

Figure 1: timing-pattern

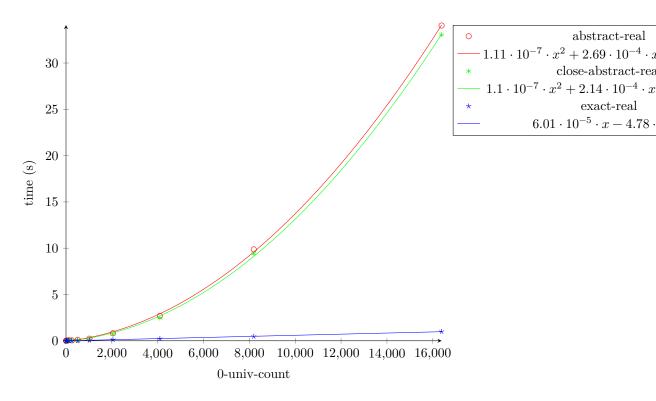
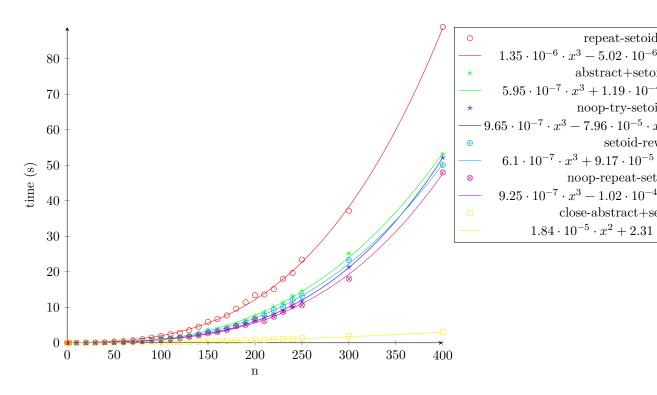
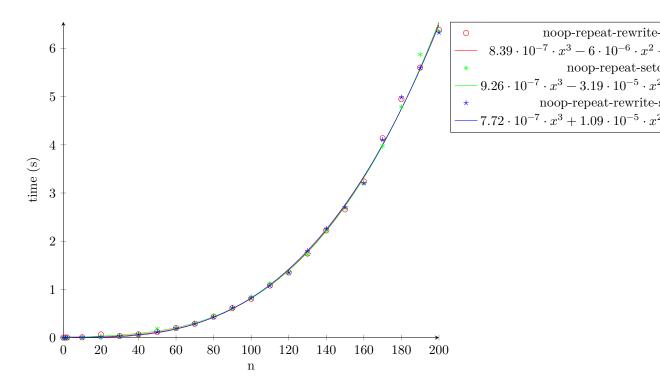


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$



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



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

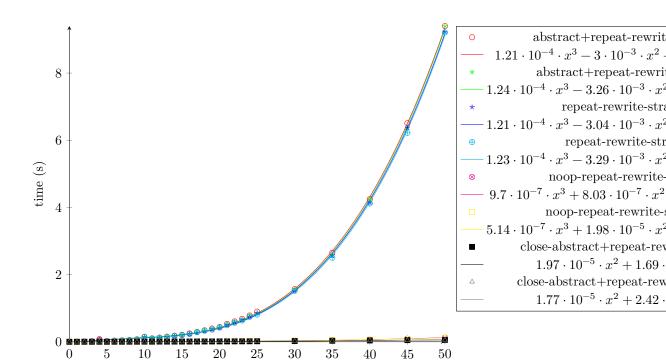
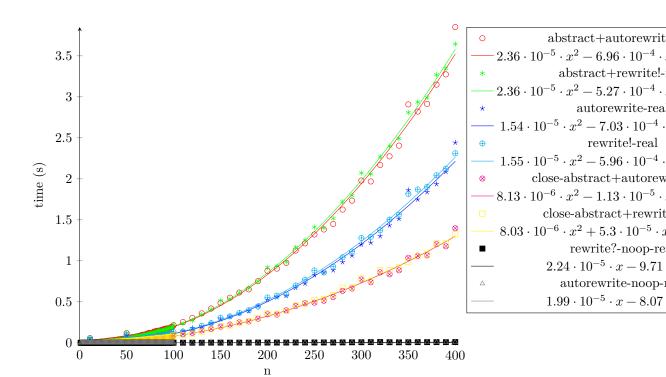


