

Figure 1: timing-pattern

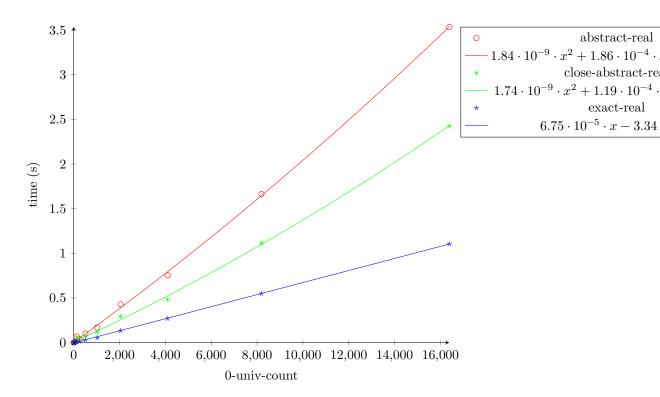
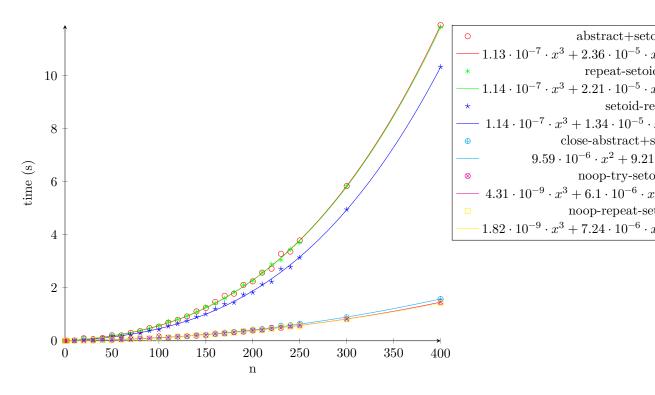
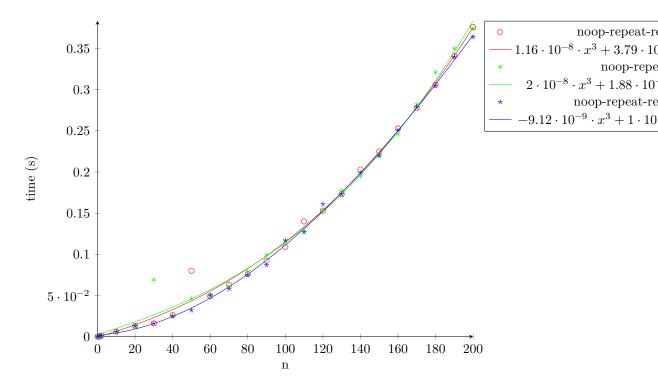


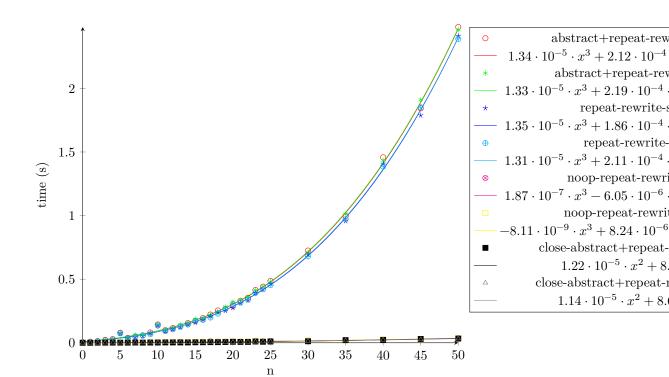
Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



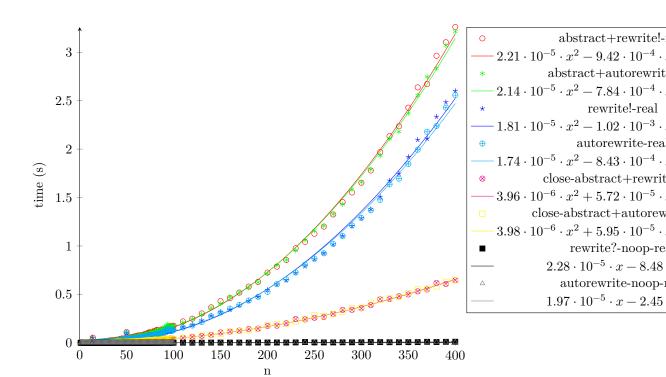
 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$ 



