

Figure 1: timing-pattern

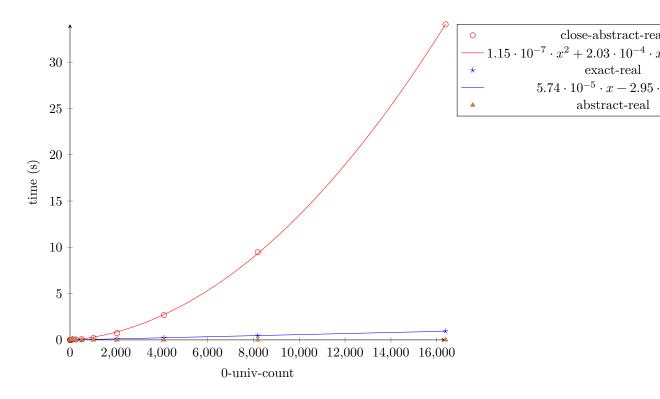


Figure 2: timing-n-polymorphic-universes param-1-n 0

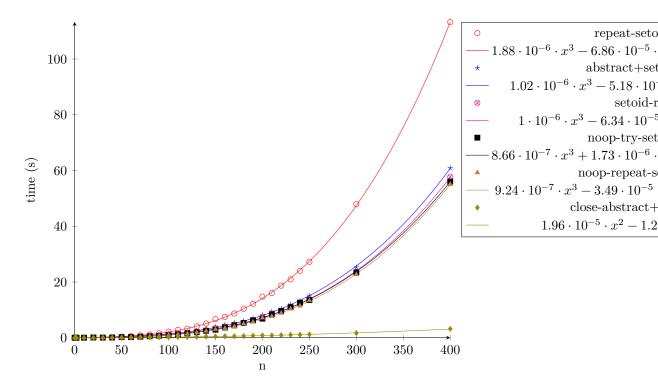


Figure 3: timing-repeat-setoid-rewrite-under-binders

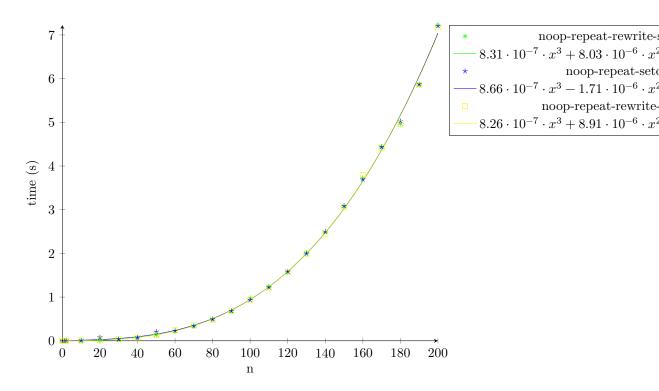
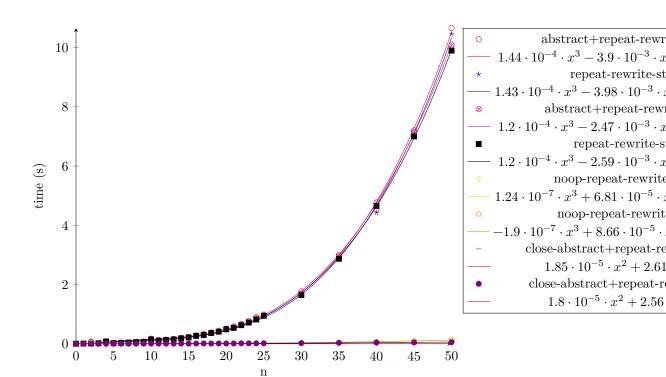
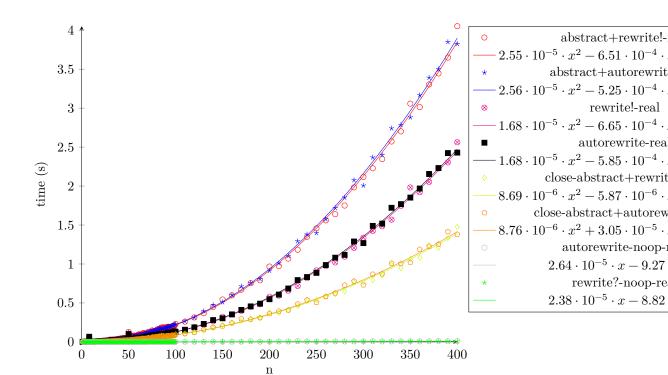


