

Figure 1: timing-pattern

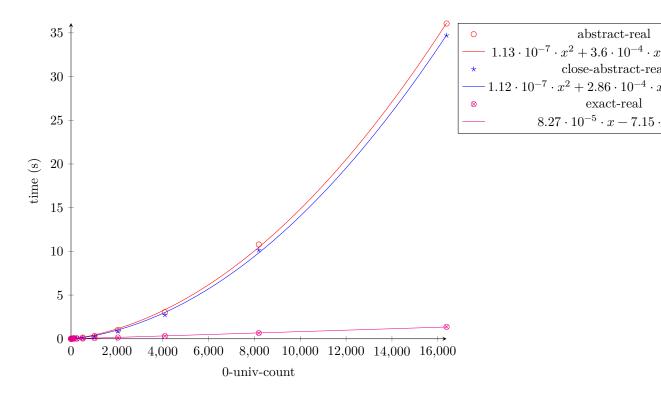
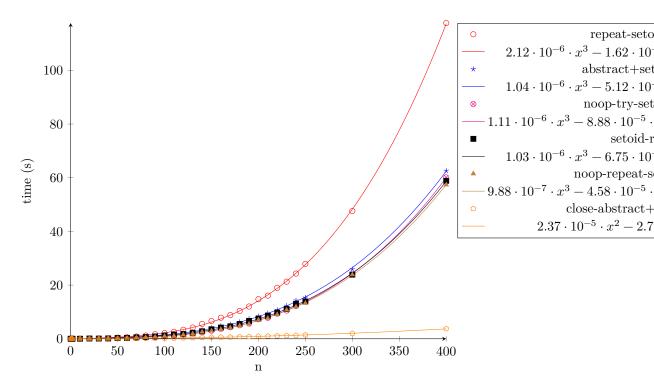


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$



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

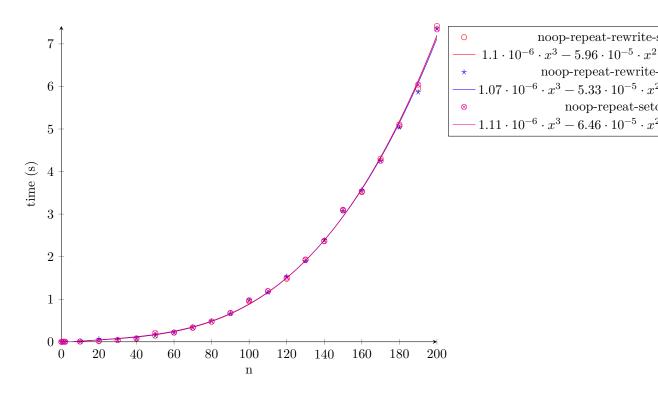
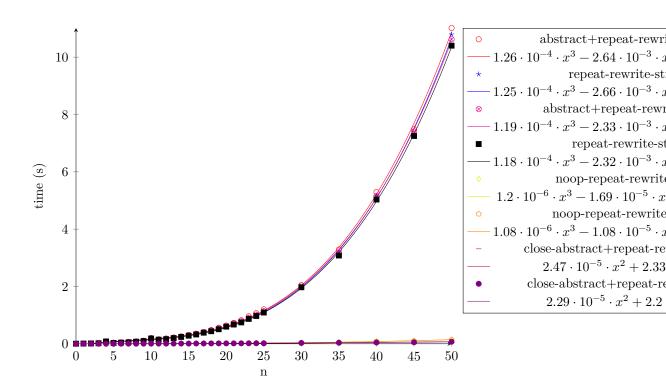
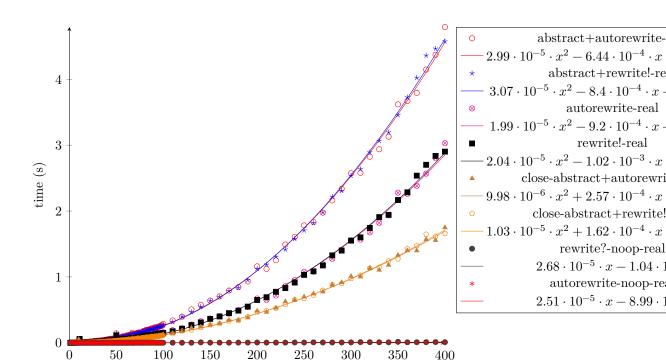


