

Figure 1: timing-pattern

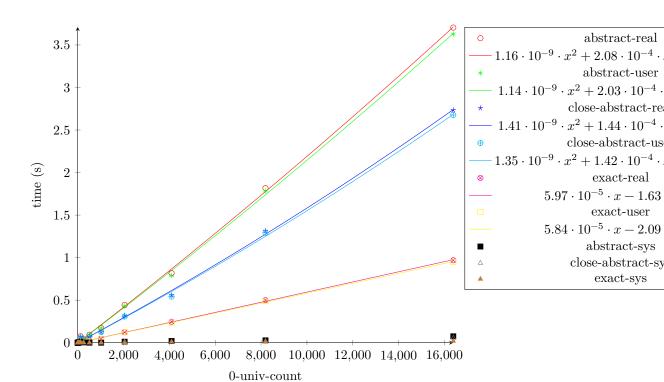


Figure 2: timing-n-polymorphic-universes param-1-n  $\,0$ 

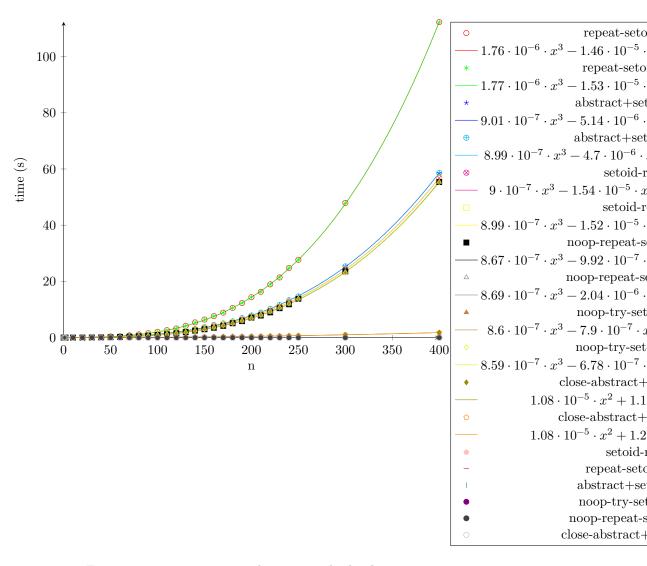


Figure 3: timing-repeat-setoid-rewrite-under-binders

