

Figure 1: timing-pattern

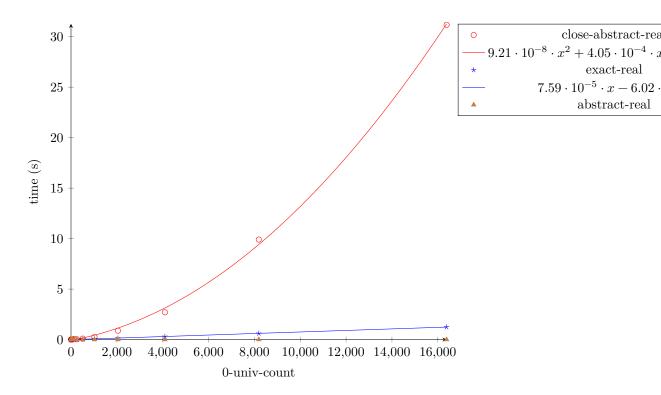
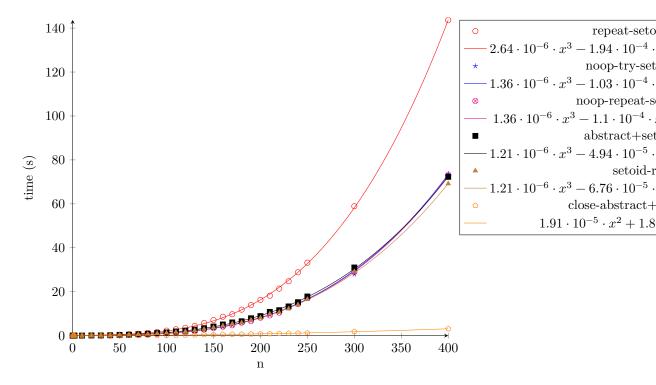
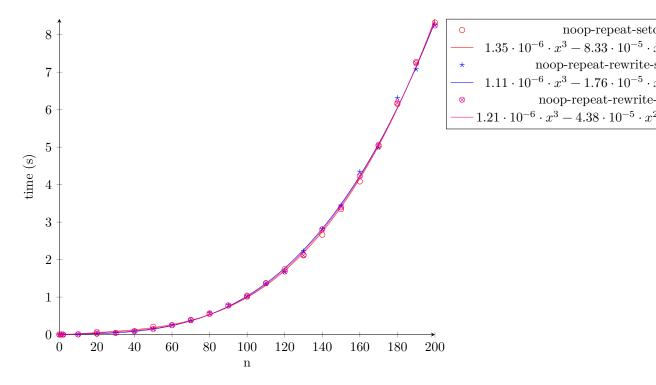


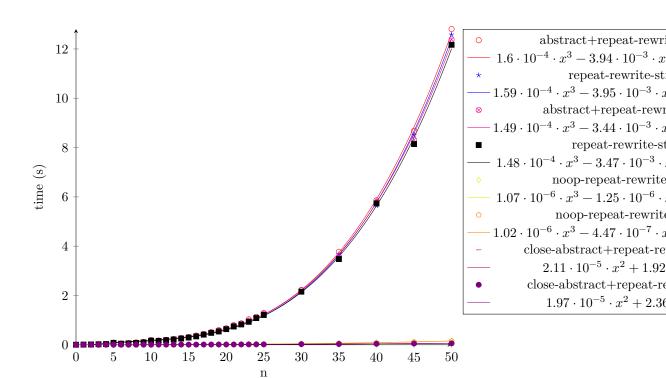
Figure 2: timing-n-polymorphic-universes param-1-n  $\,0\,$ 



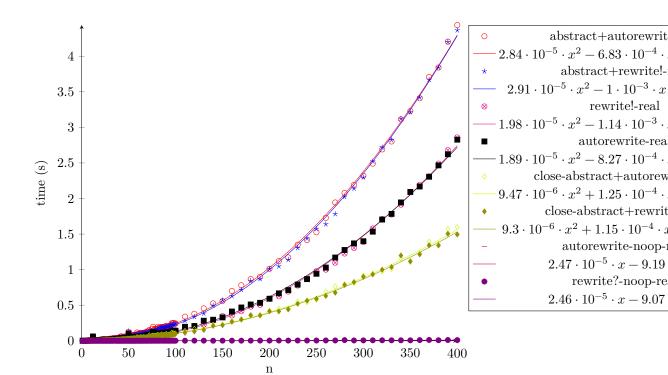
 $Figure \ 3: \ timing-repeat-setoid-rewrite-under-binders$ 



