

Figure 1: timing-pattern

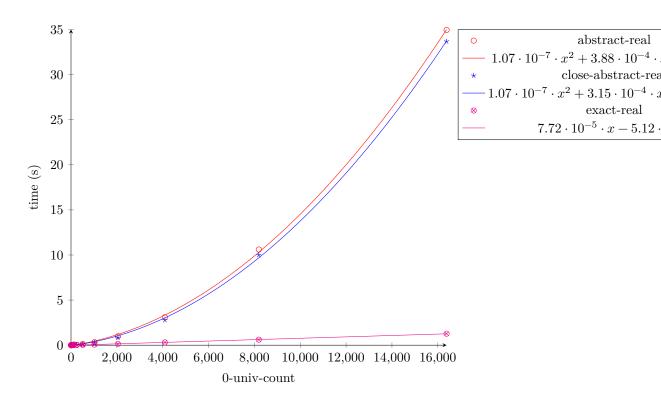
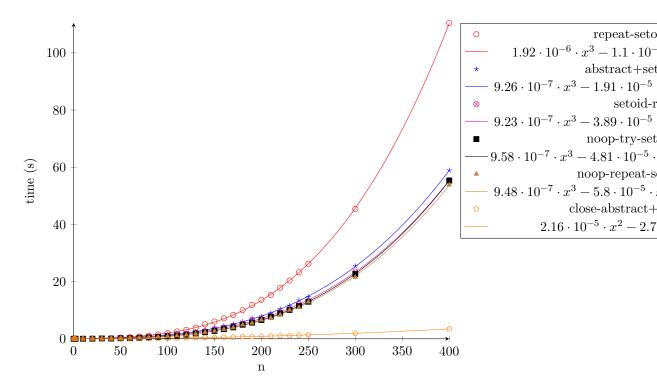


Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



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

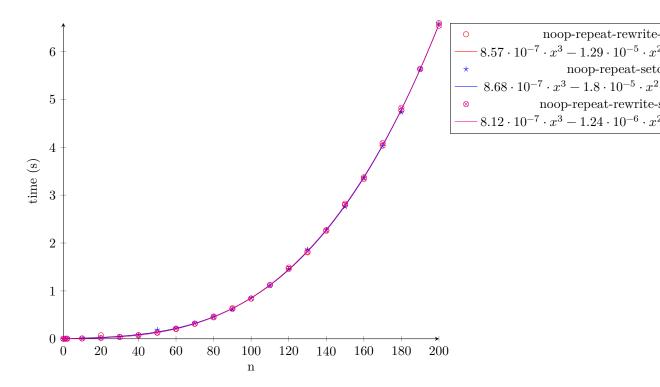
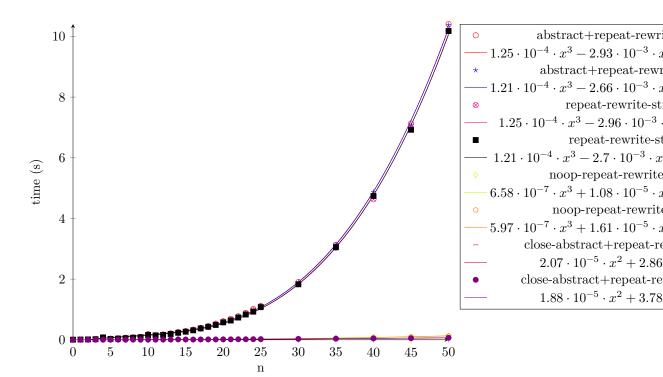
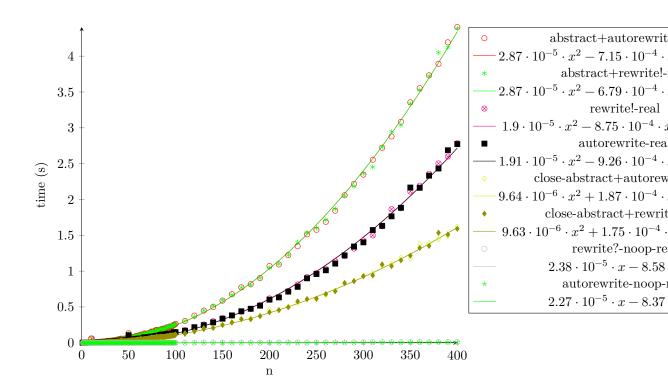