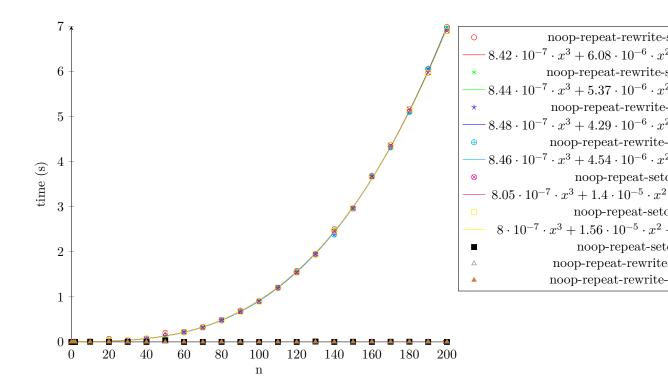


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

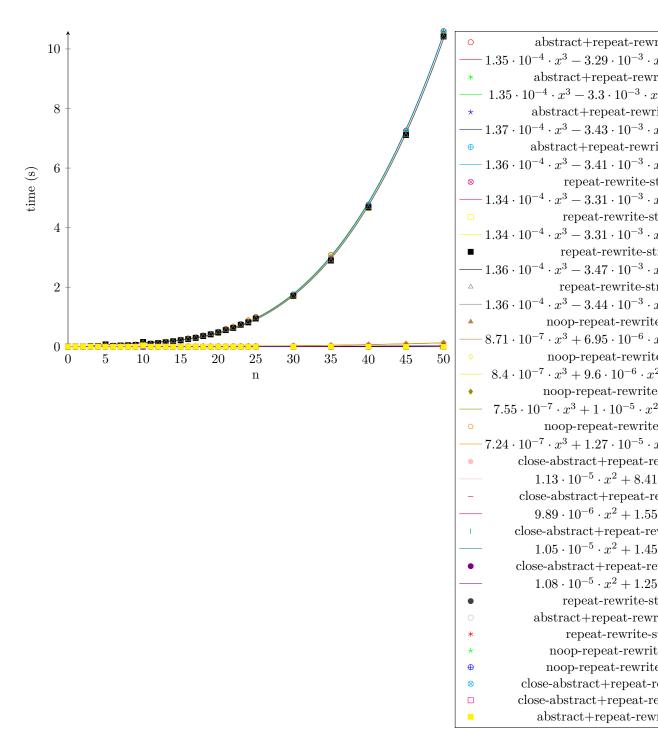
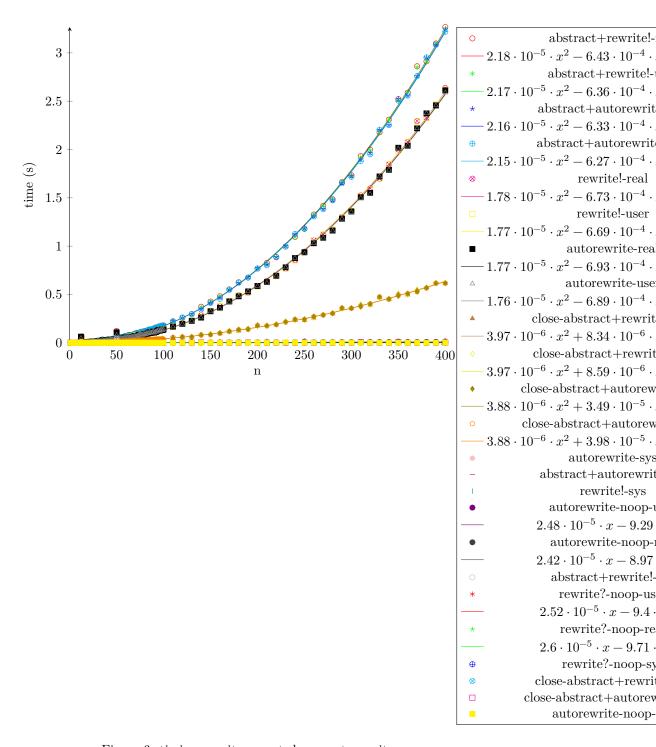