Figure 5: timing-rewrite-strat-under-binders

n



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

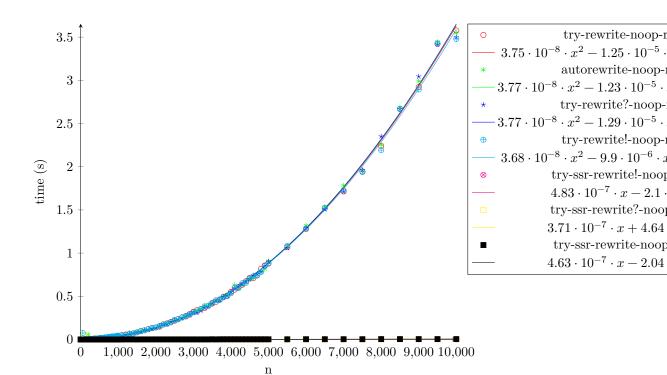


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

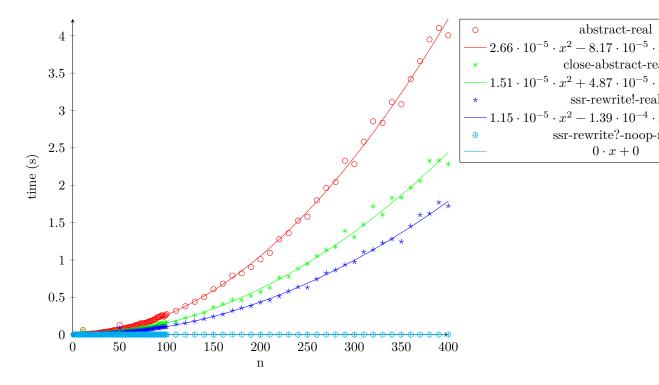
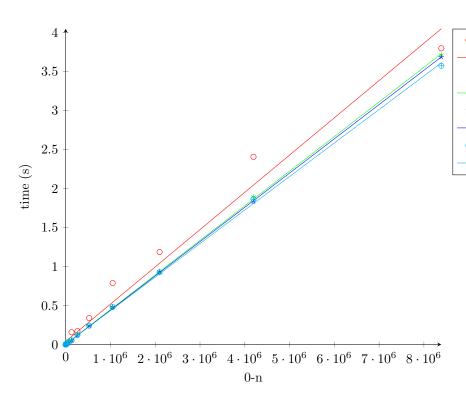


Figure 8: timing-rewrite-repeated-app-ssrrewrite



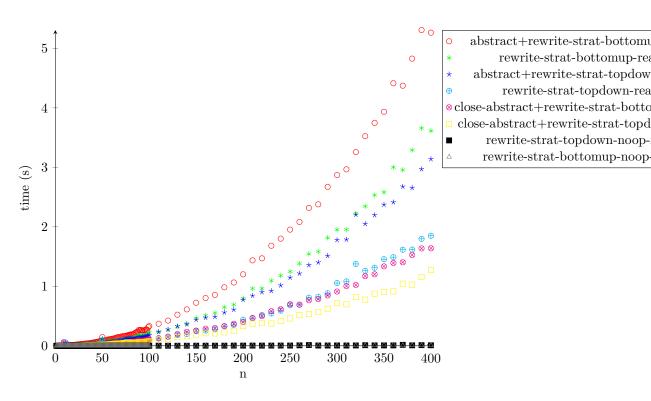
try-ssr-rewrite!-cold-noop-rea $4.78\cdot 10^{-7}\cdot x + 3.96\cdot 10^{-2}$ try-ssr-rewrite!-noop-real