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

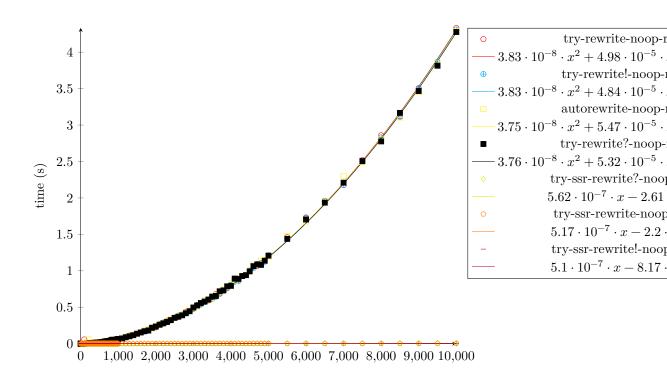


 $Figure\ 5:\ timing-rewrite-strat-under-binders$

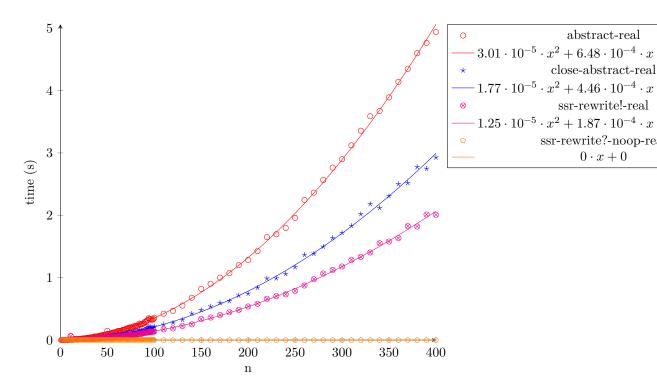


 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$

n



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



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

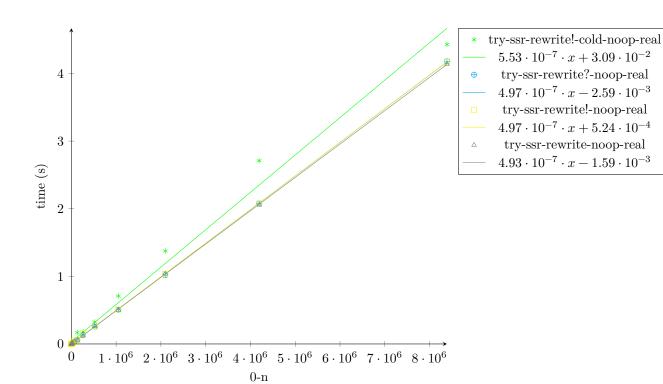
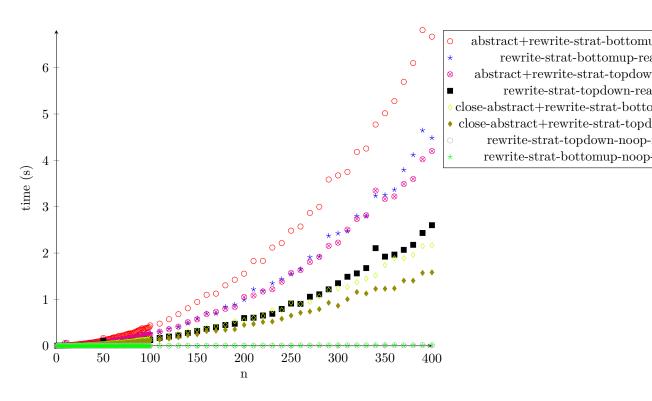