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



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



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

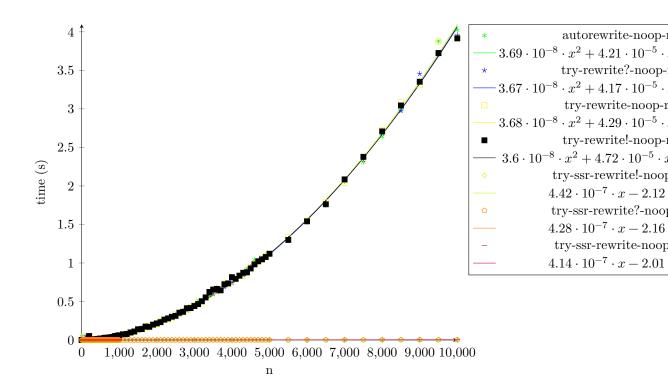
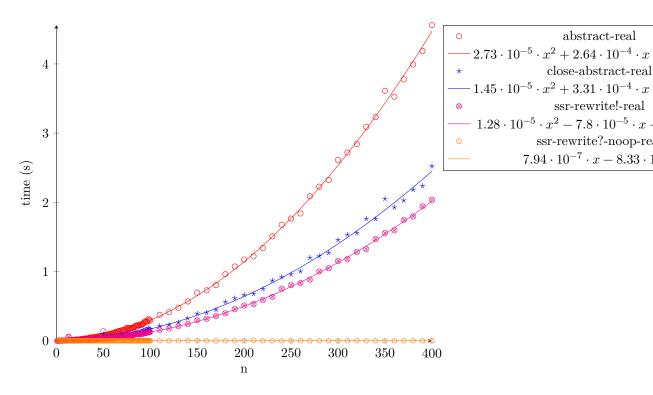
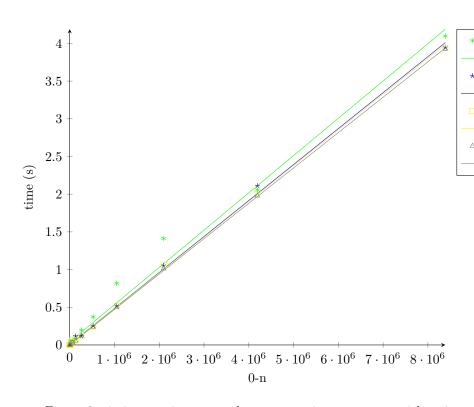


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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



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

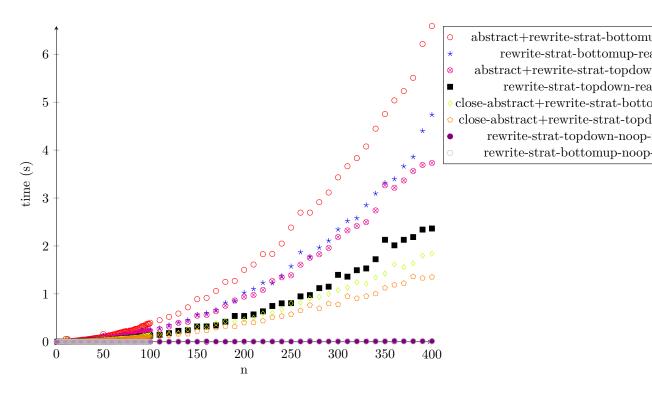
 $\begin{array}{l} 4.94 \cdot 10^{-7} \cdot x + 4.01 \cdot 10^{-2} \\ \text{try-ssr-rewrite!-noop-real} \end{array}$ 

 $4.77 \cdot 10^{-7} \cdot x + 7.57 \cdot 10^{-3}$  try-ssr-rewrite-noop-real

 $\begin{array}{l} 4.74\cdot 10^{-7}\cdot x + 5.75\cdot 10^{-3} \\ \text{try-ssr-rewrite?-noop-real} \end{array}$ 