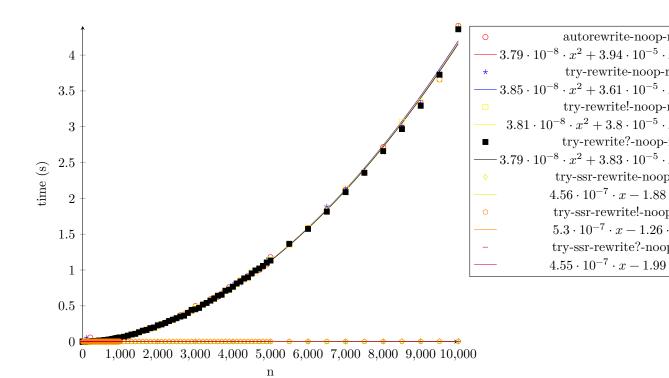
Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



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



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



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

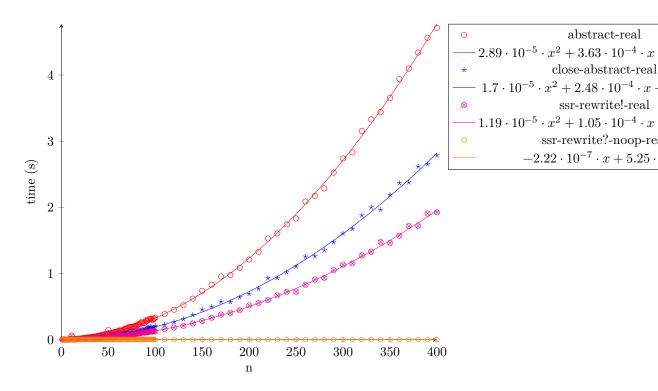
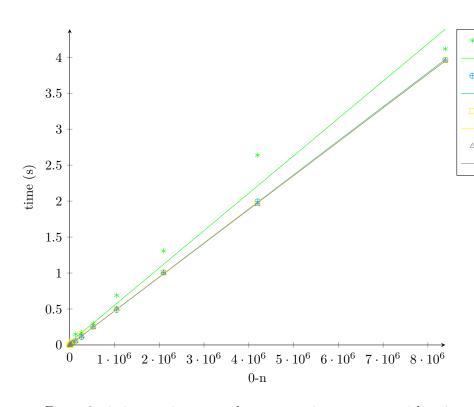


Figure 8: timing-rewrite-repeated-app-ssrrewrite



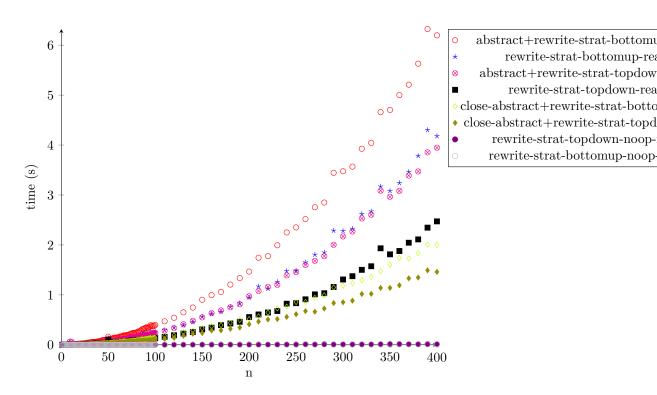
try-ssr-rewrite!-cold-noop-rea  $5.2 \cdot 10^{-7} \cdot x + 3.19 \cdot 10^{-2}$ 

try-ssr-rewrite?-noop-real  $4.73\cdot 10^{-7}\cdot x - 4.06\cdot 10^{-4}$ 

try-ssr-rewrite!-noop-real  $4.72\cdot 10^{-7}\cdot x + 2.68\cdot 10^{-3}$ 

 $\begin{array}{l} \text{try-ssr-rewrite-noop-real} \\ 4.71 \cdot 10^{-7} \cdot x - 5.36 \cdot 10^{-4} \end{array}$ 

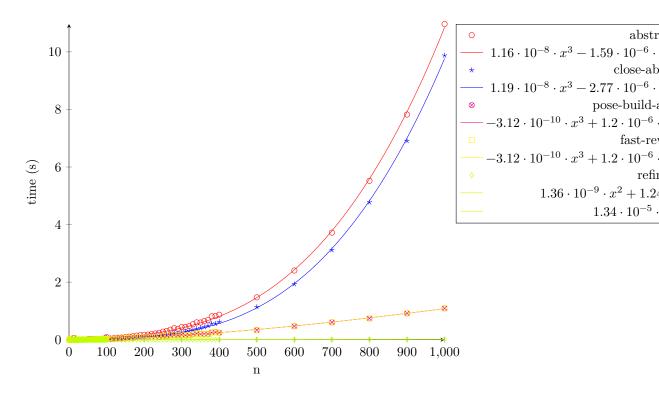
Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\ 1$ 



