

Figure 1: timing-pattern

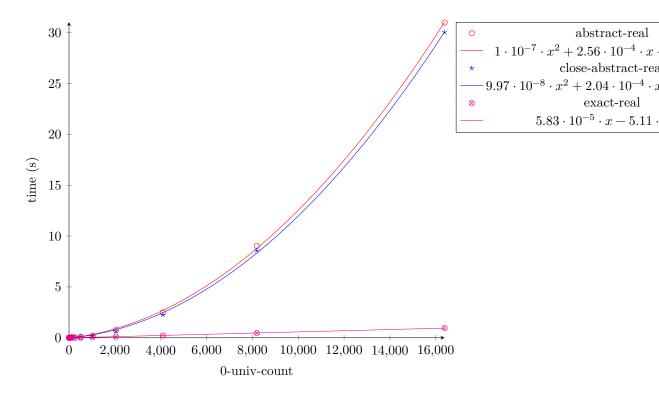
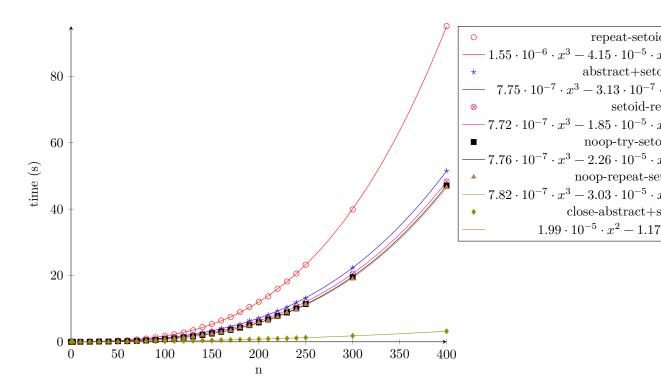
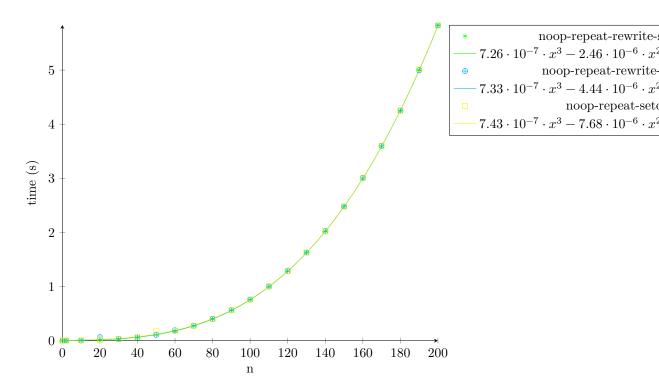


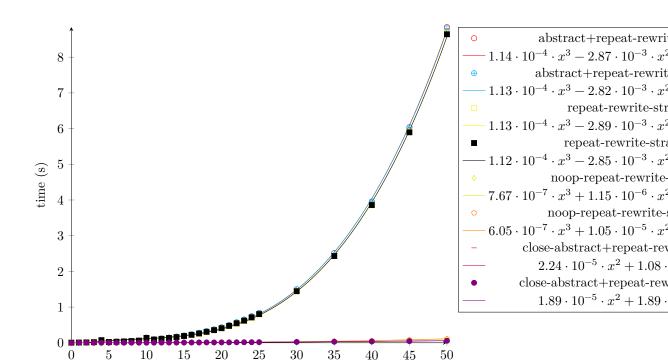
Figure 2: timing-n-polymorphic-universes param-1-n $\,0$



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



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



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

n

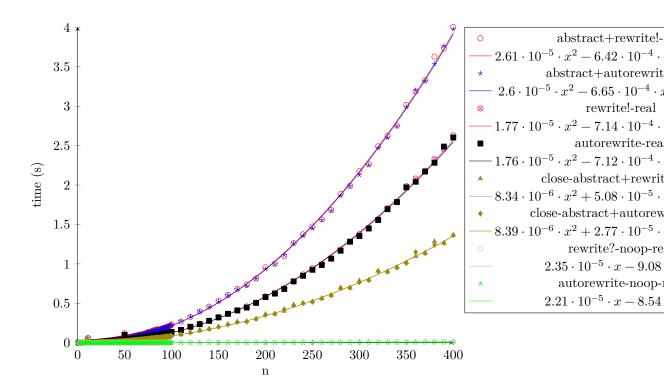
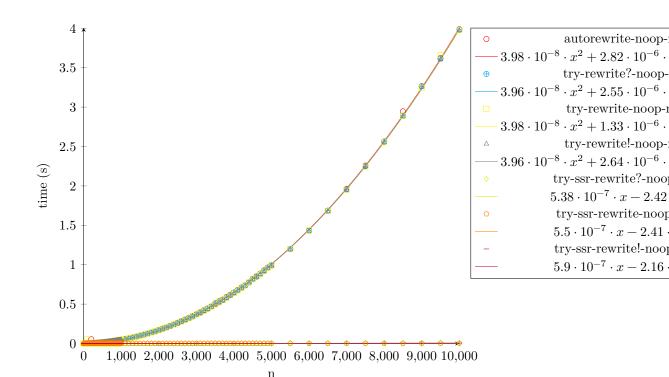