 $4.69 \cdot 10^{-7} \cdot x + 1.37 \cdot 10^{-3}$ 

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



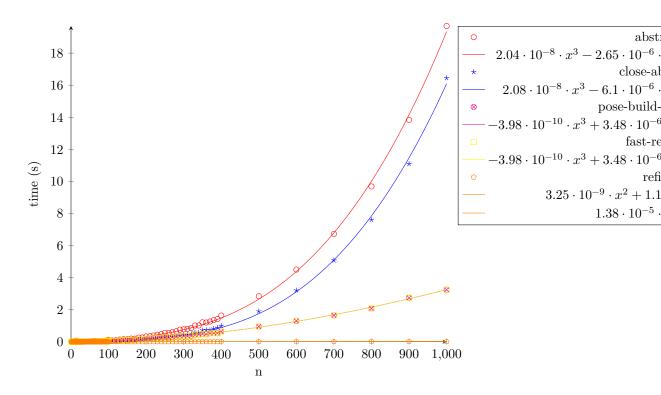
rewrite-strat-bottomup-rea

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

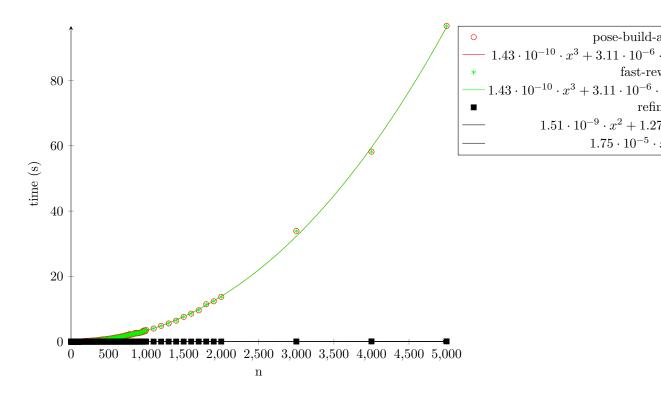
rewrite-strat-topdown-noop-

rewrite-strat-bottomup-noop-

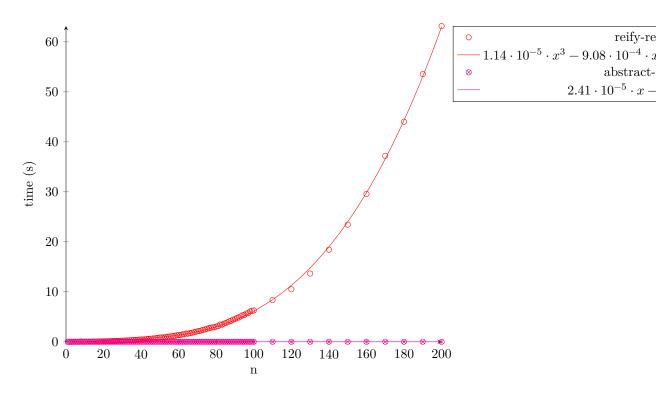
 $Figure~10:~timing\mbox{-rewrite-repeated-app-rewrite-strat}$ 



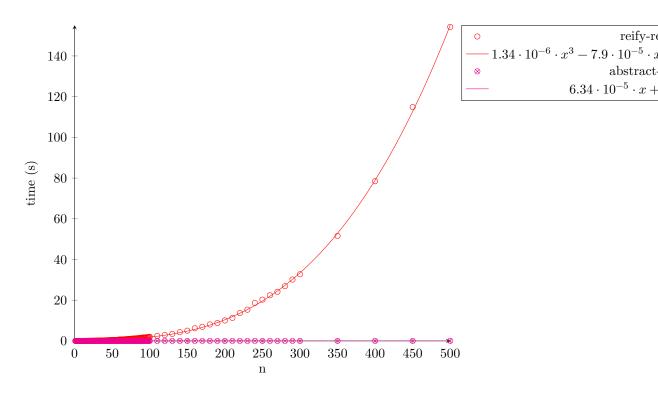
 $Figure~11:~timing\mbox{-rewrite-repeated-app-fast-rewrite}$ 



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



 ${\bf Figure~13:~timing-type class-reification-let-in-HOAS}$ 



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