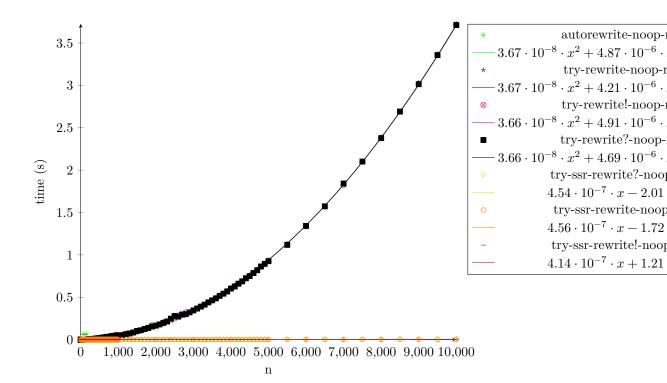
Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



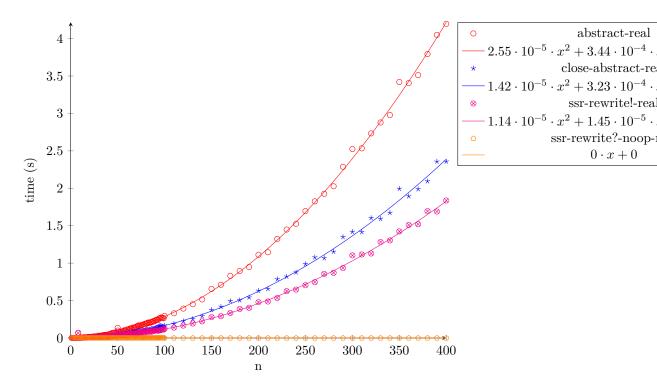
 $Figure\ 5:\ timing-rewrite-strat-under-binders$



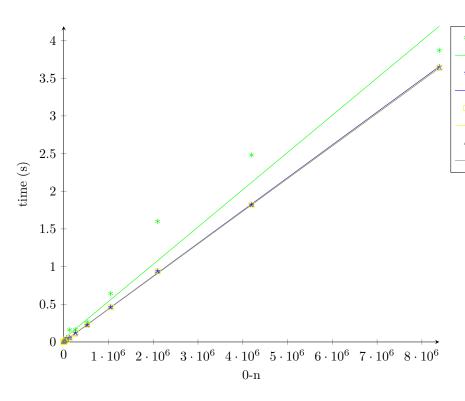
 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$



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



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



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

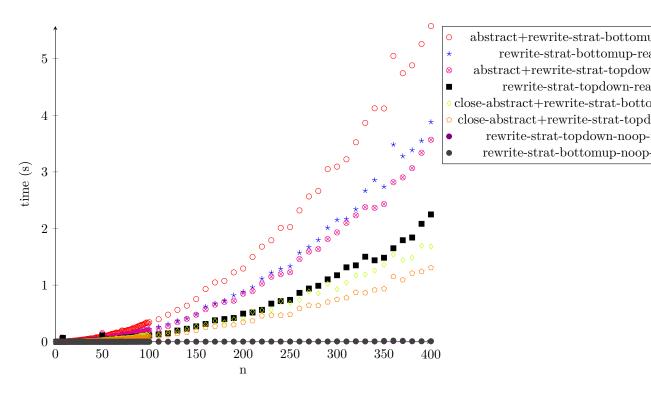
 $\begin{array}{l} 4.94 \cdot 10^{-7} \cdot x + 4.28 \cdot 10^{-2} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$

 $\begin{array}{l} 4.36\cdot 10^{-7}\cdot x + 2.55\cdot 10^{-3}\\ \text{try-ssr-rewrite?-noop-real} \end{array}$

 $\begin{array}{l} 4.34 \cdot 10^{-7} \cdot x + 6.85 \cdot 10^{-4} \\ \text{try-ssr-rewrite-noop-real} \end{array}$