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



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



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

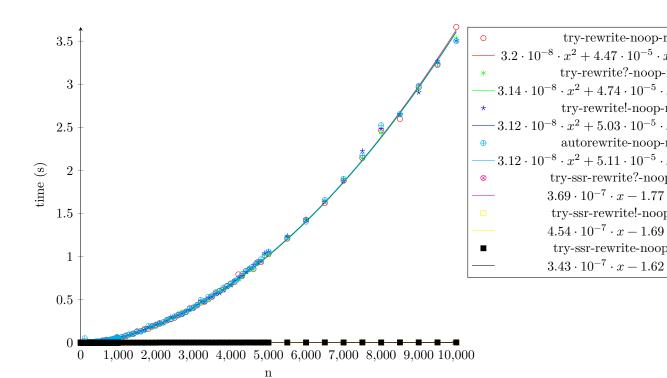
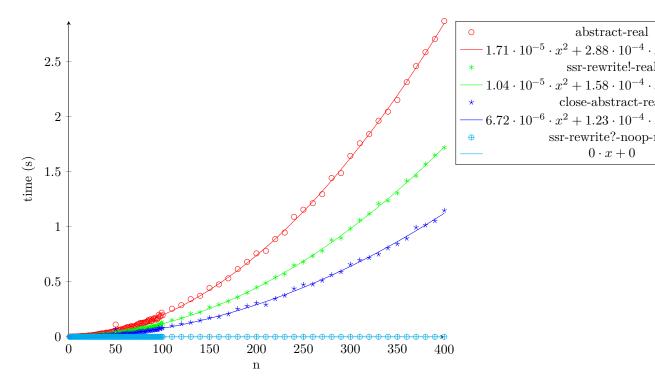
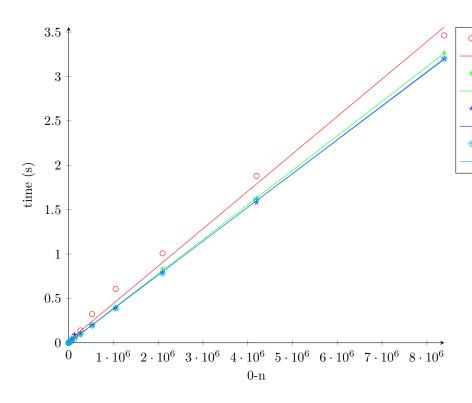


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

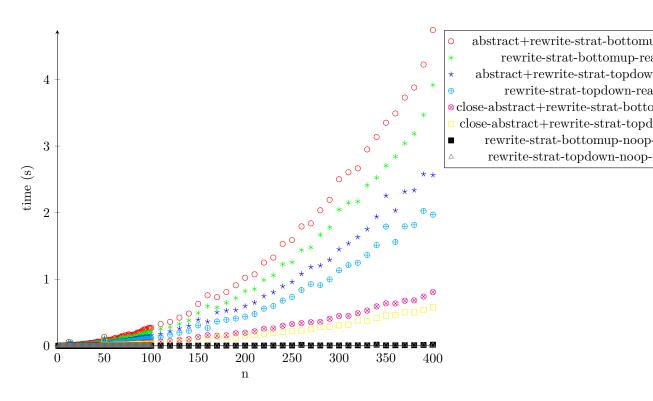


try-ssr-rewrite!-cold-noop-rea  $4.21 \cdot 10^{-7} \cdot x + 2.13 \cdot 10^{-2}$ try-ssr-rewrite-noop-real

 $\begin{array}{l} 3.89 \cdot 10^{-7} \cdot x - 2.12 \cdot 10^{-3} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$ 

 $\begin{aligned} &3.8\cdot 10^{-7}\cdot x + 2.97\cdot 10^{-3}\\ &\text{try-ssr-rewrite?-noop-real}\\ &3.82\cdot 10^{-7}\cdot x - 1.55\cdot 10^{-3} \end{aligned}$ 

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



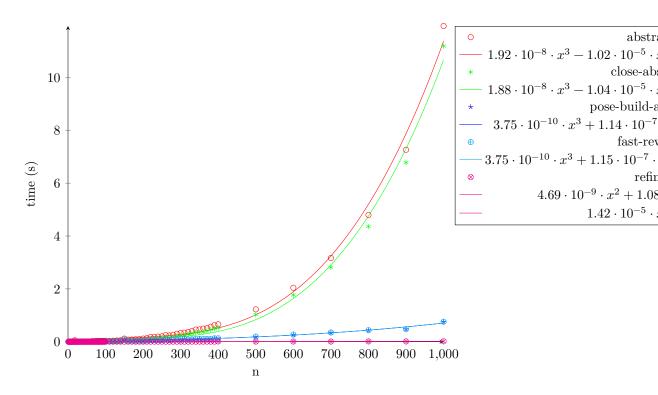
rewrite-strat-bottomup-rea abstract + rewrite - strat - topdow

