

Figure 1: timing-pattern

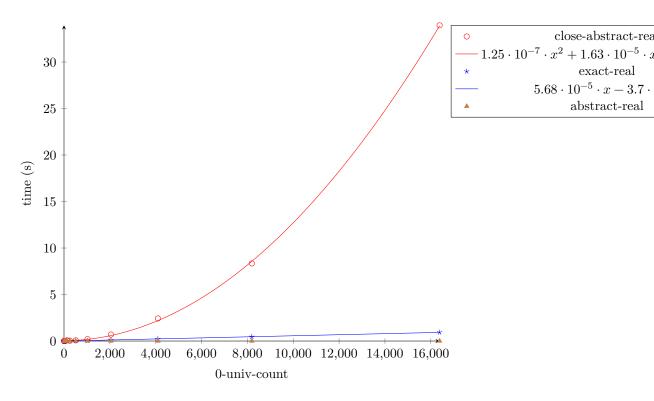


Figure 2: timing-n-polymorphic-universes param-1-n 0

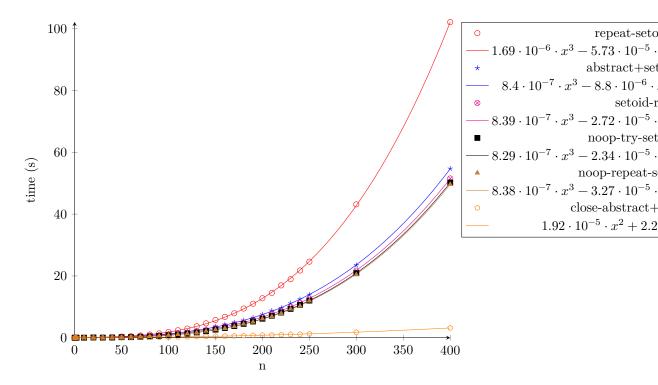


Figure 3: timing-repeat-setoid-rewrite-under-binders

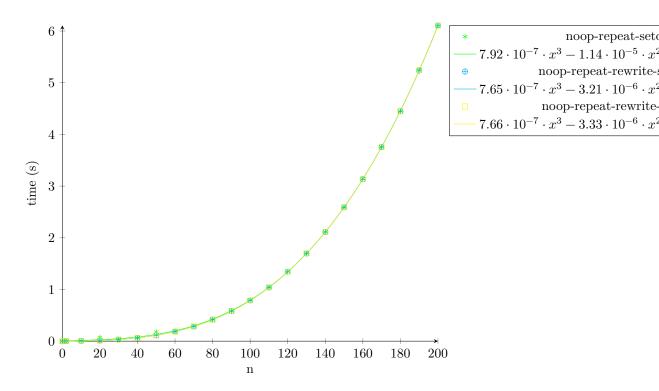
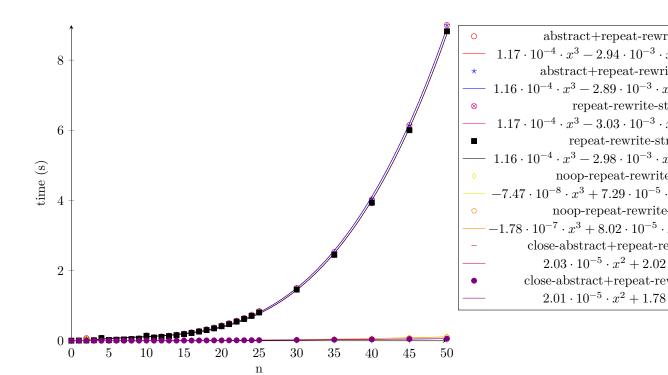
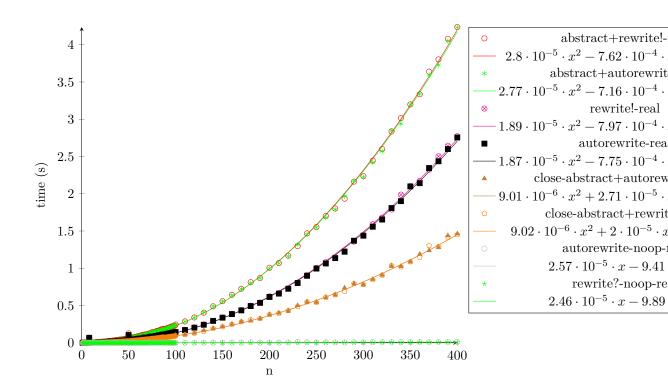