 $4.33\cdot 10^{-7}\cdot x + 1.19\cdot 10^{-4}$

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

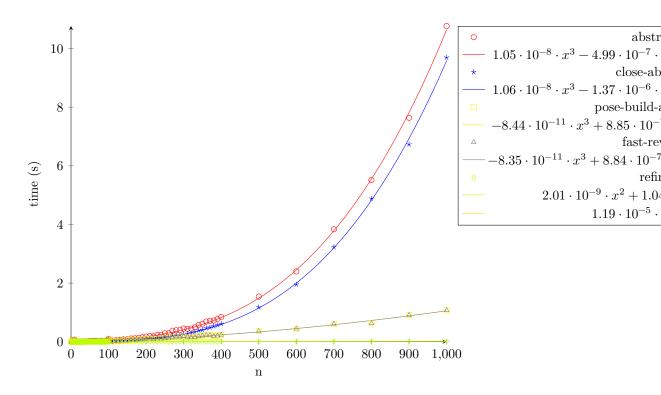


rewrite-strat-bottomup-real

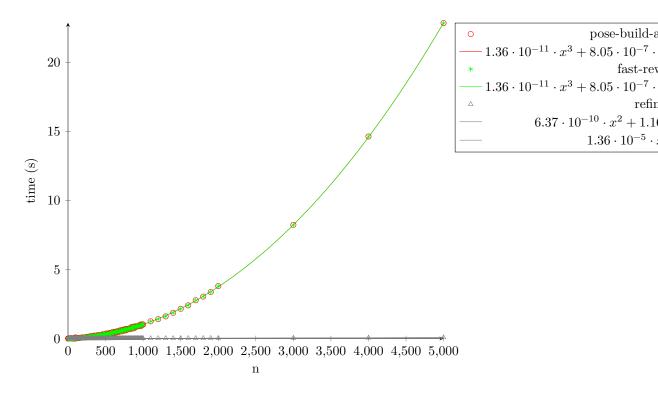
abstract + rewrite - strat - topdowrewrite-strat-topdown-rea

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

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



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



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

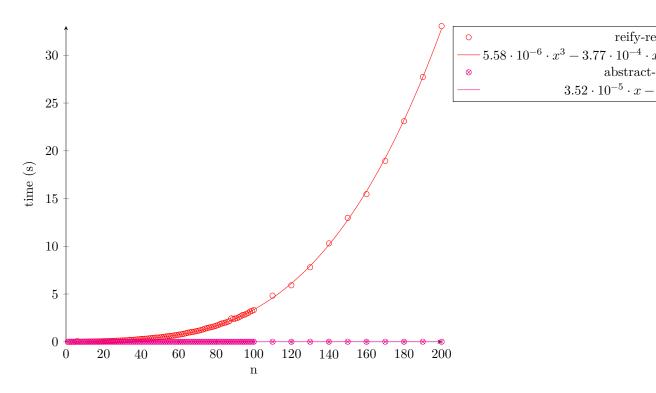
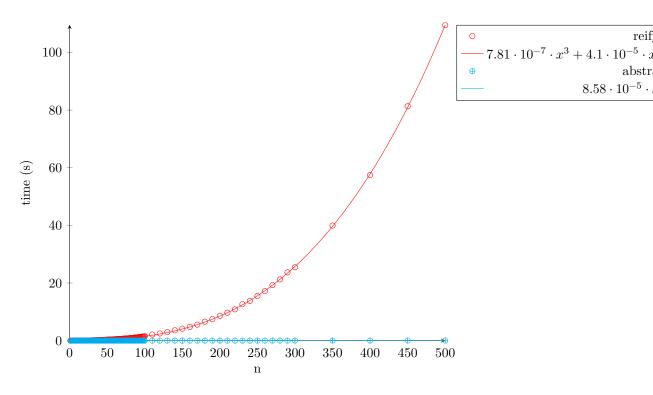
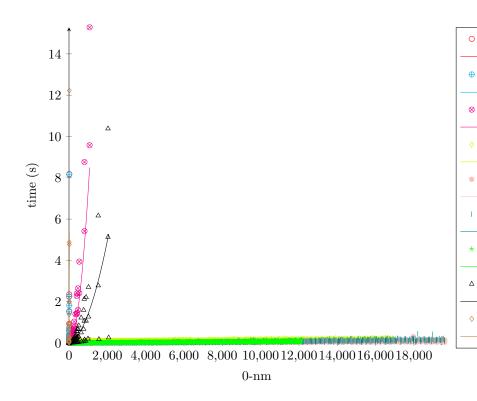