 $4.44 \cdot 10^{-7} \cdot x + 3.13 \cdot 10^{-3}$ try-ssr-rewrite-noop-real

 $4.39 \cdot 10^{-7} \cdot x + 1.26 \cdot 10^{-3}$ try-ssr-rewrite?-noop-real

 $4.3 \cdot 10^{-7} \cdot x + 4.56 \cdot 10^{-3}$

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



rewrite-strat-bottomup-rea

rewrite-strat-topdown-rea

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

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

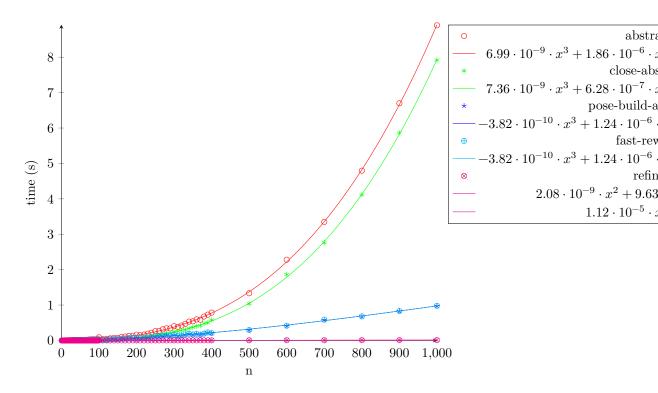


Figure 11: timing-rewrite-repeated-app-fast-rewrite

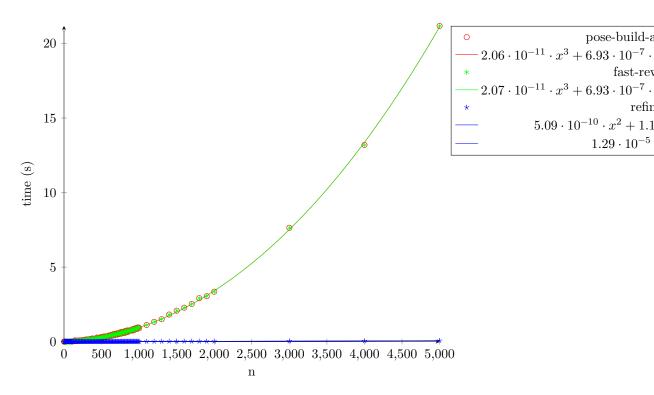


Figure 12: timing-rewrite-repeated-app-fast-rewrite-no-abstract

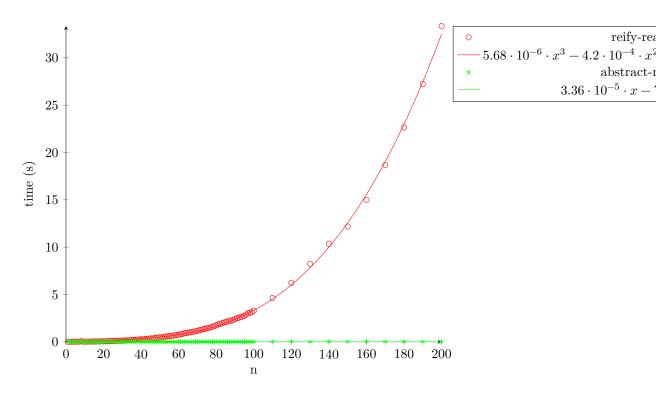


Figure 13: timing-typeclass-reification-let-in-HOAS

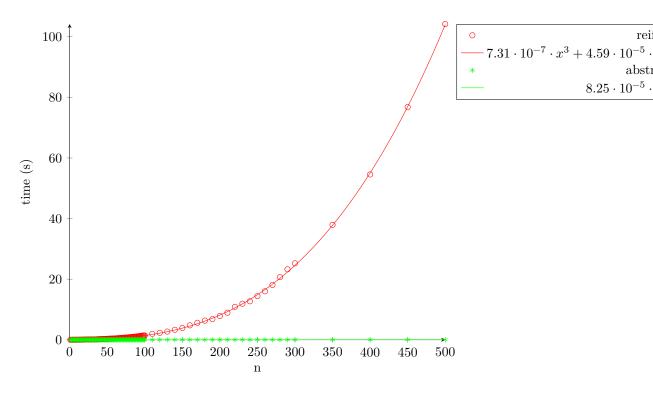


Figure 14: timing-typeclass-reification-let-in-PHOAS

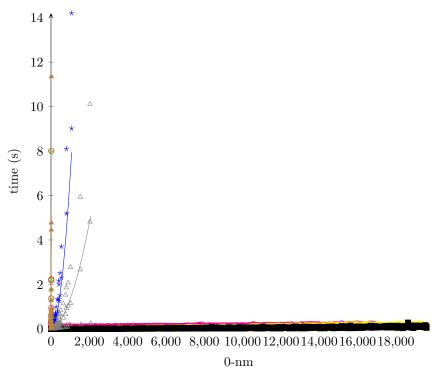


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

rewrite-strat(topdown-bot $2.74 \cdot 10^{-3} exp(0.5 \cdot (0.5))$ rewrite-strat(bottomup-bot $4.74 \cdot 10^{-3} exp(0.46 \cdot ($ cps+cbn-real $6.89 \cdot 10^{-6} \cdot x^2 - 4.93 \cdot 10^{-5} \cdot x^2 = 4.93 \cdot 10^{-5} \cdot x^2$ cps+vm-compute- $1.61 \cdot 10^{-10} \cdot x^2 + 5.73 \cdot 10^{-6} \cdot$ cps+native-compute $8.05\cdot 10^{-12}\cdot x^2 + 6.53\cdot 10^{-6}\cdot$ $\operatorname{cps+lazy-real}$ $2.02 \cdot 10^{-10} \cdot x^2 + 4.73 \cdot 10^{-6} \cdot$ cps+cbv-real $9.27 \cdot 10^{-11} \cdot x^2 + 3.56 \cdot 10^{-6} \cdot$ cps+simpl-real $1.03 \cdot 10^{-6} \cdot x^2 + 3.4 \cdot 10^{-4} \cdot x^2$ setoid-rewrite-re $-6.54 \cdot 10^{-3} \cdot x^3 + 0.21 \cdot x^2 -$