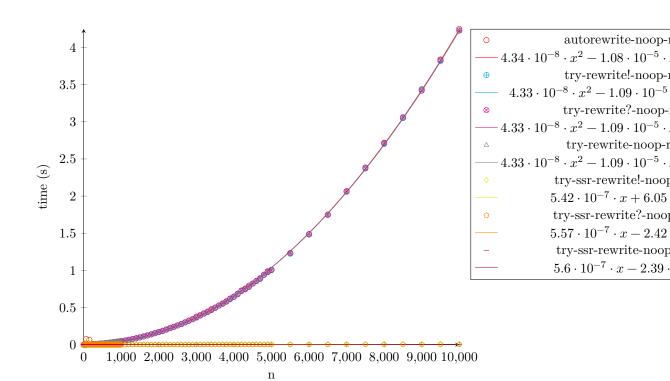
Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



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



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



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

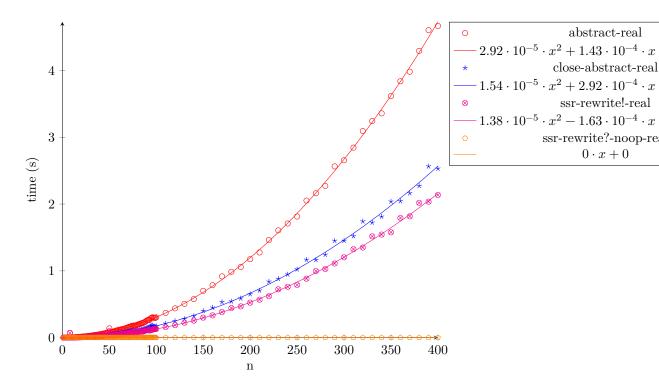
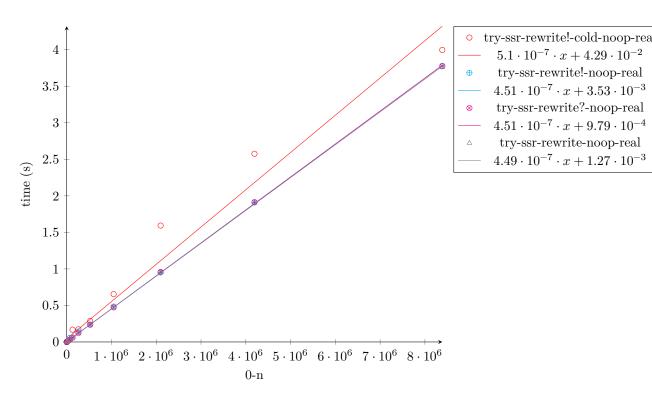


Figure 8: timing-rewrite-repeated-app-ssrrewrite



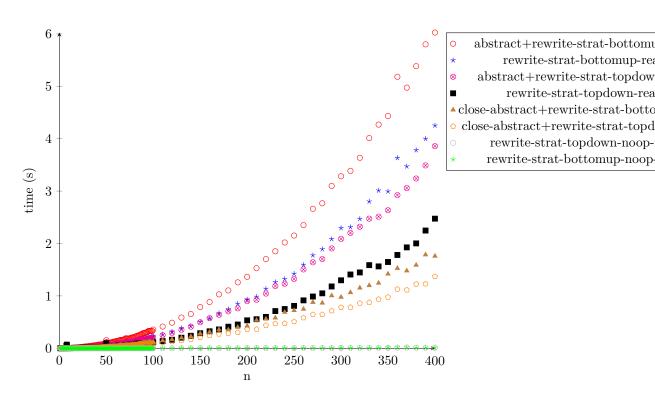
 $5.1 \cdot 10^{-7} \cdot x + 4.29 \cdot 10^{-2}$ try-ssr-rewrite!-noop-real