Figure 6: timing-rewrite-repeated-app-autorewrite



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

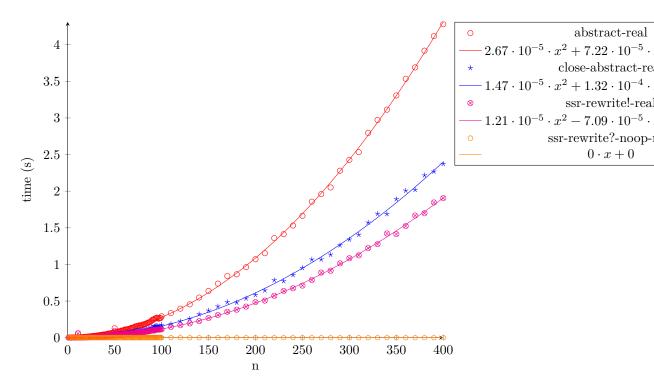
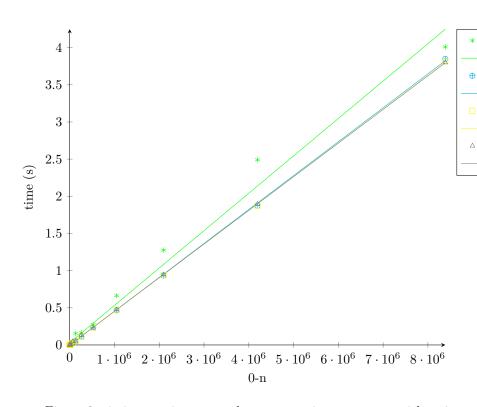


Figure 8: timing-rewrite-repeated-app-ssrrewrite



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

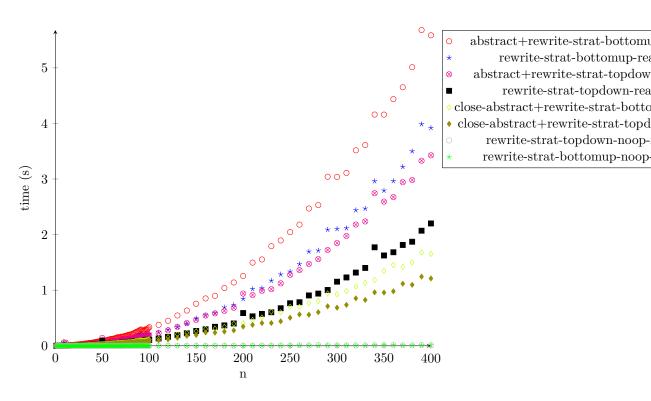
 $5.03 \cdot 10^{-7} \cdot x + 2.95 \cdot 10^{-2}$ try-ssr-rewrite?-noop-real

 $\begin{array}{l} 4.56 \cdot 10^{-7} \cdot x - 3.49 \cdot 10^{-3} \\ \text{try-ssr-rewrite-noop-real} \end{array}$

 $\begin{array}{l} 4.54 \cdot 10^{-7} \cdot x - 2.68 \cdot 10^{-3} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$

