

Figure 1: timing-pattern

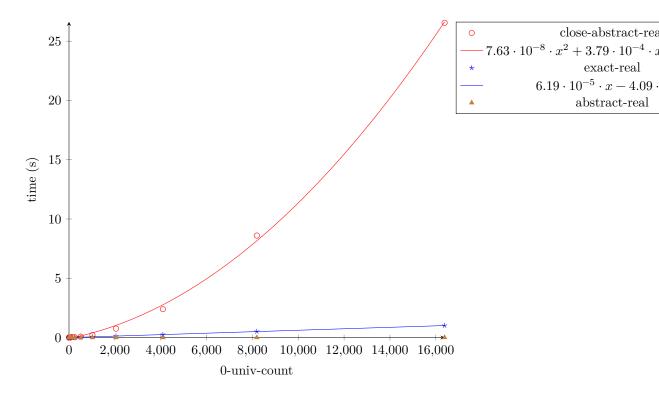
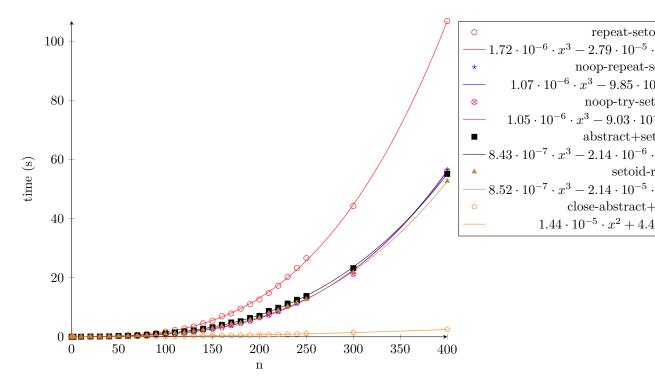
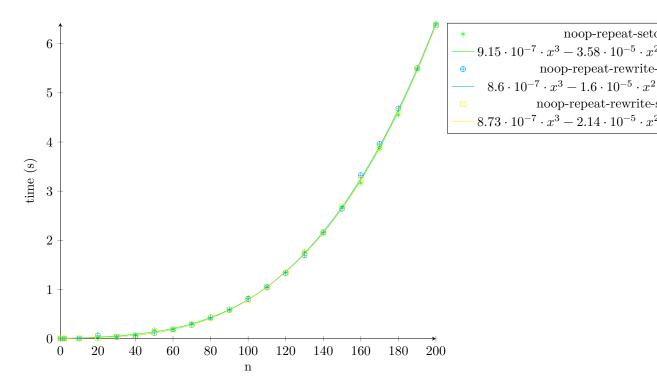


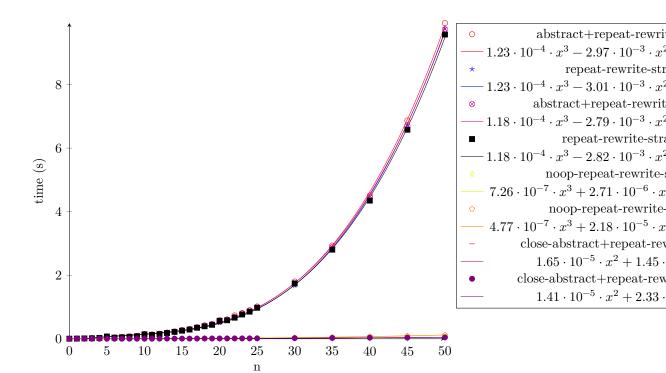
Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



