

Figure 1: timing-pattern

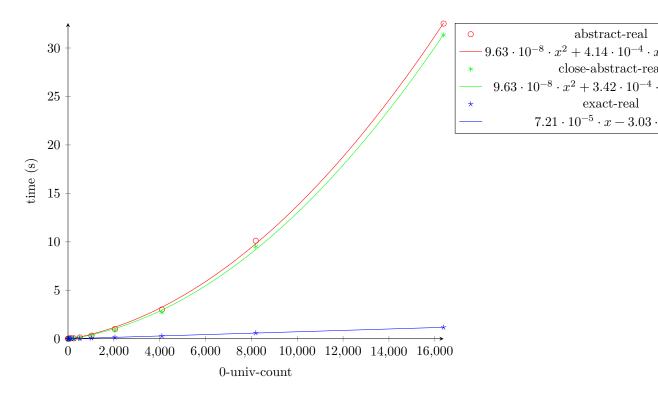


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$

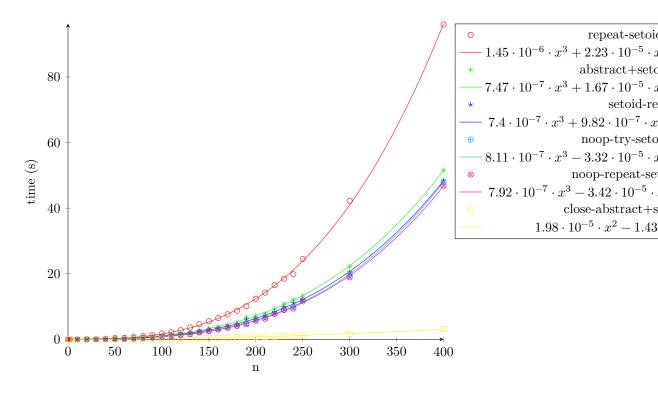
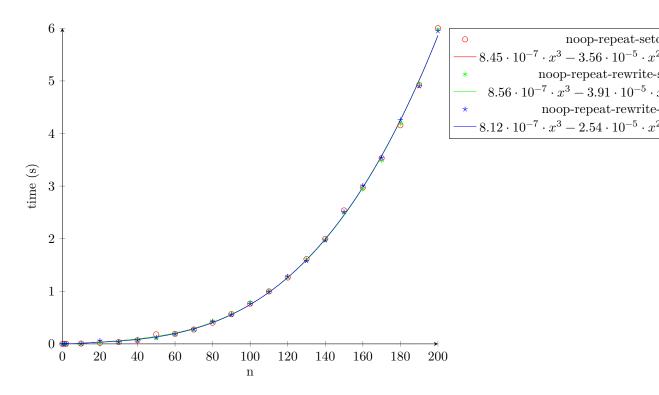
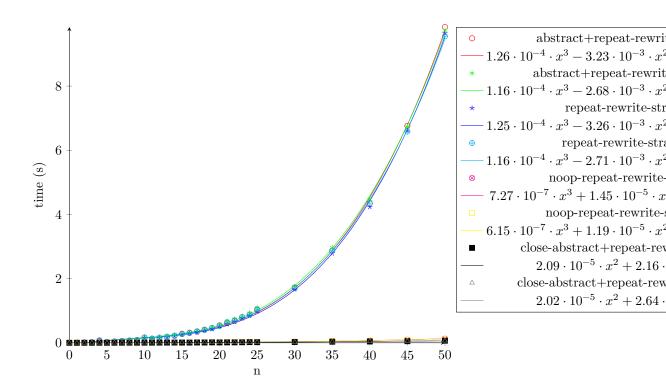


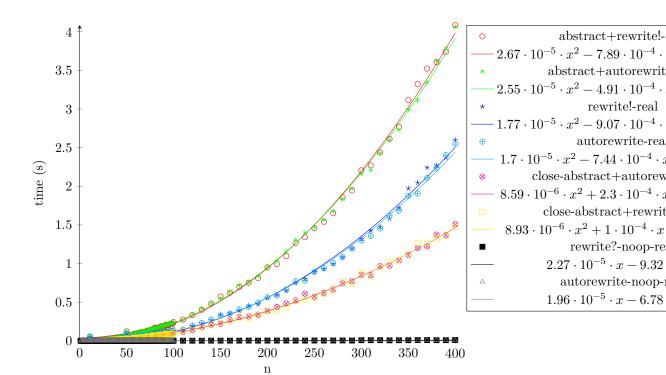
Figure 3: timing-repeat-setoid-rewrite-under-binders



