

Figure 1: timing-pattern

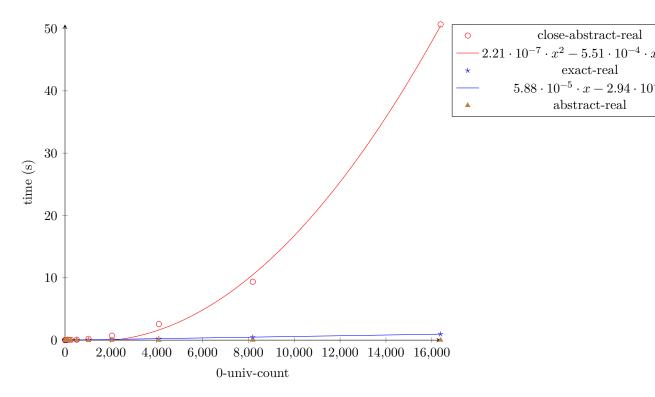


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$

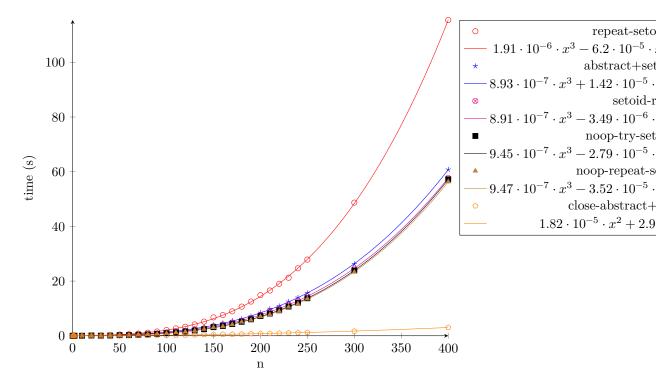
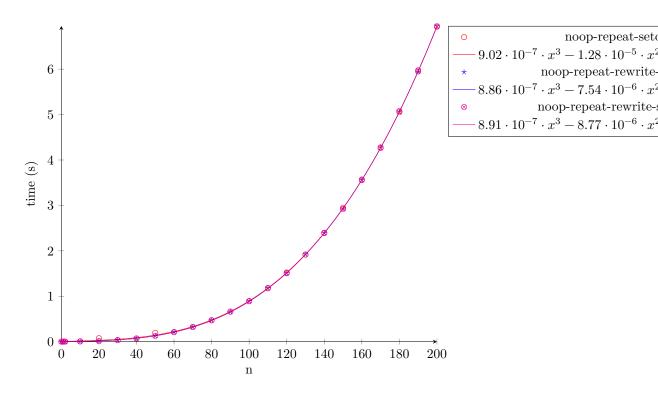
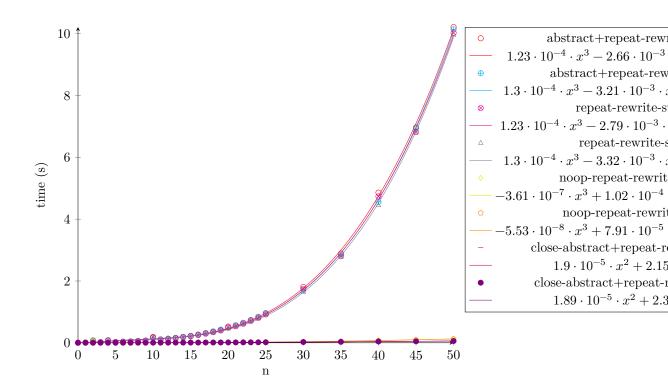


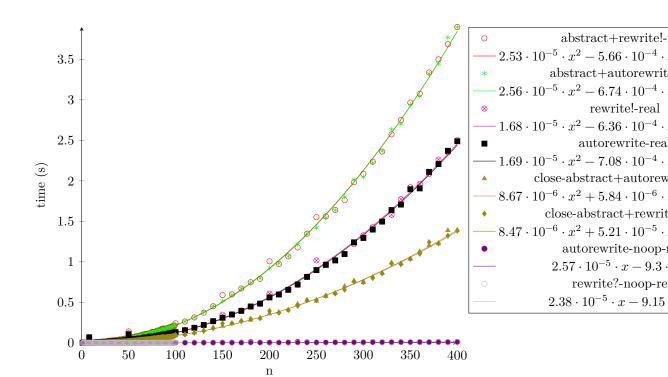
Figure 3: timing-repeat-setoid-rewrite-under-binders