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

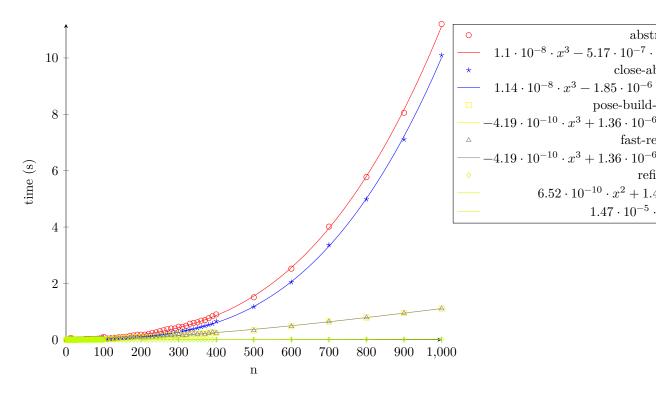


rewrite-strat-bottomup-rea

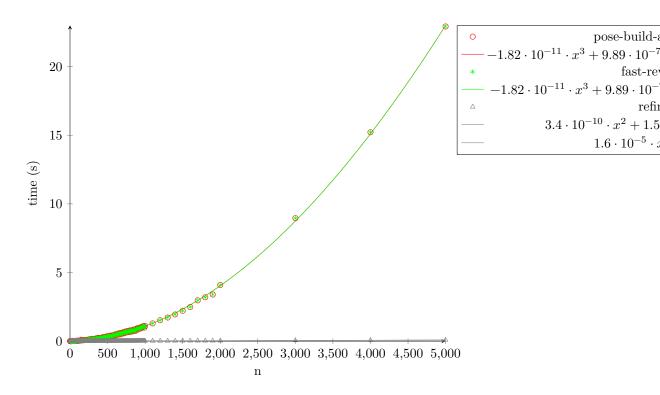
abstract + rewrite - strat - topdowrewrite-strat-topdown-rea

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

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



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



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

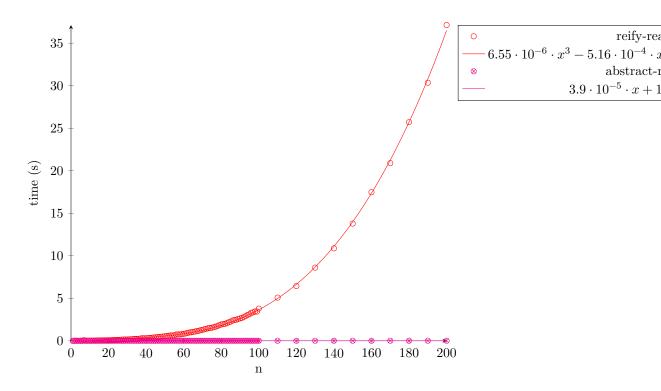


Figure 13: timing-typeclass-reification-let-in-HOAS

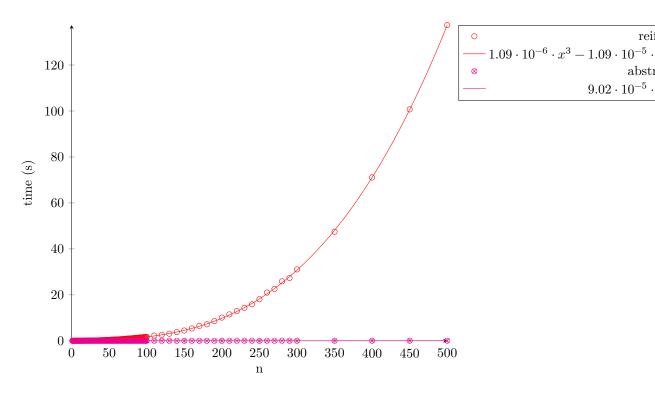
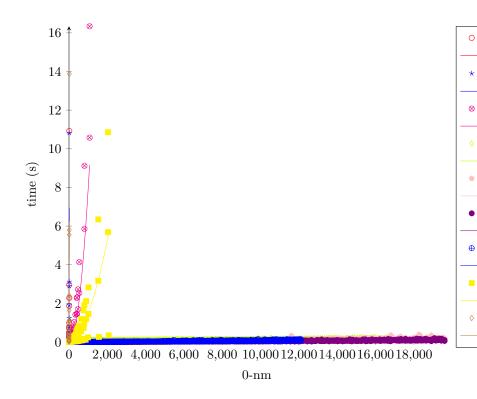