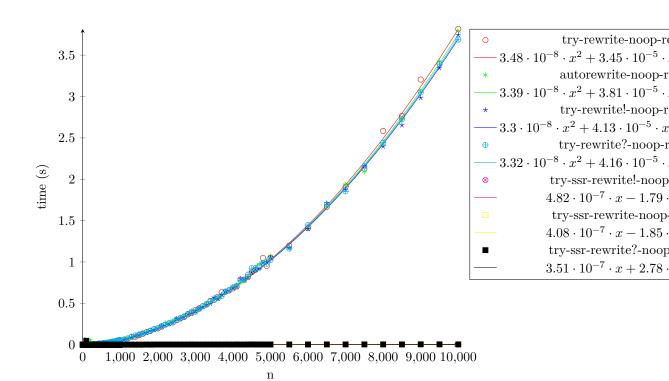
 $Figure\ 4:\ timing-repeat-setoid-rewrite-under-binders-noop$



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



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



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

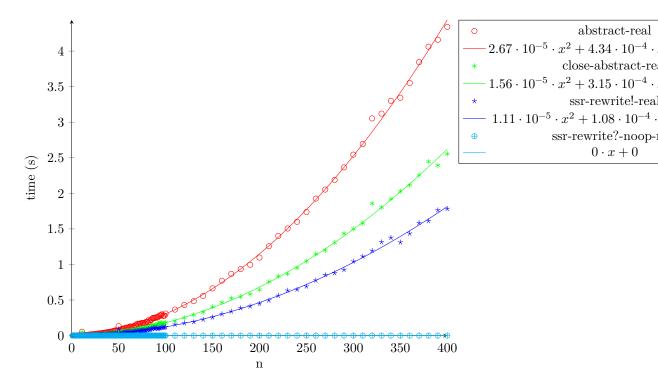
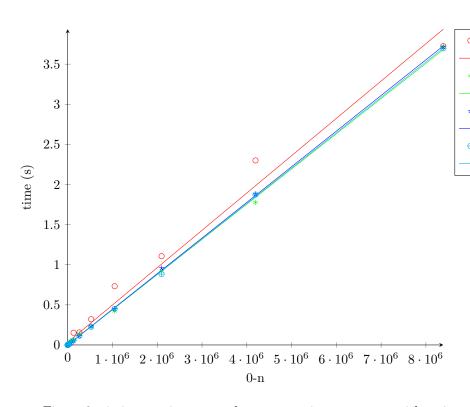


Figure 8: timing-rewrite-repeated-app-ssrrewrite



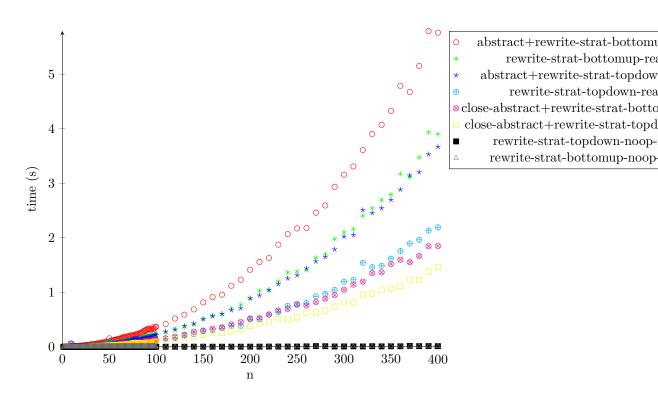
try-ssr-rewrite!-cold-noop-rea $4.65\cdot 10^{-7}\cdot x + 3.33\cdot 10^{-2}$

