

Figure 1: timing-pattern

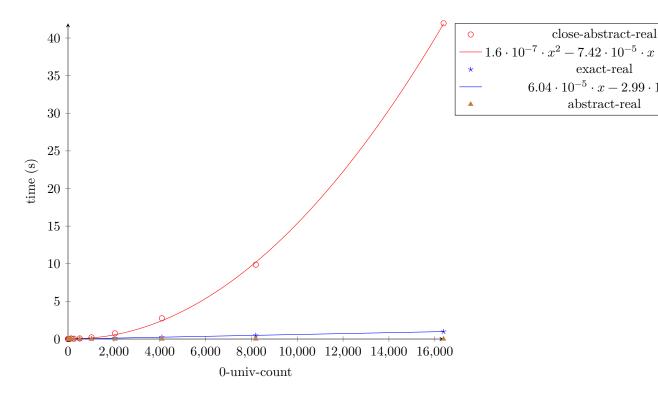


Figure 2: timing-n-polymorphic-universes param-1-n 0

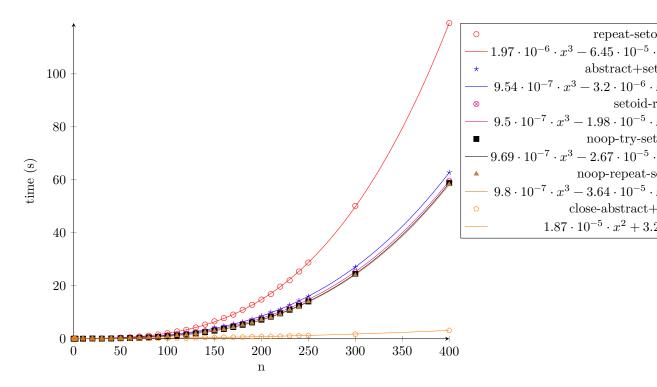


Figure 3: timing-repeat-setoid-rewrite-under-binders

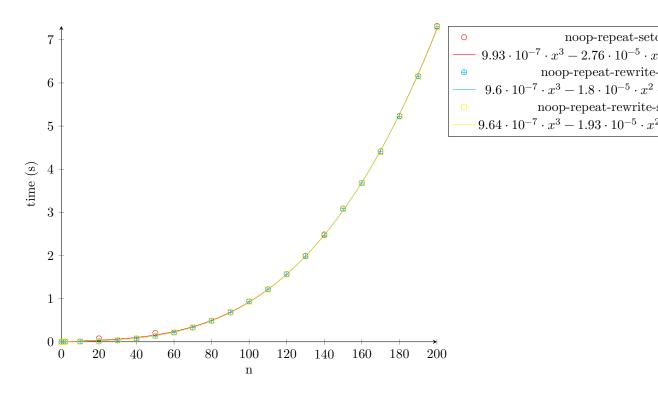
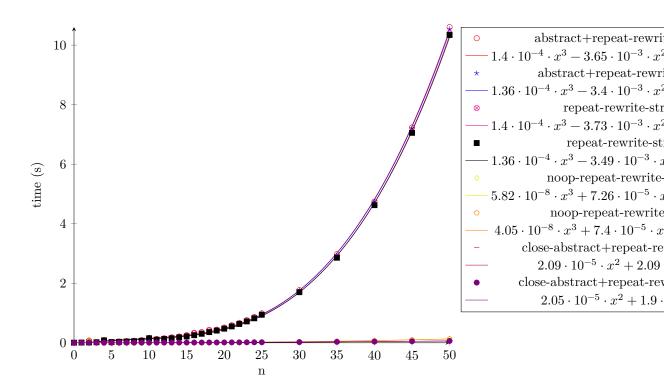