 $4.51 \cdot 10^{-7} \cdot x + 3.53 \cdot 10^{-3}$ try-ssr-rewrite?-noop-real

 $4.51 \cdot 10^{-7} \cdot x + 9.79 \cdot 10^{-4}$ try-ssr-rewrite-noop-real

 $4.49\cdot 10^{-7}\cdot x + 1.27\cdot 10^{-3}$

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

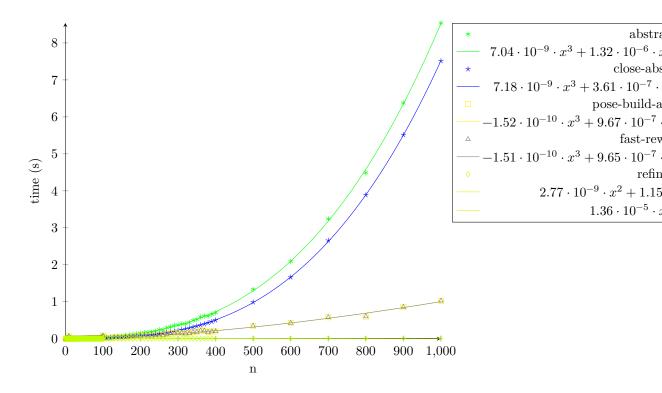


rewrite-strat-bottomup-rea

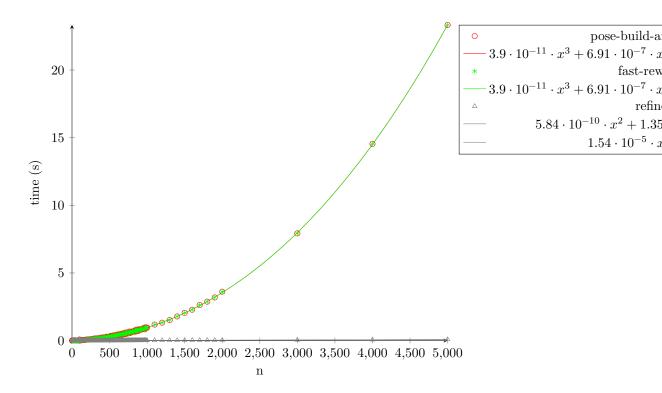
rewrite-strat-topdown-rea

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

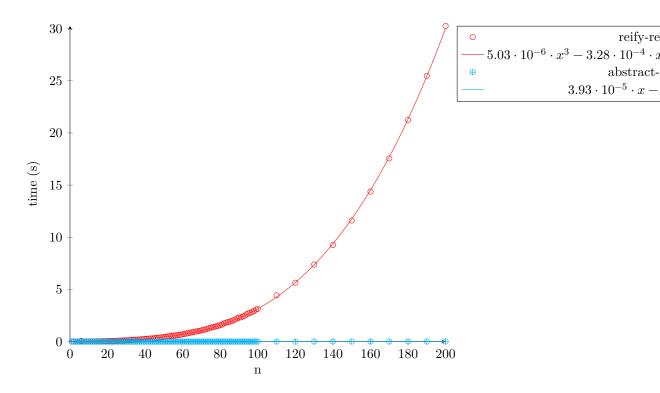
Figure 10: timing-rewrite-repeated-app-rewrite-strat



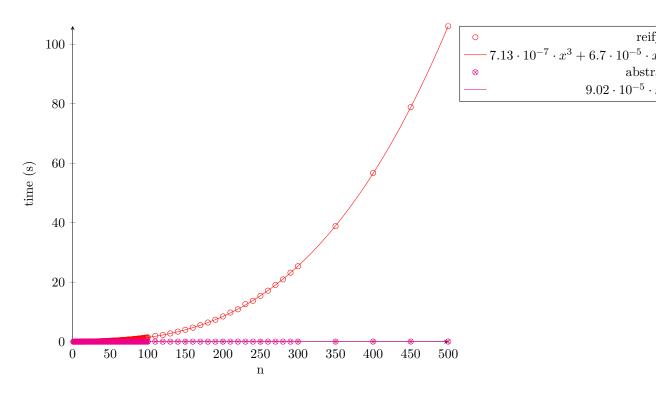
 $Figure~11:~timing\mbox{-rewrite-repeated-app-fast-rewrite}$