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



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



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

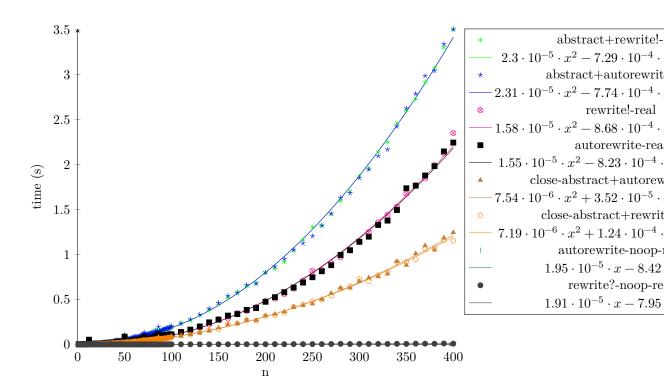


Figure 6: timing-rewrite-repeated-app-autorewrite

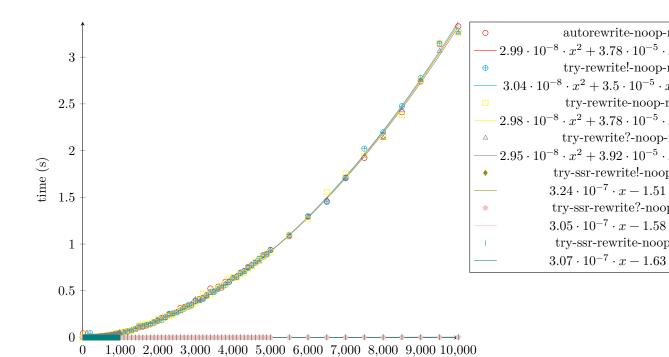
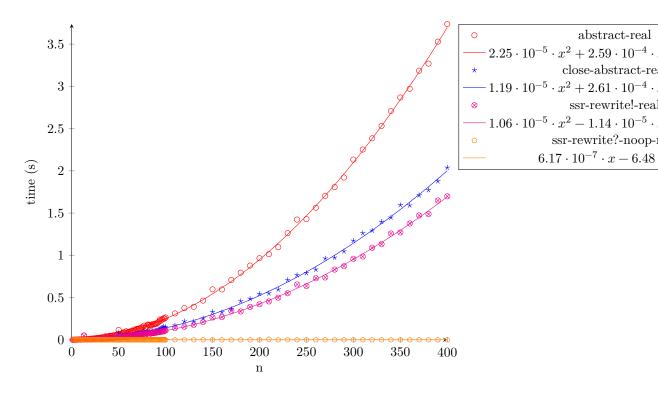
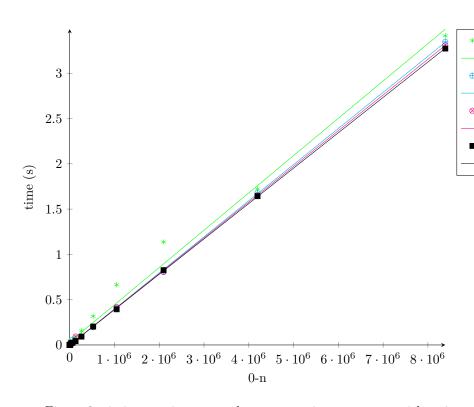


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

n



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

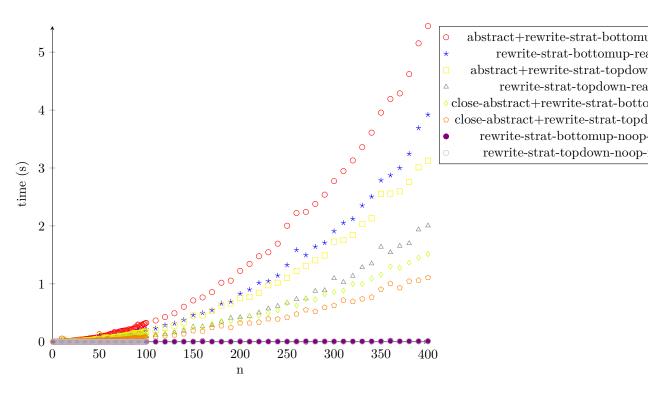


try-ssr-rewrite!-cold-noop-rea $4.12\cdot 10^{-7}\cdot x + 3.19\cdot 10^{-2}$ 

 $\begin{array}{l} \text{try-ssr-rewrite-noop-real} \\ 3.99 \cdot 10^{-7} \cdot x - 1.81 \cdot 10^{-3} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$ 