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



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

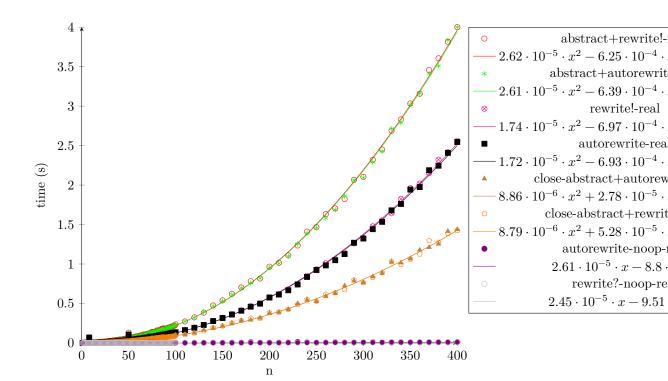
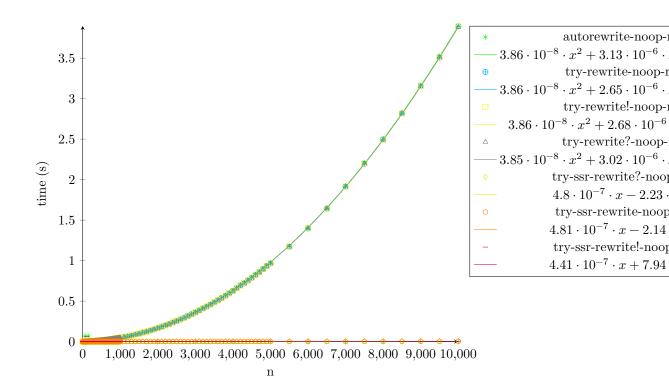


Figure 6: timing-rewrite-repeated-app-autorewrite



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

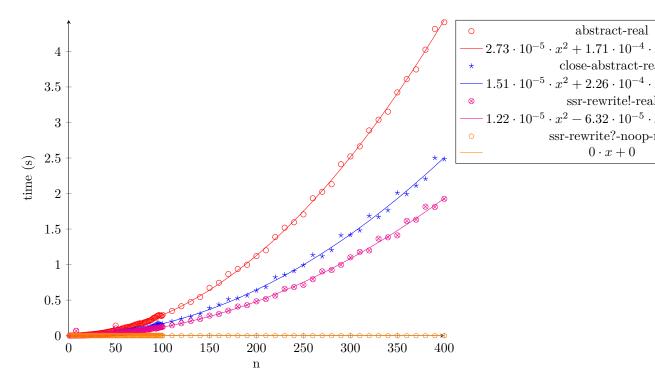
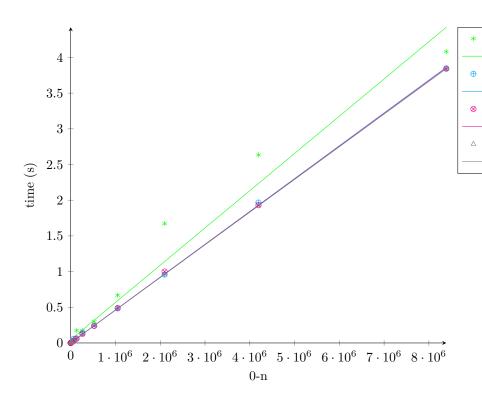


Figure 8: timing-rewrite-repeated-app-ssrrewrite



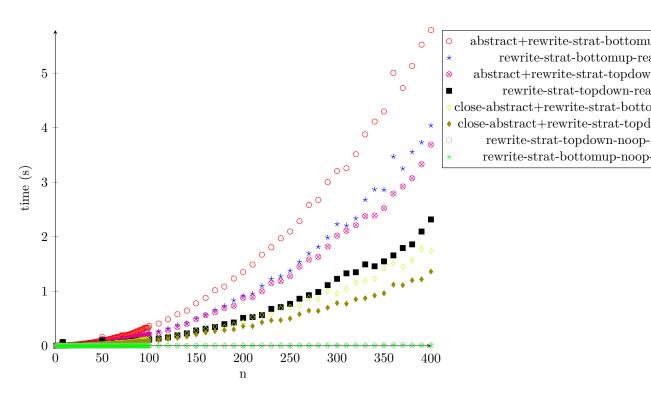
try-ssr-rewrite!-cold-noop-rea $5.22\cdot 10^{-7}\cdot x + 4.56\cdot 10^{-2}$