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



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



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

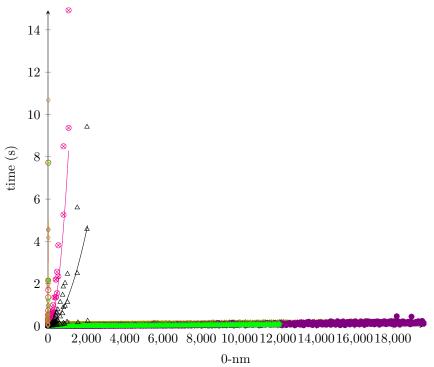


Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

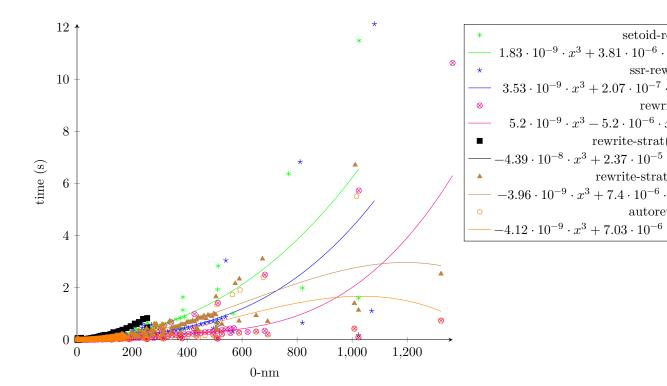
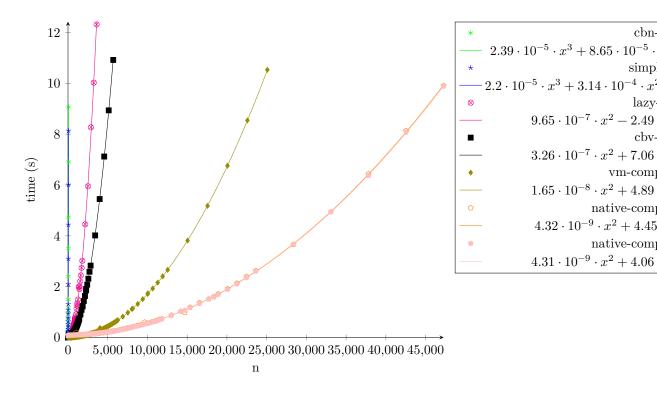


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



cbn-

simp

lazy

vm-com

native-comp

native-comp

 $9.65\cdot 10^{-7}\cdot x^2 - 2.49$

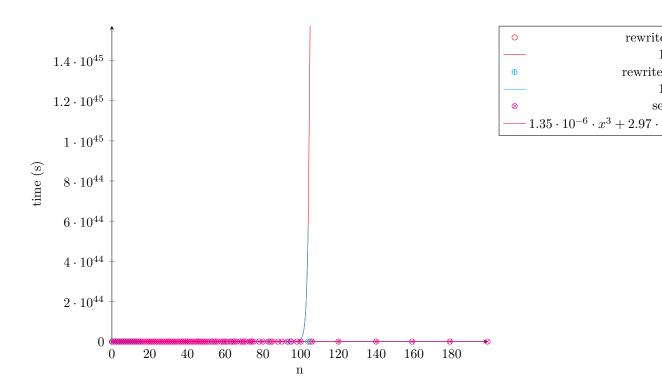
 $3.26 \cdot 10^{-7} \cdot x^2 + 7.06$

 $1.65 \cdot 10^{-8} \cdot x^2 + 4.89$

 $4.32 \cdot 10^{-9} \cdot x^2 + 4.45$

 $4.31 \cdot 10^{-9} \cdot x^2 + 4.06$

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



rewrite

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