try-ssr-rewrite!-noop-real $4.39\cdot 10^{-7}\cdot x - 1.02\cdot 10^{-3}$

try-ssr-rewrite?-noop-real $4.44\cdot 10^{-7}\cdot x + 5.27\cdot 10^{-4}$

try-ssr-rewrite-noop-real $4.41\cdot 10^{-7}\cdot x - 2.18\cdot 10^{-3}$

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



rewrite-strat-bottomup-rea

rewrite-strat-topdown-rea

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

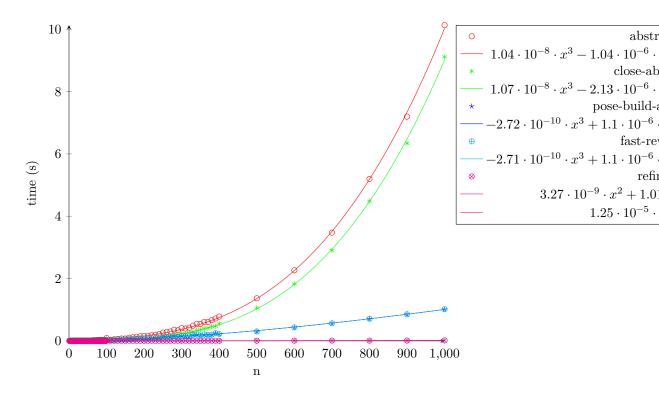
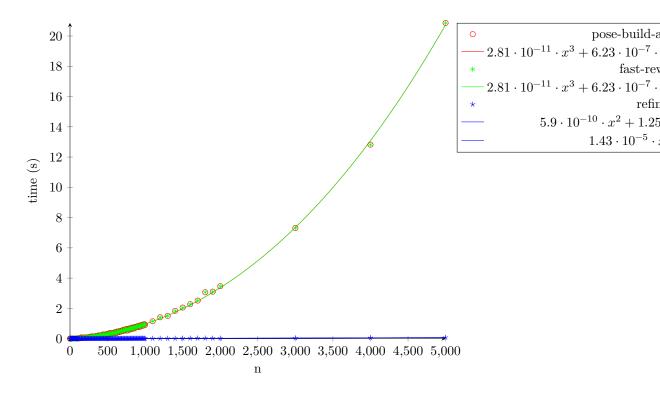
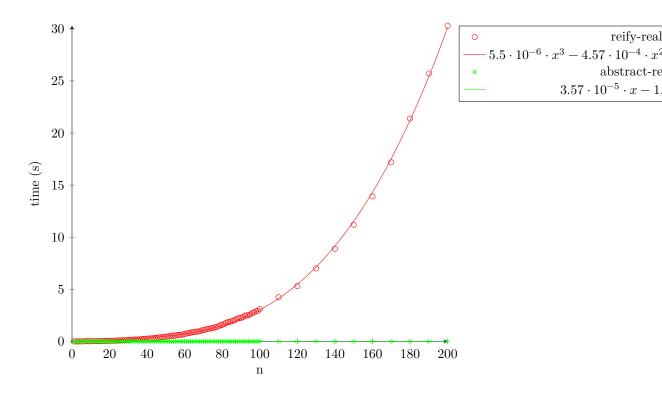


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



 ${\bf Figure~13:~timing-type class-reification-let-in-HOAS}$

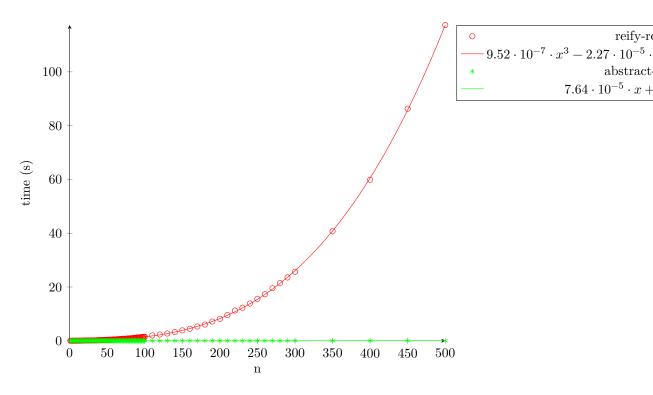
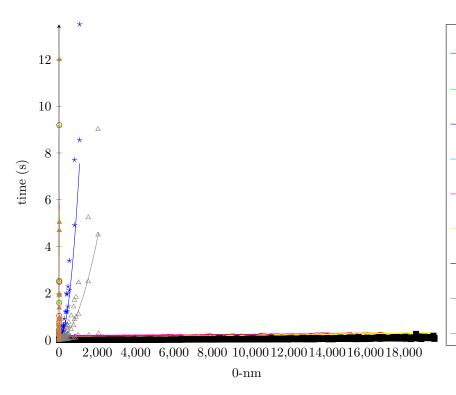


