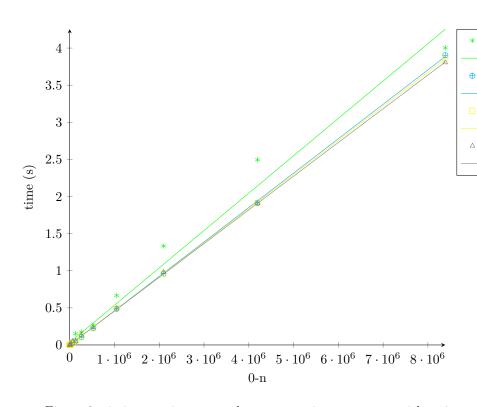
 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$



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



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



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

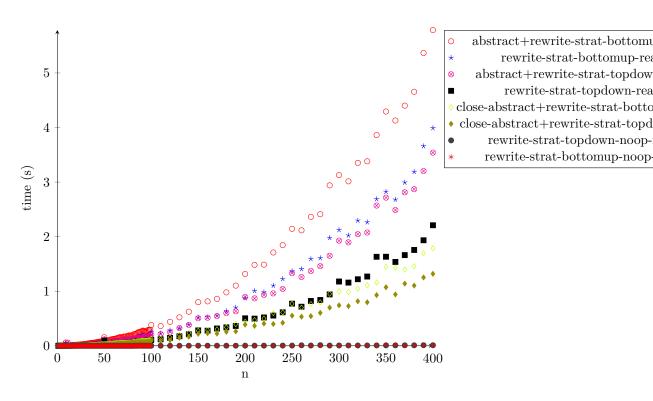
 $5.03 \cdot 10^{-7} \cdot x + 3.21 \cdot 10^{-2}$ try-ssr-rewrite?-noop-real

 $\begin{array}{l} 4.64 \cdot 10^{-7} \cdot x - 2.62 \cdot 10^{-3} \\ \text{try-ssr-rewrite-noop-real} \end{array}$

 $\begin{array}{l} 4.59 \cdot 10^{-7} \cdot x - 1.68 \cdot 10^{-3} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$

 $4.54 \cdot 10^{-7} \cdot x + 2.72 \cdot 10^{-3}$

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-

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

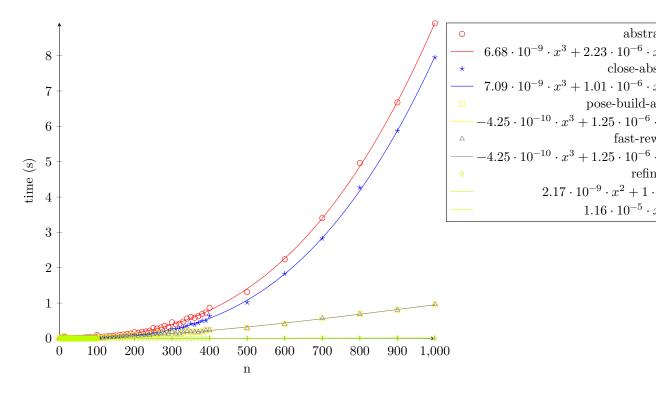
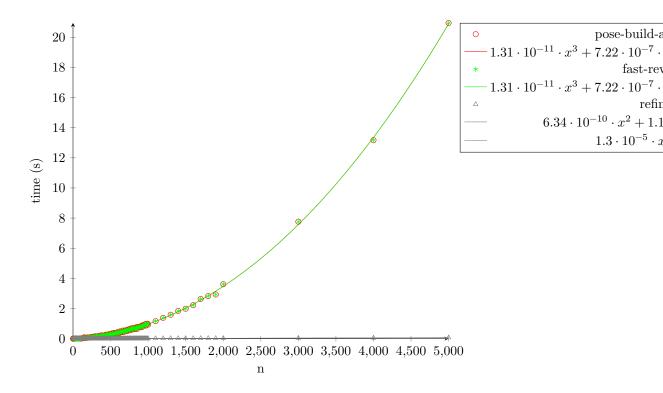


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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