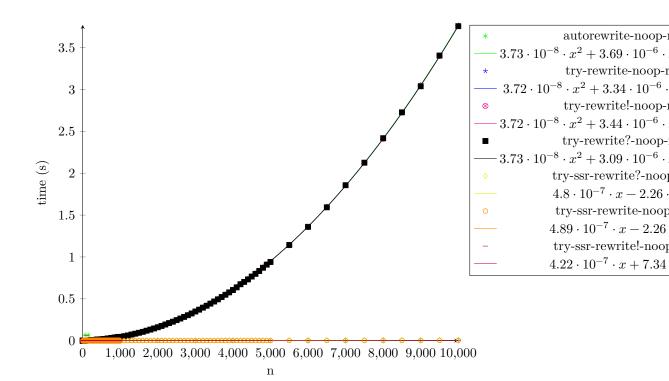
 $Figure\ 4:\ timing-repeat-setoid-rewrite-under-binders-noop$



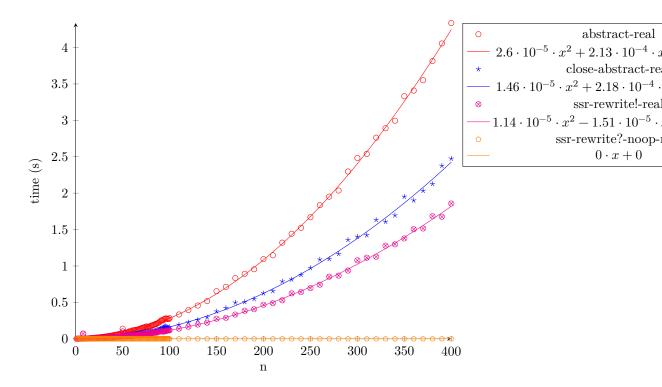
 $Figure\ 5:\ timing-rewrite-strat-under-binders$



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



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



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

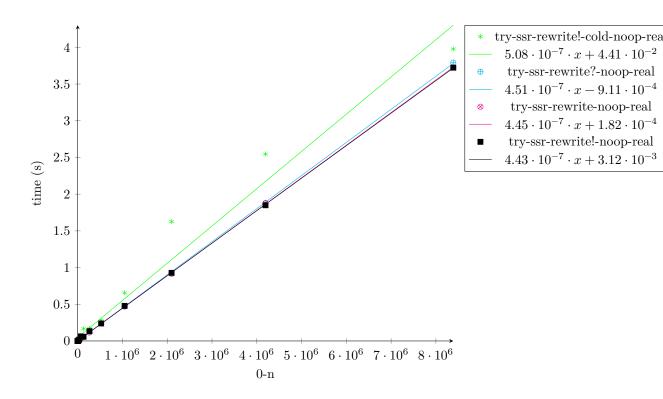
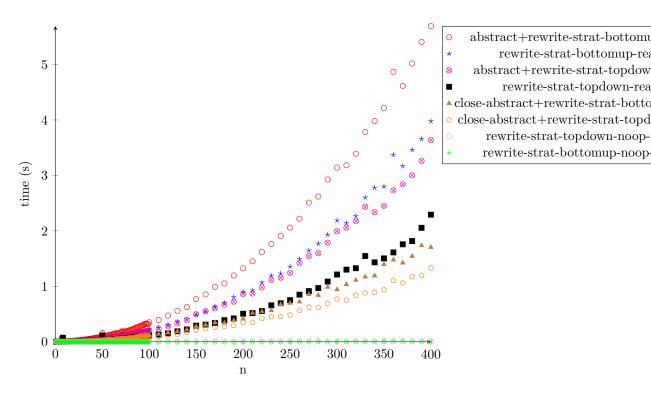