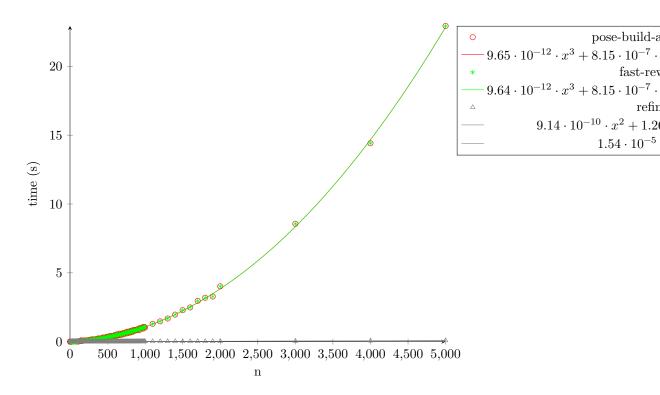
rewrite-strat-bottomup-rea

rewrite-strat-topdown-rea

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



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



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

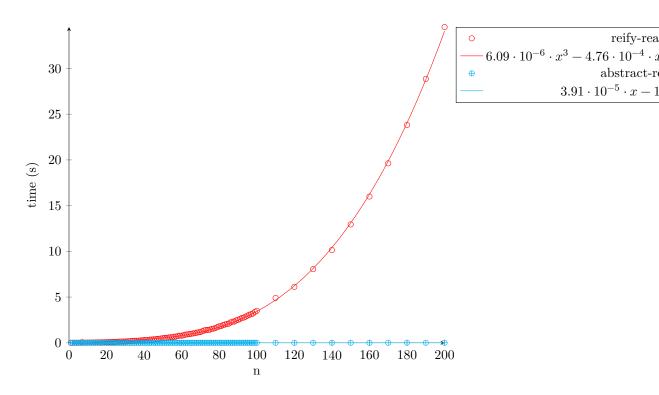


Figure 13: timing-typeclass-reification-let-in-HOAS

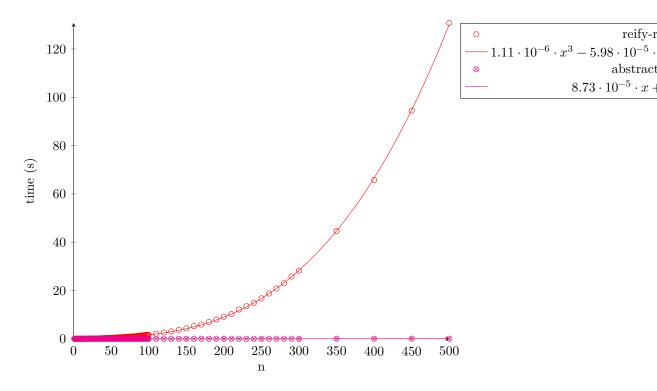
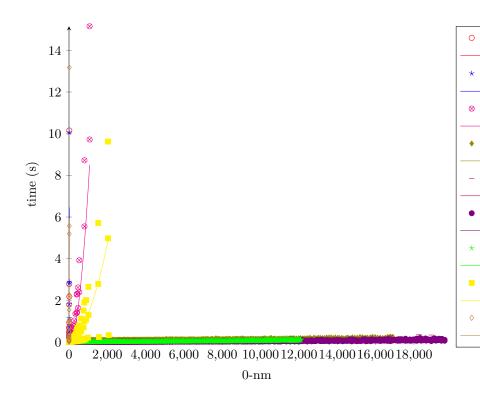


Figure 14: timing-typeclass-reification-let-in-PHOAS



rewrite-strat(bottomup-bot

 $7.4 \cdot 10^{-6} \cdot x^2 - 7.06 \cdot 10^{-5} \cdot x^2$ 

 $1.13 \cdot 10^{-10} \cdot x^2 + 5.03 \cdot 10^{-6} \cdot$ 

 $2.44 \cdot 10^{-10} \cdot x^2 + 4.16 \cdot 10^{-6}$ 

 $1.16\cdot 10^{-10}\cdot x^2 + 3.33\cdot 10^{-6}\cdot \\$ 

 $2.17 \cdot 10^{-10} \cdot x^2 + 5.46 \cdot 10^{-6} \cdot$ 

 $9.79 \cdot 10^{-7} \cdot x^2 + 3.97 \cdot 10^{-4} \cdot x^2$ 

 $-7.7 \cdot 10^{-3} \cdot x^3 + 0.25 \cdot x^2 -$ 

 $6.38\cdot 10^{-3}\exp{(0.46\cdot (}$  rewrite-strat(top down-bot  $7.02\cdot 10^{-3}\exp{(0.45\cdot (}$ 