Figure 14: timing-typeclass-reification-let-in-PHOAS



rewrite-strat(bottomup-bot $6.48 \cdot 10^{-3} exp(0.46 \cdot ($

rewrite-strat (topdown-bot) 6.56 \cdot 10⁻³ exp (0.46 \cdot (

 $8.25\cdot 10^{-6}\cdot x^2 - 3.83\cdot 10^{-4}\cdot x^2 + 3.83\cdot 1$

 $1.28 \cdot 10^{-10} \cdot x^2 + 4.89 \cdot 10^{-6} \cdot$

 $2.64 \cdot 10^{-10} \cdot x^2 + 4.55 \cdot 10^{-6} \cdot$

 $1.14 \cdot 10^{-10} \cdot x^2 + 3.63 \cdot 10^{-6} \cdot$

 $2.33\cdot 10^{-10}\cdot x^2 + 5.64\cdot 10^{-6}\cdot \\$

 $1.17 \cdot 10^{-6} \cdot x^2 + 3.2 \cdot 10^{-4} \cdot x^2$

 $-8.13 \cdot 10^{-3} \cdot x^3 + 0.26 \cdot x^2 - \\$

cps+cbn-real

cps+lazy-real

 $\operatorname{cps+cbv-real}$

cps+simpl-real

setoid-rewrite-re

cps+vm-compute-

cps+native-compute

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

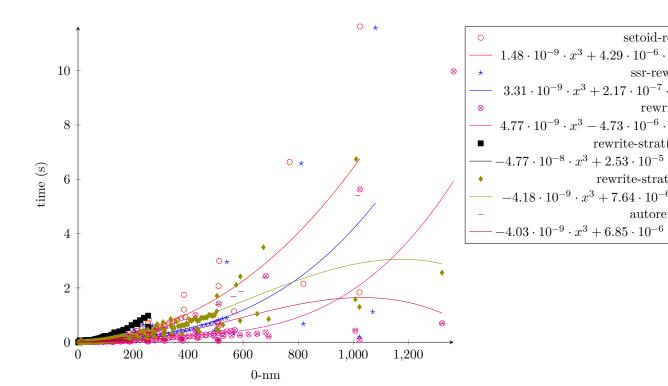
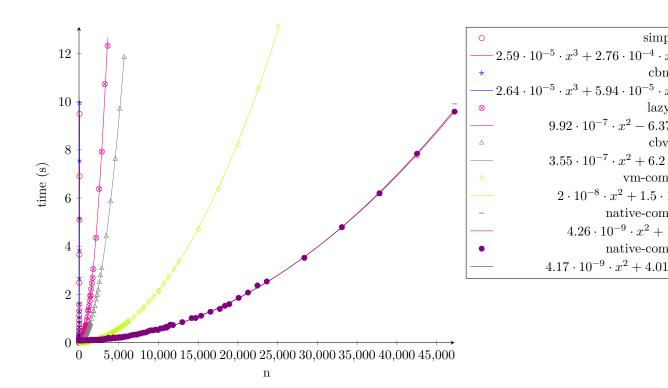


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



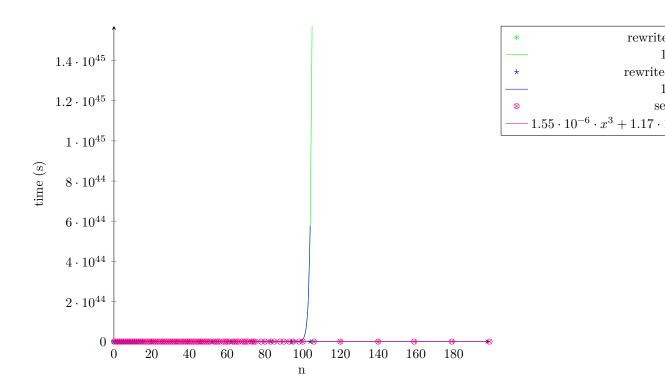
simp

vm-com

native-com

native-com

Figure 17: timing-sieve-of-eratosthenes



rewrite

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

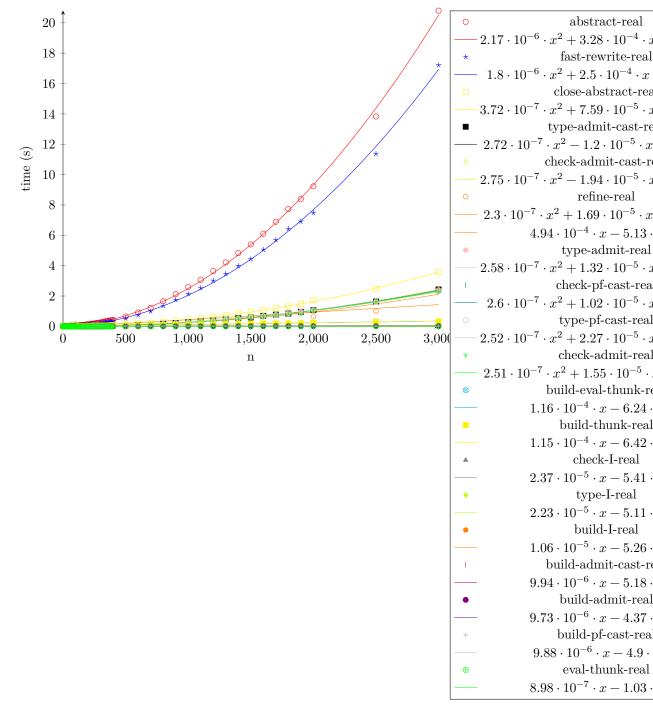


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2