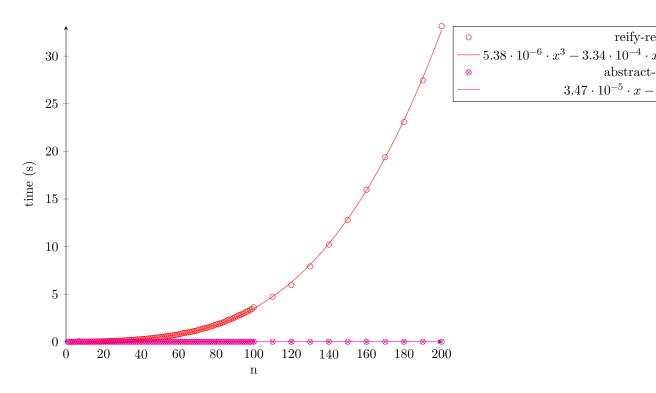


Figure 13: timing-typeclass-reification-let-in-HOAS

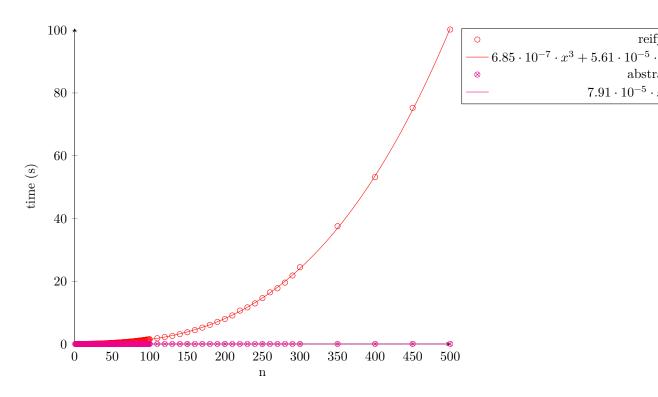


Figure 14: timing-typeclass-reification-let-in-PHOAS

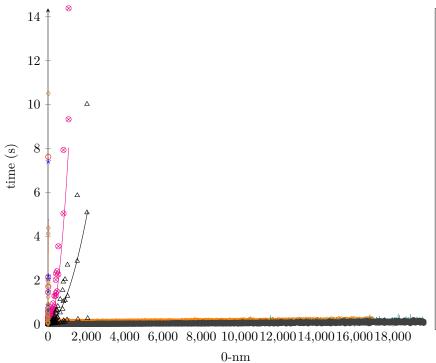


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

rewrite-strat(bottomup-bot $5.58 \cdot 10^{-3} exp (0.45 \cdot ($ rewrite-strat(topdown-bottomup-bott