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

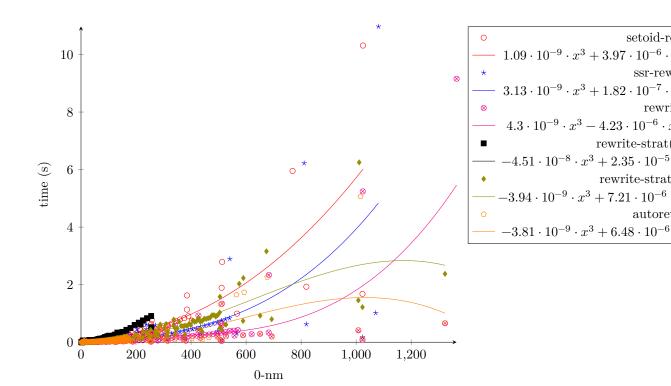
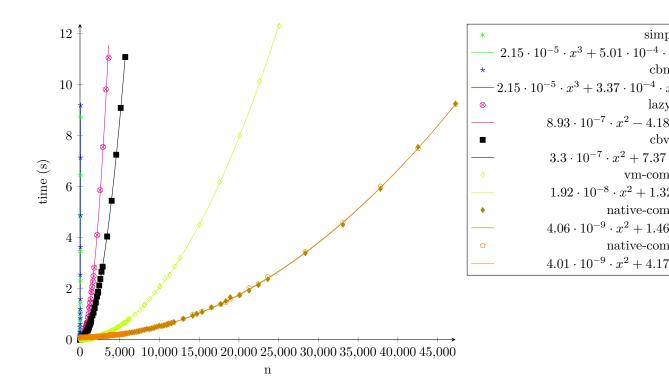


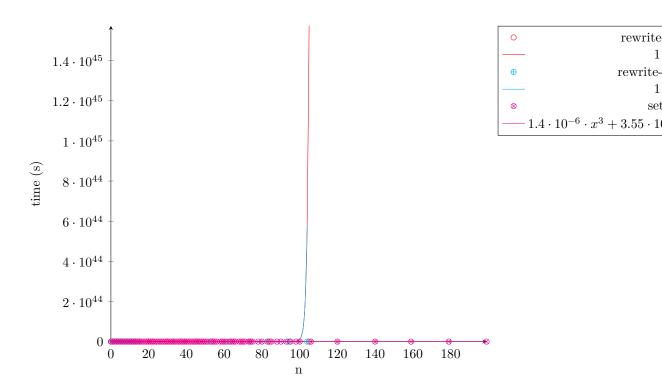
Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



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 $Figure\ 17:\ timing\mbox{-sieve-of-eratos} thenes$ 



rewrite

rewrite-

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

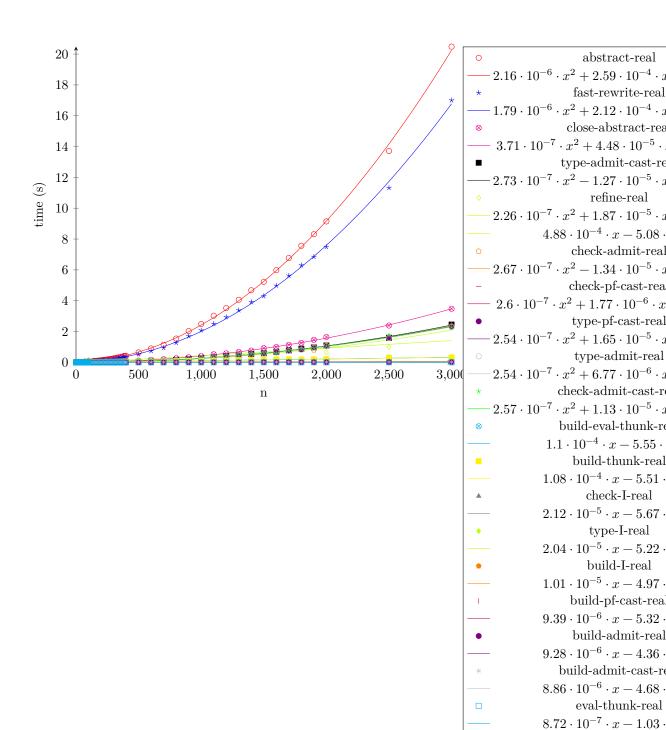


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2