Figure 13: timing-typeclass-reification-let-in-HOAS



 ${\bf Figure~14:~timing-type class-reification-let-in-PHOAS}$



rewrite-strat (top down-bot

 $7.39 \cdot 10^{-6} \cdot x^2 - 6.65 \cdot 10^{-5} \cdot$

 $3.56\cdot 10^{-11}\cdot x^2 + 6.22\cdot 10^{-6}\cdot \\$

 $7.93 \cdot 10^{-11} \cdot x^2 + 4 \cdot 10^{-6} \cdot x$

 $1.75 \cdot 10^{-10} \cdot x^2 + 5.41 \cdot 10^{-6}$

 $1.39 \cdot 10^{-10} \cdot x^2 + 4.93 \cdot 10^{-6} \cdot$

 $1.05 \cdot 10^{-6} \cdot x^2 + 3.78 \cdot 10^{-4} \cdot x^2 + 3.78 \cdot 10^{-4}$

 $-7.1 \cdot 10^{-3} \cdot x^3 + 0.23 \cdot x^2 -$

 $5.97\cdot 10^{-3}\exp{(0.45\cdot ($ rewrite-strat(bottomup-bot $3.04\cdot 10^{-3}\exp{(0.49\cdot (}$

cps+cbn-real

cps+cbv-real

cps+lazy-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

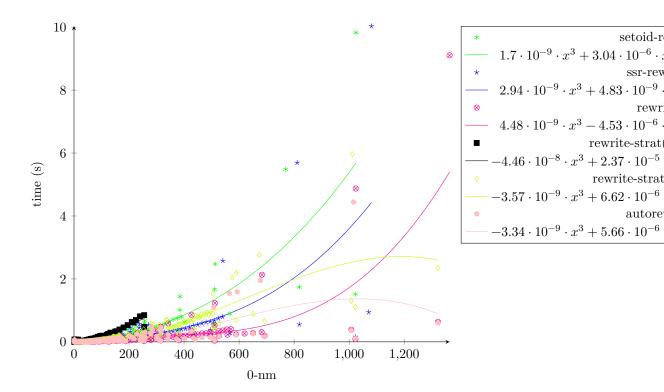
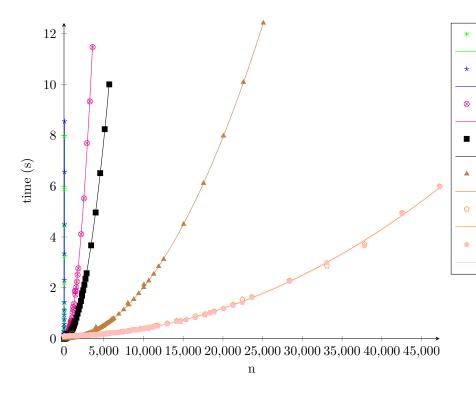


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

lazy

vm-com

native-com $2.53 \cdot 10^{-9} \cdot x^2 + 3$

native-com $2.55 \cdot 10^{-9} \cdot x^2 + 2$

 $1.67 \cdot 10^{-5} \cdot x^3 + 6.85 \cdot 10^{-4} \cdot x^3$

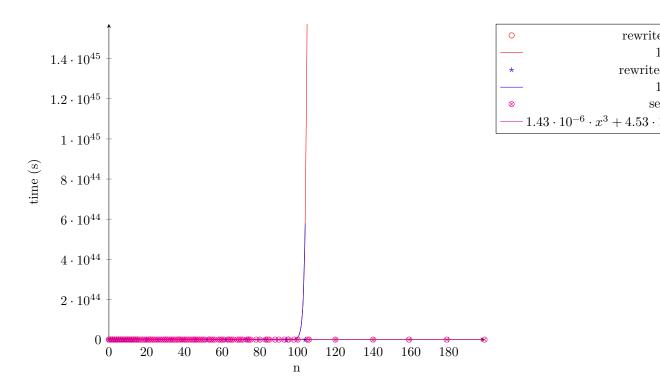
 $2.18 \cdot 10^{-5} \cdot x^3 + 1.35 \cdot 10^{-4} \cdot x^3$

 $9.06 \cdot 10^{-7} \cdot x^2 - 4.8$

 $2.99 \cdot 10^{-7} \cdot x^2 + 6.17$

 $1.95 \cdot 10^{-8} \cdot x^2 + 6.41$

Figure 17: timing-sieve-of-eratosthenes



rewrite

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