 $7.15\cdot 10^{-6}\cdot x^2 - 2.43\cdot 10^{-4}\cdot x^2 + 2.43\cdot 1$

 $1.72 \cdot 10^{-10} \cdot x^2 + 5.41 \cdot 10^{-6} \cdot$

 $8.37 \cdot 10^{-11} \cdot x^2 + 4.92 \cdot 10^{-6} \cdot$

 $2.29 \cdot 10^{-10} \cdot x^2 + 3.92 \cdot 10^{-6} \cdot$

 $1.11 \cdot 10^{-10} \cdot x^2 + 3.09 \cdot 10^{-6} \cdot$

 $1.03 \cdot 10^{-6} \cdot x^2 + 3.6 \cdot 10^{-4} \cdot x^2$

 $-6.07 \cdot 10^{-3} \cdot x^3 + 0.19 \cdot x^2 -$

 $6.21 \cdot 10^{-3} \exp{(0.44 \cdot ($

cps+cbn-real

cps+lazy-real

cps+cbv-real

cps+simpl-real

setoid-rewrite-re

cps+vm-compute-

cps+native-compute

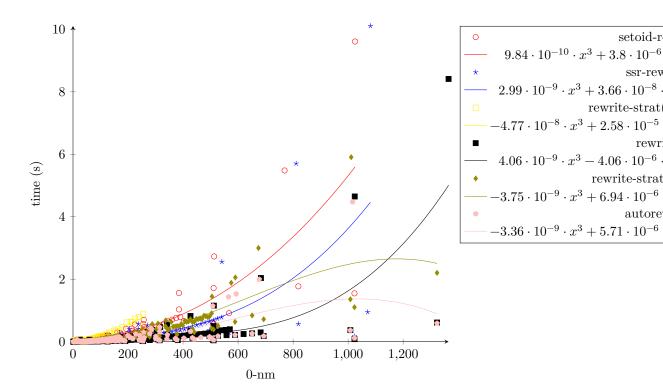
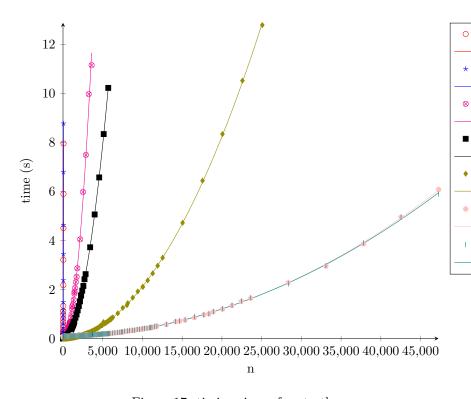


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

vm-com

native-com

native-com

 $1.64 \cdot 10^{-5} \cdot x^3 + 7.46 \cdot 10^{-4} \cdot$

 $2.15 \cdot 10^{-5} \cdot x^3 + 2.13 \cdot 10^{-4} \cdot x^3$

 $9.06 \cdot 10^{-7} \cdot x^2 - 2.5$

 $3.05 \cdot 10^{-7} \cdot x^2 + 6.11$

 $1.99 \cdot 10^{-8} \cdot x^2 + 1.33$

 $2.59 \cdot 10^{-9} \cdot x^2 + 3.34$

 $2.49 \cdot 10^{-9} \cdot x^2 + 6.11$

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

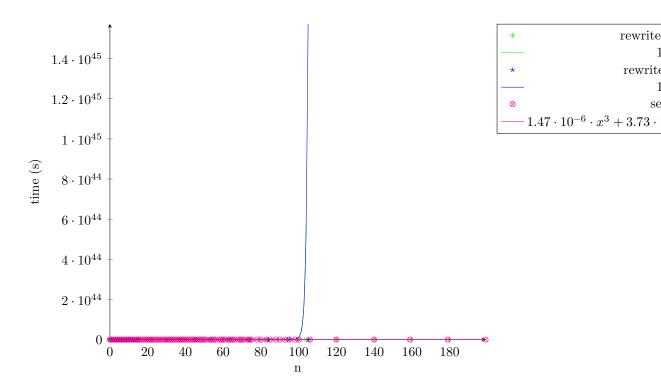


Figure 18: timing-rewrite-under-lets-plus-0 $\,$

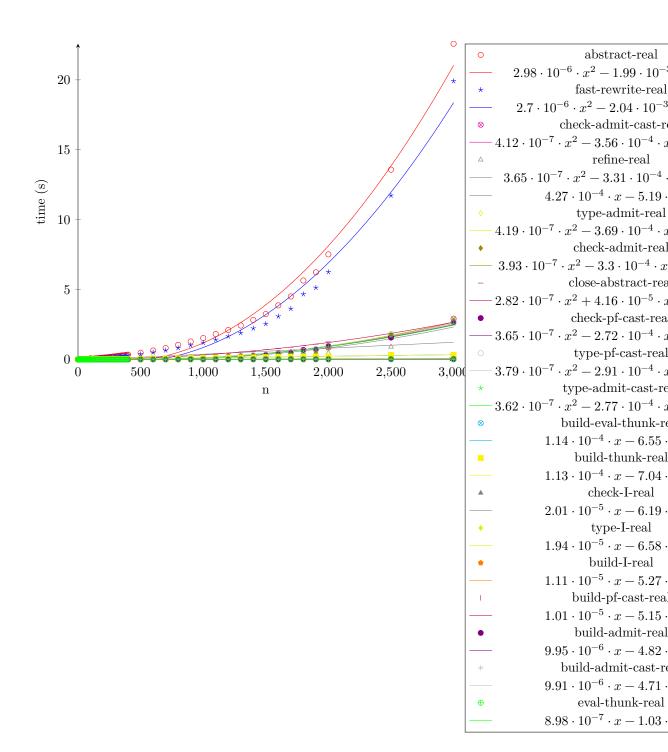


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2