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$



rewrite-strat-bottomup-rea

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

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

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

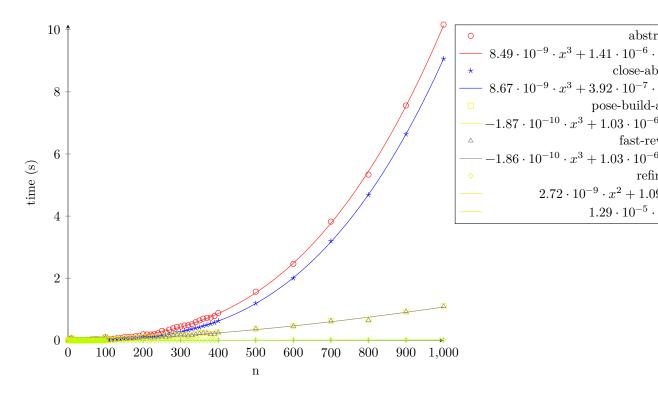
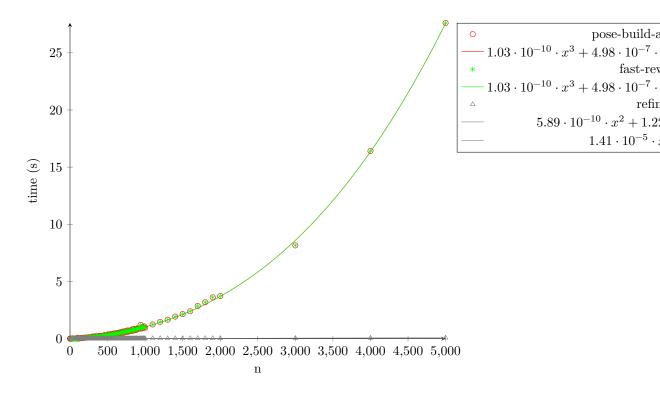


Figure 11: timing-rewrite-repeated-app-fast-rewrite



Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract

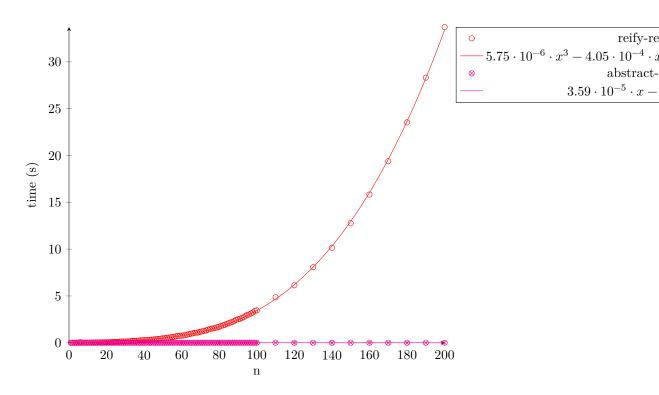


Figure 13: timing-typeclass-reification-let-in-HOAS

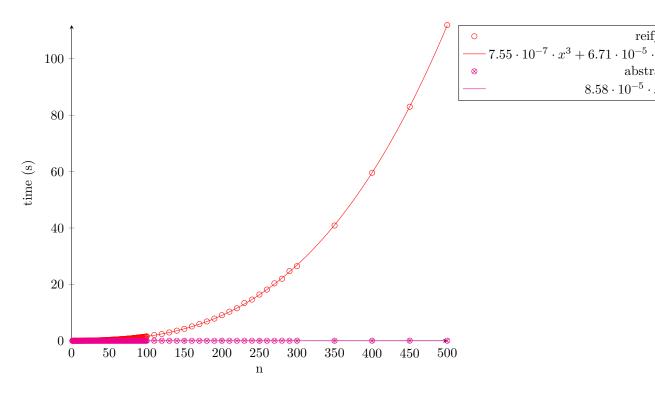
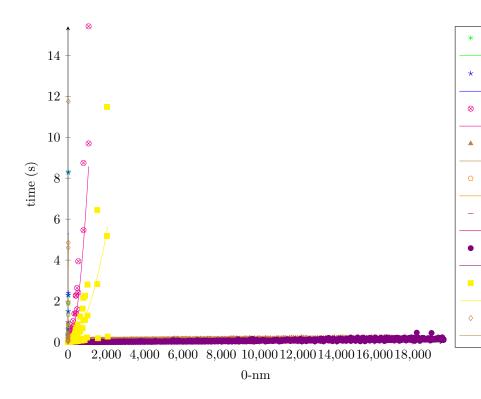