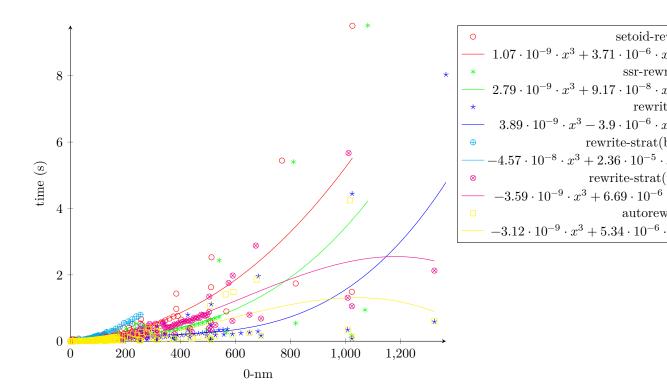
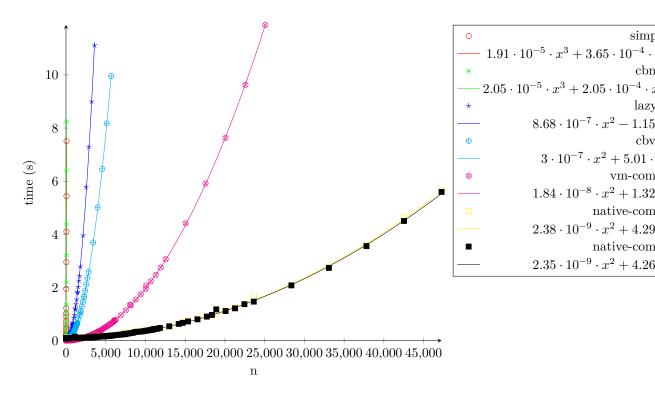


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

vm-com

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 $8.68 \cdot 10^{-7} \cdot x^2 - 1.15$

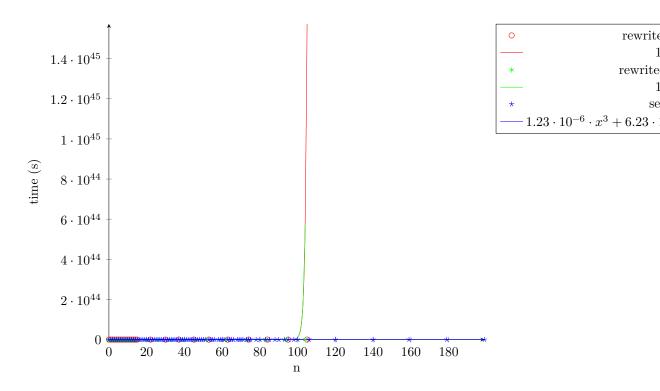
 $3 \cdot 10^{-7} \cdot x^2 + 5.01 \cdot$

 $1.84 \cdot 10^{-8} \cdot x^2 + 1.32$

 $2.38 \cdot 10^{-9} \cdot x^2 + 4.29$

 $2.35 \cdot 10^{-9} \cdot x^2 + 4.26$

Figure 17: timing-sieve-of-eratosthenes



rewrite

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

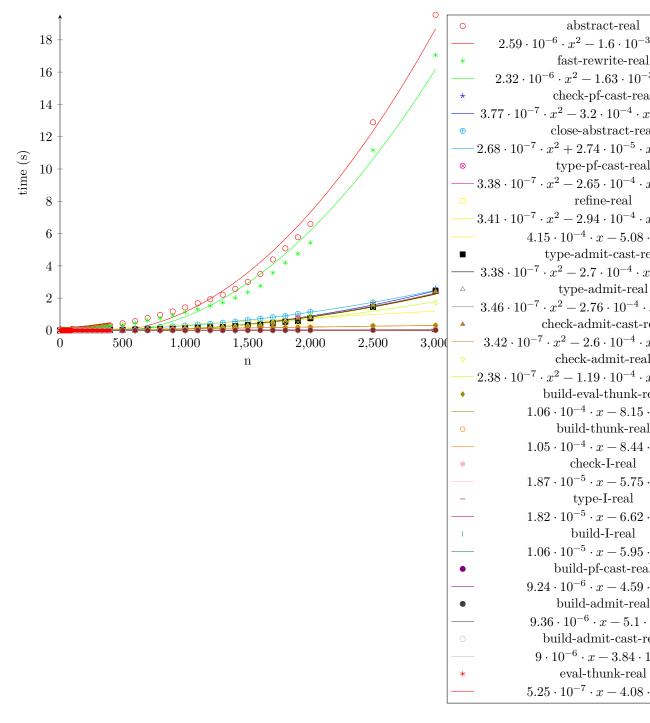


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2