try-ssr-rewrite!-noop-real $4.6 \cdot 10^{-7} \cdot x + 3.21 \cdot 10^{-3}$

try-ssr-rewrite?-noop-real $4.59 \cdot 10^{-7} \cdot x + 2 \cdot 10^{-3}$

try-ssr-rewrite-noop-real $4.58\cdot 10^{-7}\cdot x + 2.57\cdot 10^{-4}$

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



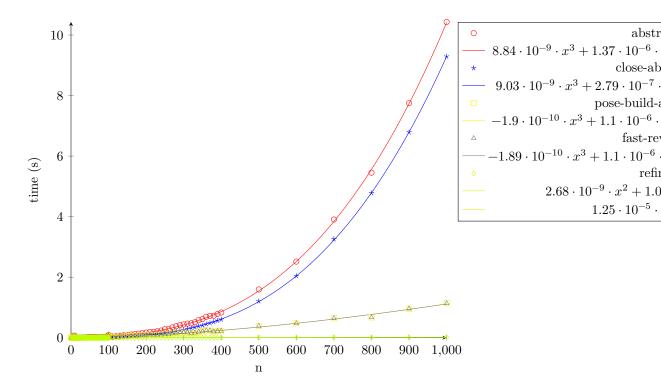
rewrite-strat-bottomup-real

rewrite-strat-topdown-rea

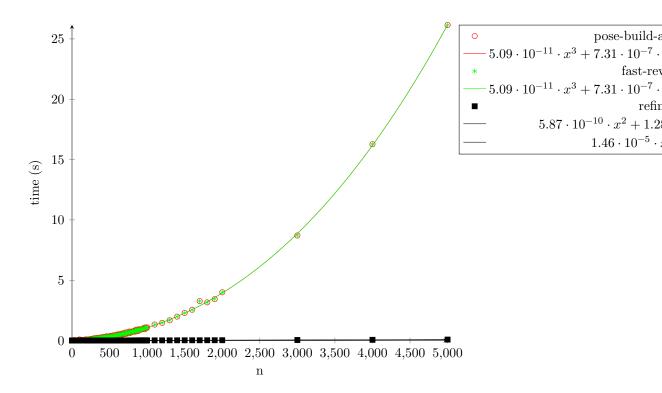
rewrite-strat-topdown-nooprewrite-strat-bottomup-noop-

abstract + rewrite - strat - topdow

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



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



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

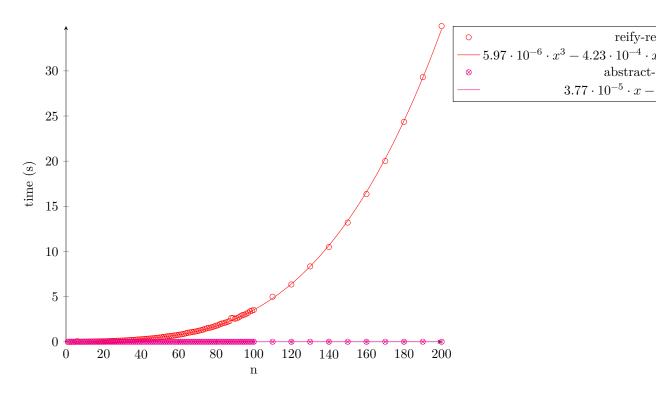
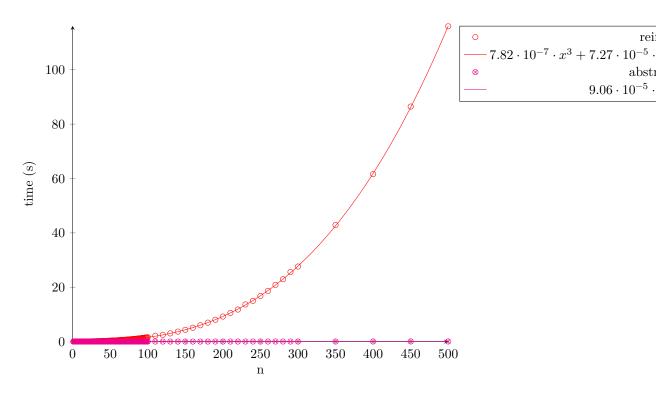