 $4.52 \cdot 10^{-7} \cdot x + 5.73 \cdot 10^{-4}$

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-

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

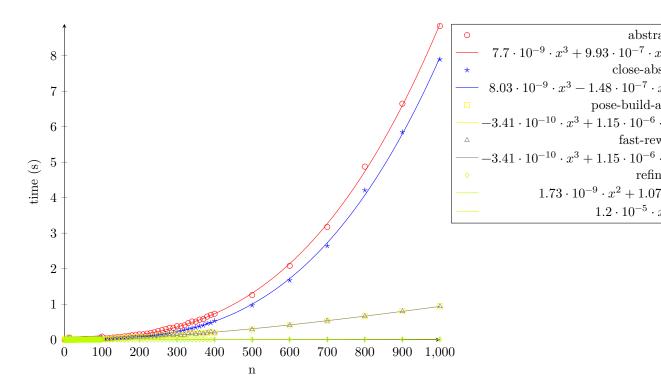
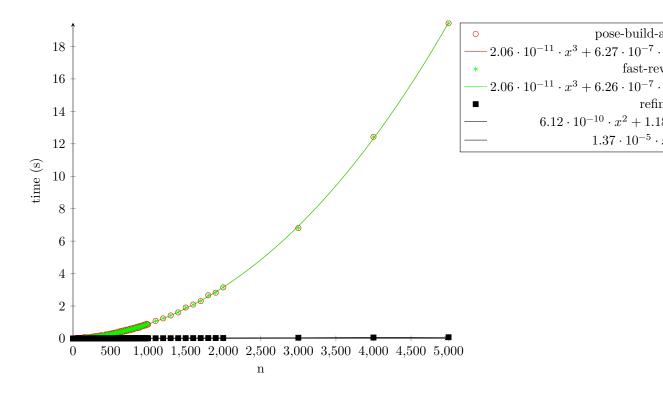
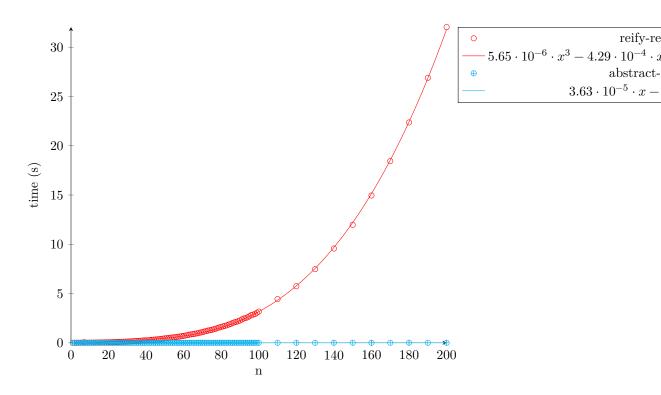


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



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

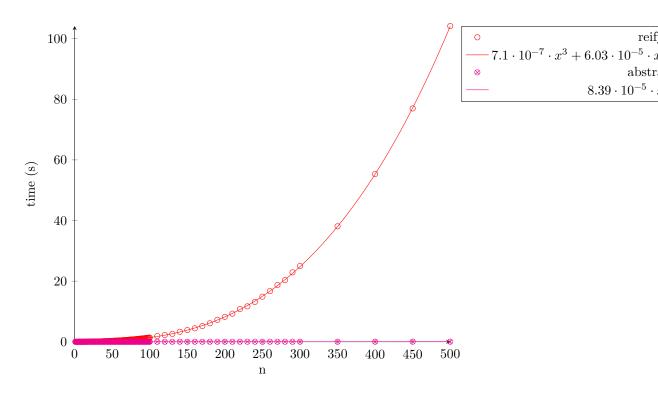
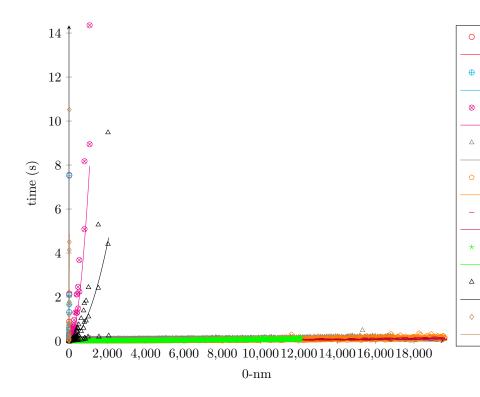


Figure 14: timing-typeclass-reification-let-in-PHOAS



rewrite-strat (topdown-bot 5.08 \cdot 10⁻³ exp (0.46 \cdot (rewrite-strat (bottomup-bot