rewrite-strat-topdown-rea

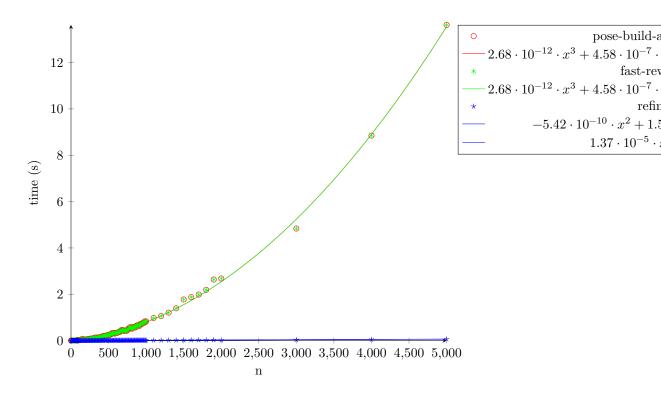
rewrite-strat-bottomup-noop-

rewrite-strat-topdown-noop-

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



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



 $Figure~12:~timing\mbox{-rewrite-repeated-app-fast-rewrite-no-abstract}$ 

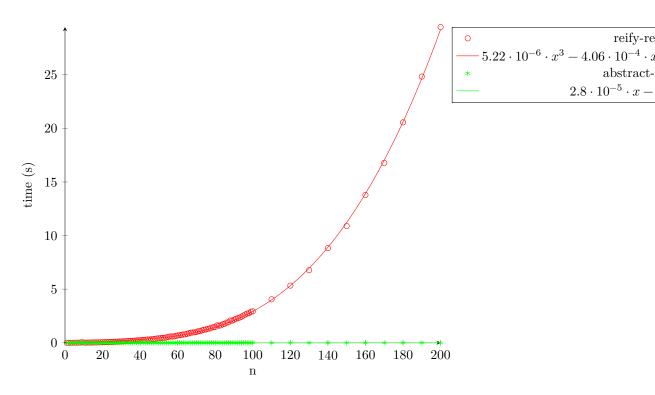
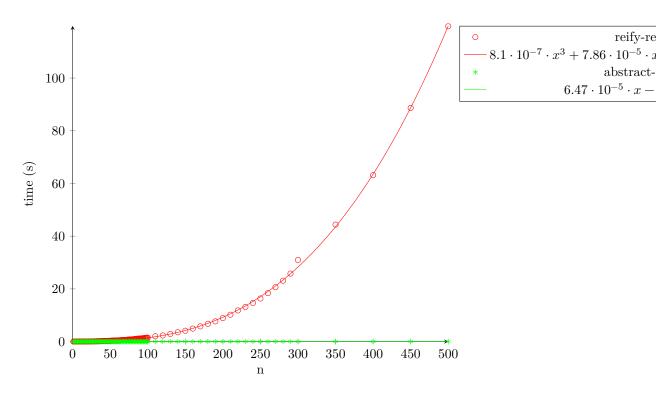


Figure 13: timing-typeclass-reification-let-in-HOAS



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

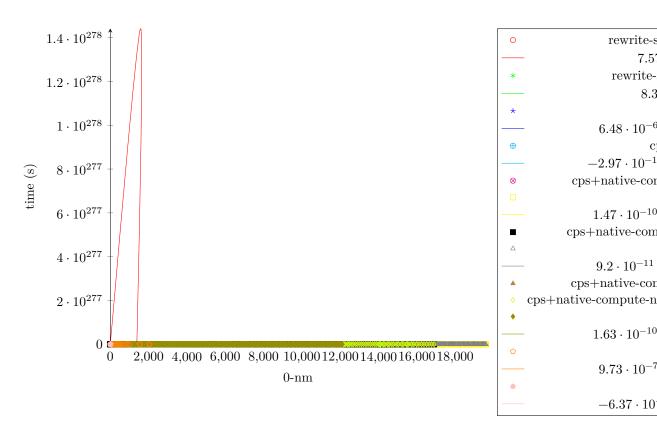


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

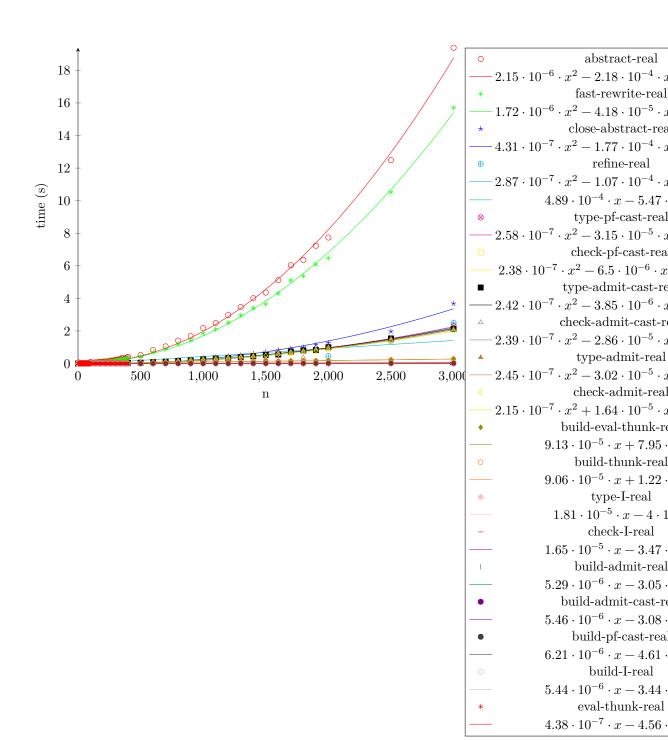


Figure 16: timing-rewrite-repeated-app-fast-rewrite-ltac2