Figure 13: timing-typeclass-reification-let-in-HOAS



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

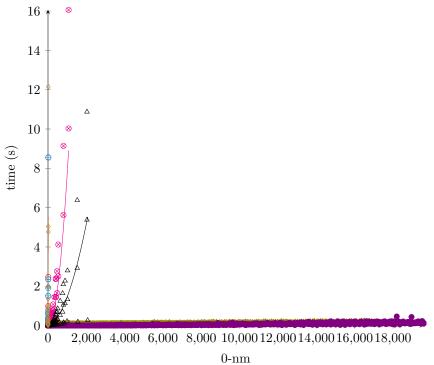


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

rewrite-strat(topdown-bot $5.71 \cdot 10^{-3} exp (0.46 \cdot ($ rewrite-strat(bottomup-bot $5.42 \cdot 10^{-3} exp (0.46 \cdot ($ cps+cbn-real $7.82 \cdot 10^{-6} \cdot x^2 - 1.54 \cdot 10^{-4} \cdot x^2 = 1.54 \cdot 10^{-4} \cdot x^2$ cps+vm-compute- $1.11 \cdot 10^{-10} \cdot x^2 + 5.62 \cdot 10^{-6} \cdot$ cps+native-compute $7.06 \cdot 10^{-11} \cdot x^2 + 5.91 \cdot 10^{-6} \cdot$ $_{\rm cps+cbv\text{-}real}$ $9.84 \cdot 10^{-11} \cdot x^2 + 3.98 \cdot 10^{-6} \cdot$ cps+lazy-real $2.14\cdot 10^{-10}\cdot x^2 + 4.82\cdot 10^{-6}\cdot \\$ cps+simpl-real $-1.12 \cdot 10^{-6} \cdot x^2 + 3.55 \cdot 10^{-4} \cdot x^2$ setoid-rewrite-re $-7.04 \cdot 10^{-3} \cdot x^3 + 0.22 \cdot x^2 - \\$

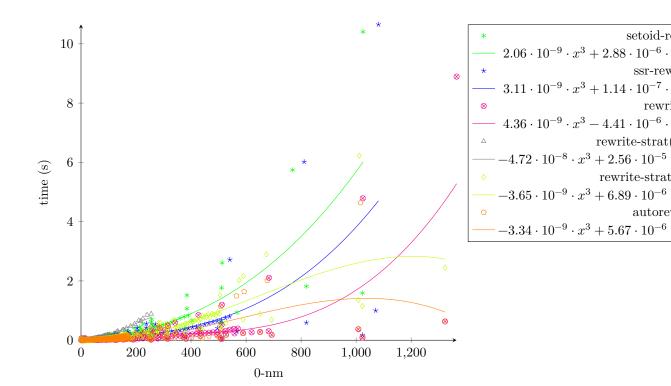
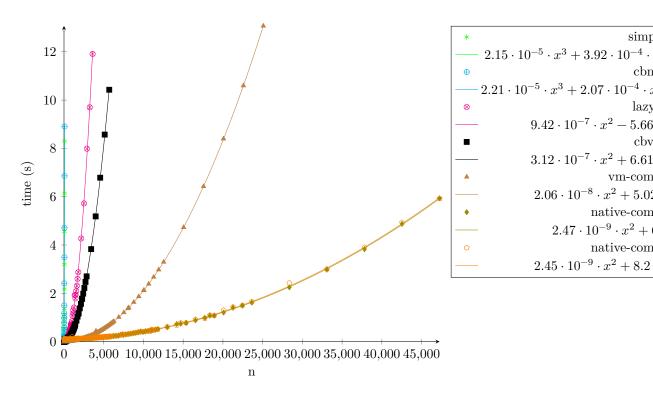


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

vm-com

native-com $2.47 \cdot 10^{-9} \cdot x^2 + 6$

native-com

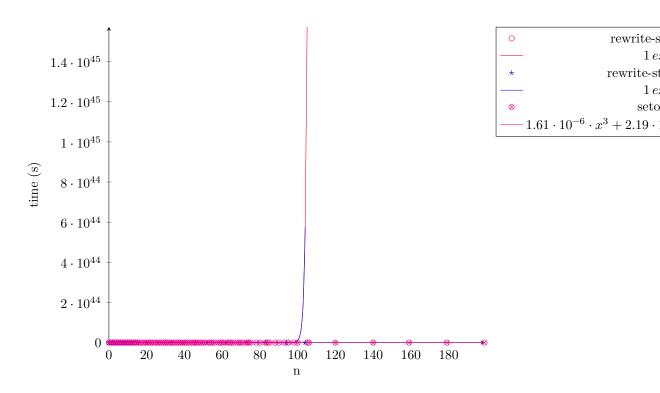
 $9.42 \cdot 10^{-7} \cdot x^2 - 5.66$

 $3.12 \cdot 10^{-7} \cdot x^2 + 6.61$

 $2.06 \cdot 10^{-8} \cdot x^2 + 5.02$

 $2.45 \cdot 10^{-9} \cdot x^2 + 8.2$

Figure 17: timing-sieve-of-eratosthenes



rewrite-s

rewrite-st

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