 $6.98\cdot 10^{-6}\cdot x^2 - 1.24\cdot 10^{-4}\cdot x^2 + 1.00$

 $1.74 \cdot 10^{-10} \cdot x^2 + 4.15 \cdot 10^{-6}$

 $2.4 \cdot 10^{-10} \cdot x^2 + 4.21 \cdot 10^{-6} \cdot$

 $8.06 \cdot 10^{-11} \cdot x^2 + 4.2 \cdot 10^{-6} \cdot x^$

 $2.07 \cdot 10^{-10} \cdot x^2 + 5.14 \cdot 10^{-6} \cdot$

 $9.72 \cdot 10^{-7} \cdot x^2 + 2.63 \cdot 10^{-4}$

 $-6.16 \cdot 10^{-3} \cdot x^3 + 0.2 \cdot x^2 -$

 $4.82 \cdot 10^{-3} exp (0.46 \cdot ($

cps+native-compute

cps+cbn-real

cps+lazy-real

cps+cbv-real

cps+simpl-real

setoid-rewrite-re

cps+vm-compute-

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

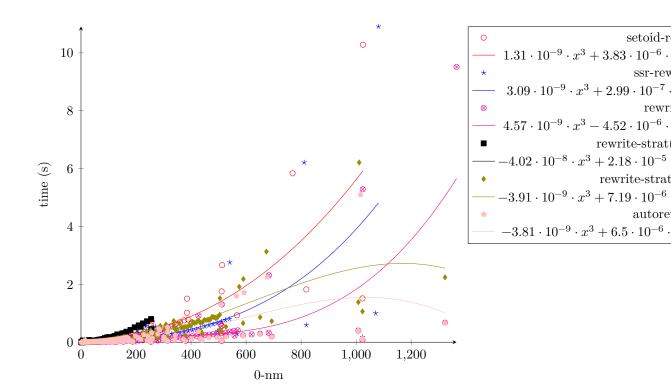
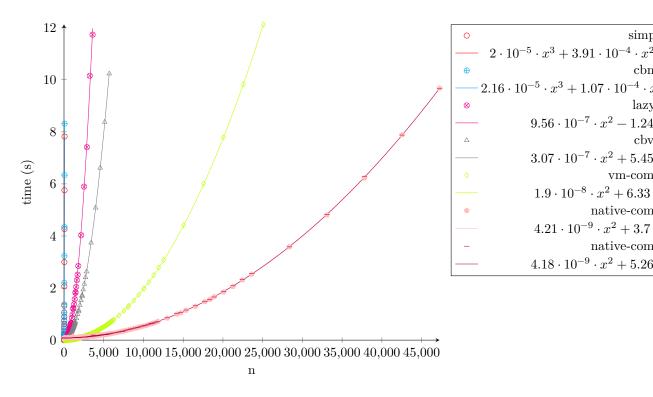


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



 $9.56 \cdot 10^{-7} \cdot x^2 - 1.24$

cbv $3.07 \cdot 10^{-7} \cdot x^2 + 5.45$

 $1.9 \cdot 10^{-8} \cdot x^2 + 6.33$

 $4.21\cdot 10^{-9}\cdot x^2 + 3.7$

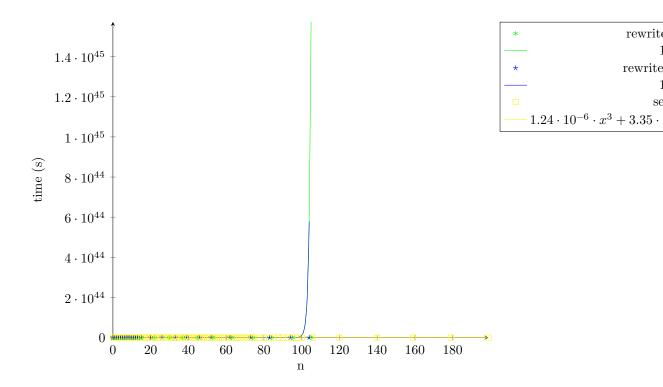
 $4.18 \cdot 10^{-9} \cdot x^2 + 5.26$

vm-com

native-com

native-com

Figure 17: timing-sieve-of-eratosthenes



rewrite

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

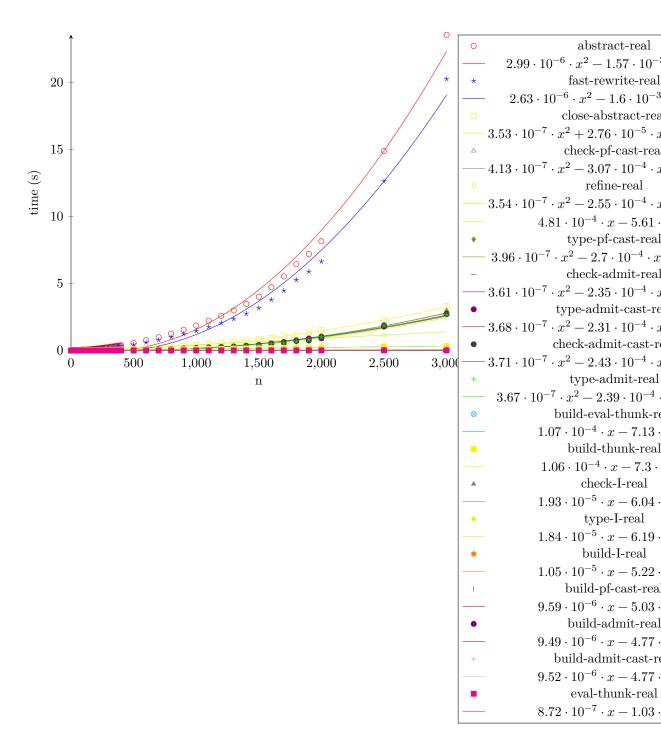


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2