Figure 14: timing-typeclass-reification-let-in-PHOAS



rewrite-strat(topdown-bot $6.25 \cdot 10^{-3} exp(0.46 \cdot ($

rewrite-strat (bottomup-bot 5.85 \cdot 10⁻³ exp (0.46 \cdot (

 $6.64 \cdot 10^{-6} \cdot x^2 - 1.38 \cdot 10^{-4} \cdot x^2 + 1.00 \cdot x^$

 $1.74 \cdot 10^{-10} \cdot x^2 + 4.99 \cdot 10^{-6} \cdot$

 $1.24 \cdot 10^{-10} \cdot x^2 + 4.12 \cdot 10^{-6} \cdot$

 $2.02\cdot 10^{-10}\cdot x^2 + 4.12\cdot 10^{-6}\cdot \\$

 $1.01 \cdot 10^{-10} \cdot x^2 + 3.11 \cdot 10^{-6} \cdot$

 $9.16 \cdot 10^{-7} \cdot x^2 + 3.36 \cdot 10^{-4} \cdot x^2$

 $-6.96 \cdot 10^{-3} \cdot x^3 + 0.22 \cdot x^2 -$

cps+cbn-real

cps+vm-compute-

cps+native-compute

cps+lazy-real

 $\operatorname{cps+cbv-real}$

cps+simpl-real

setoid-rewrite-re

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

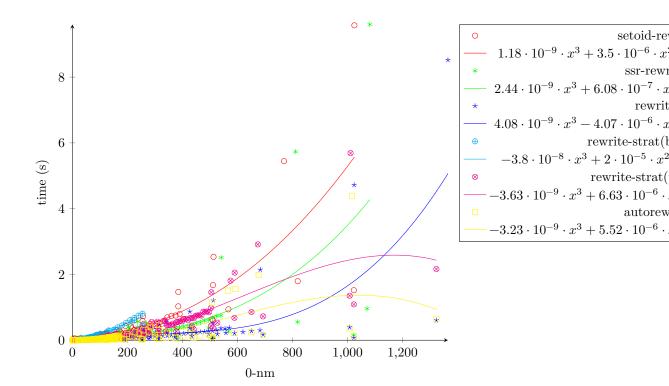
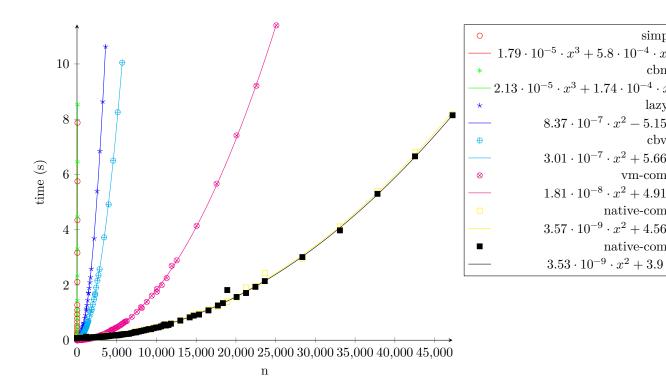


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



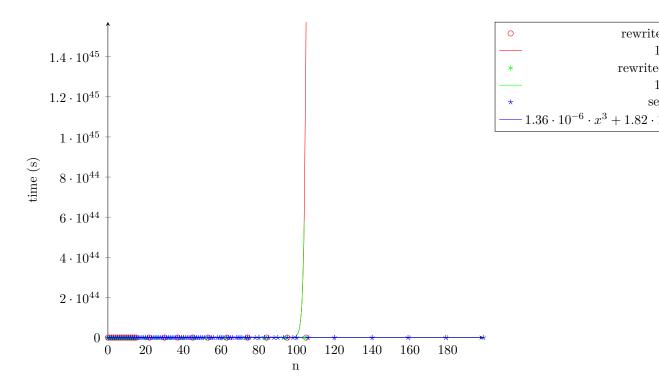
simp

vm-com

native-com

native-com

Figure 17: timing-sieve-of-eratosthenes



rewrite

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

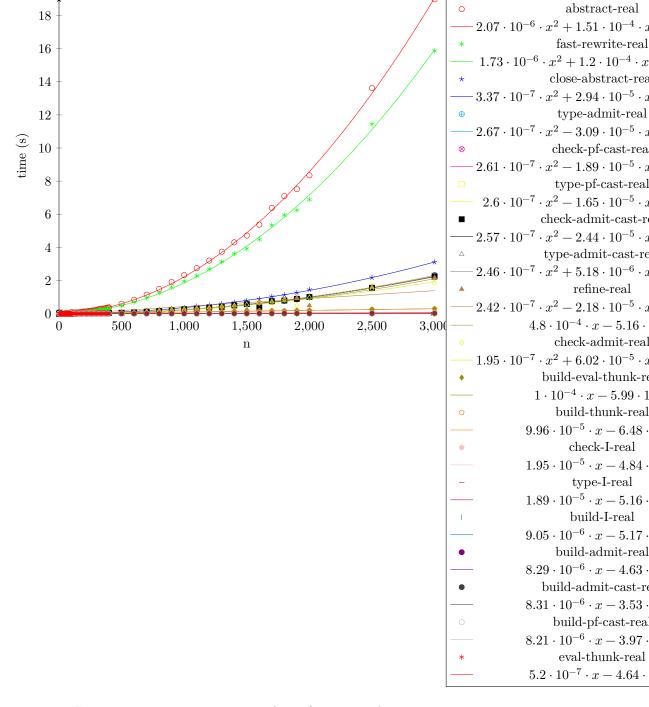


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2