 $\begin{array}{l} 3.94 \cdot 10^{-7} \cdot x + 1.08 \cdot 10^{-4} \\ \text{try-ssr-rewrite?-noop-real} \\ 3.91 \cdot 10^{-7} \cdot x - 1.01 \cdot 10^{-3} \end{array}$ 

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

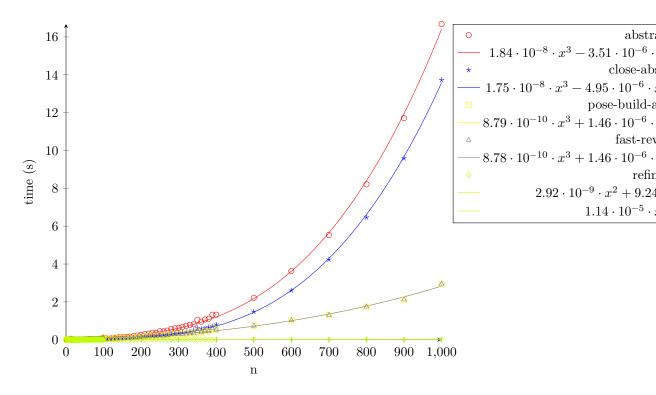


 $abstract + rewrite - strat - bottom \\ u$ 

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

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

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



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

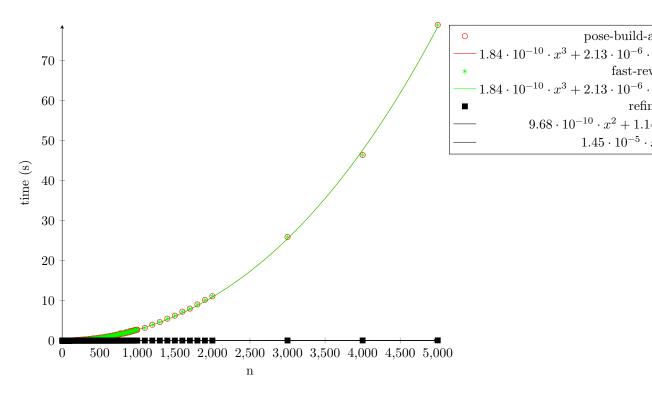


Figure 12: timing-rewrite-repeated-app-fast-rewrite-no-abstract

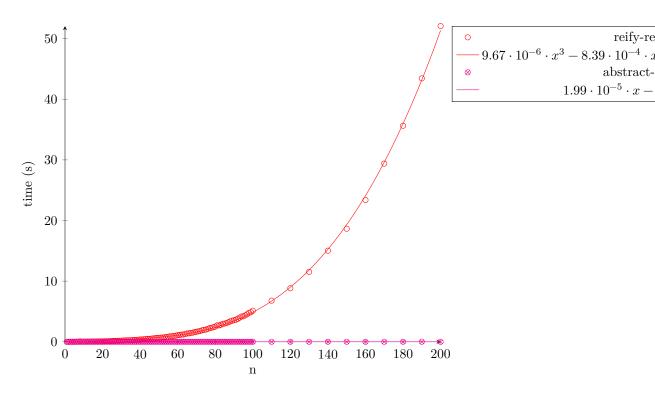
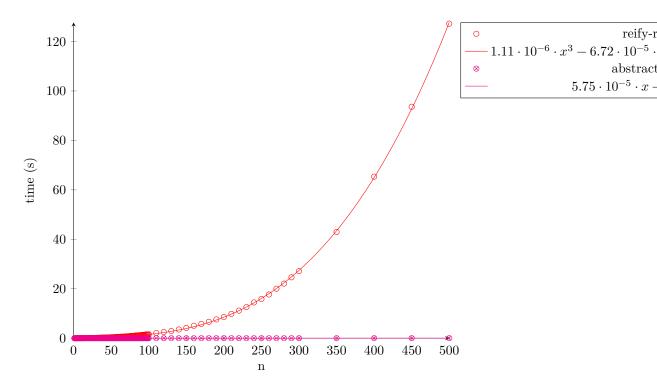


Figure 13: timing-typeclass-reification-let-in-HOAS



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