Figure 14: timing-typeclass-reification-let-in-PHOAS



rewrite-strat(bottomup-bot $5.23 \cdot 10^{-3} exp(0.46 \cdot ($

rewrite-strat (topdown-bot 5.69 \cdot 10⁻³ exp (0.46 \cdot (

 $7.55 \cdot 10^{-6} \cdot x^2 - 1.72 \cdot 10^{-4} \cdot .$

 $5.91 \cdot 10^{-11} \cdot x^2 + 5.79 \cdot 10^{-6} \cdot$

 $1.16 \cdot 10^{-10} \cdot x^2 + 5.38 \cdot 10^{-6} \cdot$

 $1.05 \cdot 10^{-10} \cdot x^2 + 3.66 \cdot 10^{-6} \cdot$

 $2.23\cdot 10^{-10}\cdot x^2 + 4.62\cdot 10^{-6}\cdot \\$

 $1.17 \cdot 10^{-6} \cdot x^2 + 2.94 \cdot 10^{-4} \cdot x^2$

 $-6.79 \cdot 10^{-3} \cdot x^3 + 0.22 \cdot x^2 -$

cps+cbn-real

cps+native-compute

cps+vm-compute-

cps+cbv-real

cps+lazy-real

cps+simpl-real

setoid-rewrite-re

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

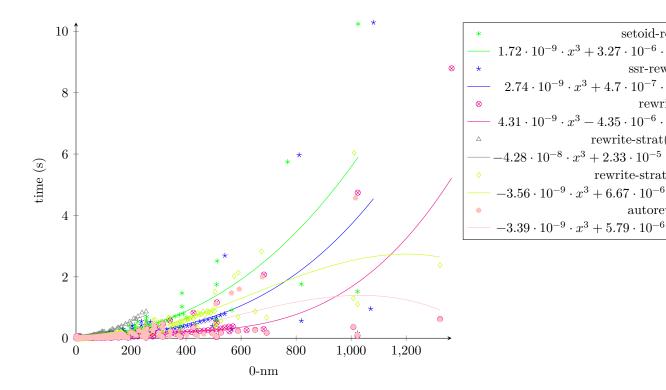
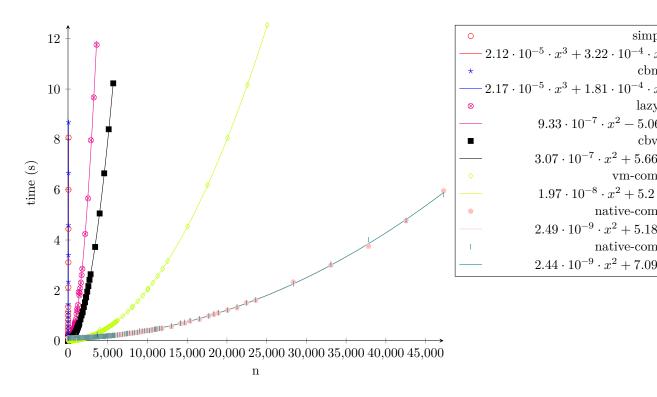


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

lazy

vm-com

native-com

native-com

 $9.33 \cdot 10^{-7} \cdot x^2 - 5.06$

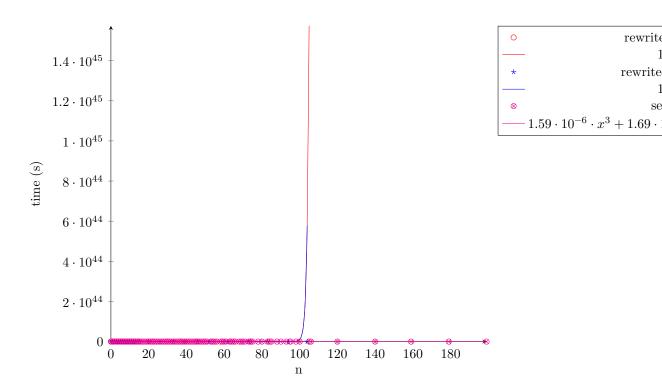
 $3.07 \cdot 10^{-7} \cdot x^2 + 5.66$

 $1.97 \cdot 10^{-8} \cdot x^2 + 5.2$

 $2.49 \cdot 10^{-9} \cdot x^2 + 5.18$

 $2.44 \cdot 10^{-9} \cdot x^2 + 7.09$

Figure 17: timing-sieve-of-eratosthenes



rewrite

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