Figure 5: timing-rewrite-strat-under-binders



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

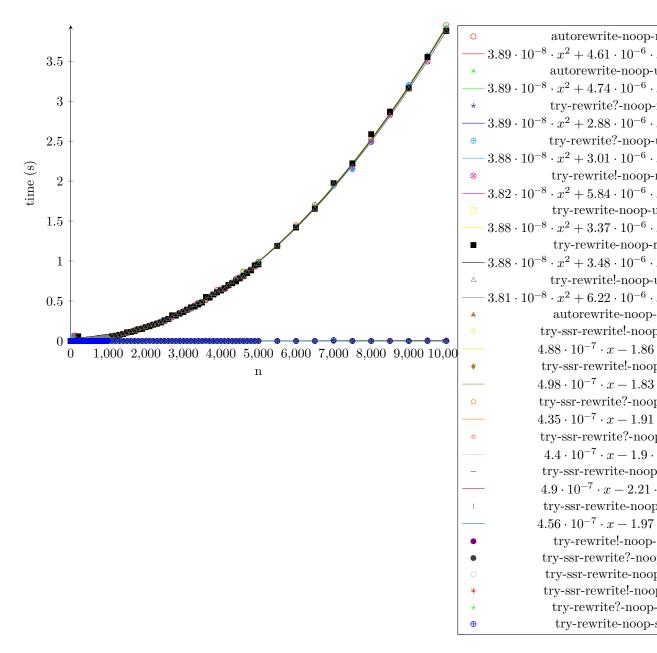


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

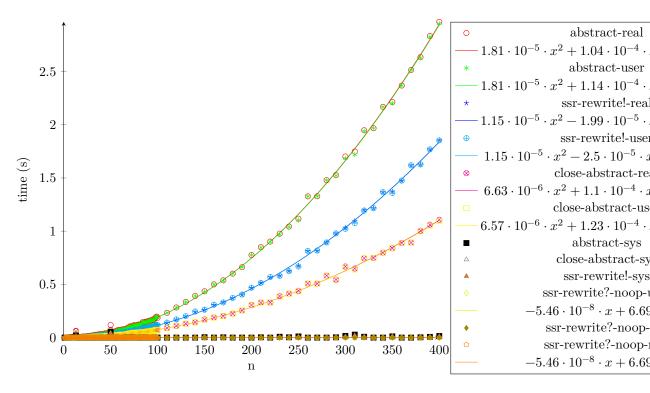


Figure 8: timing-rewrite-repeated-app-ssrrewrite

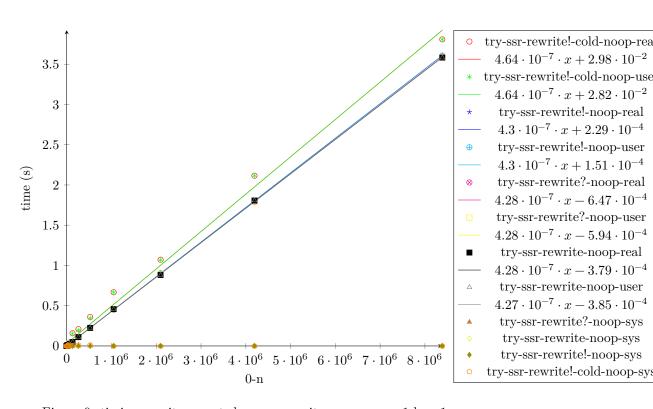


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\ 1$ 

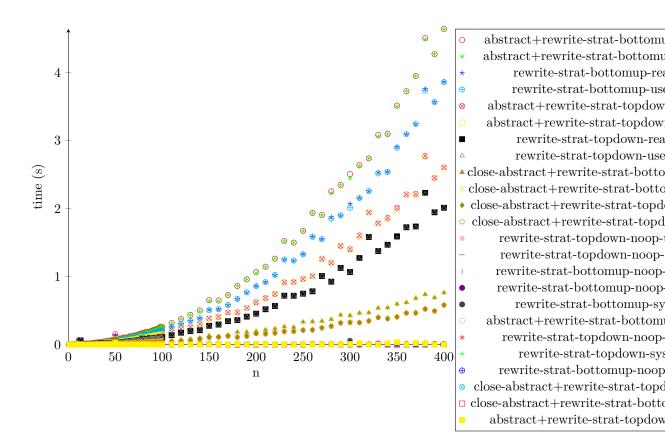


Figure 10: timing-rewrite-repeated-app-rewrite-strat

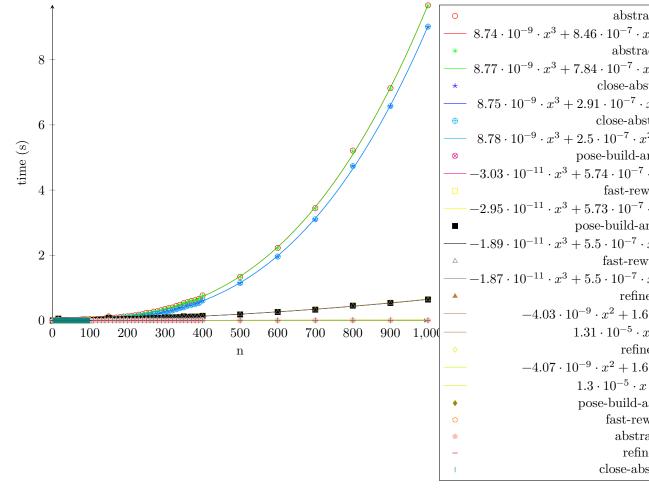
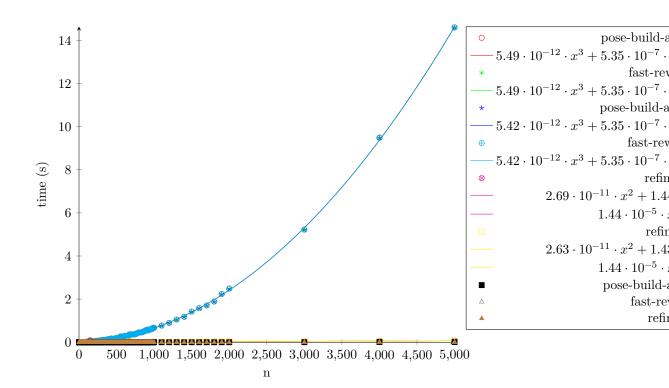
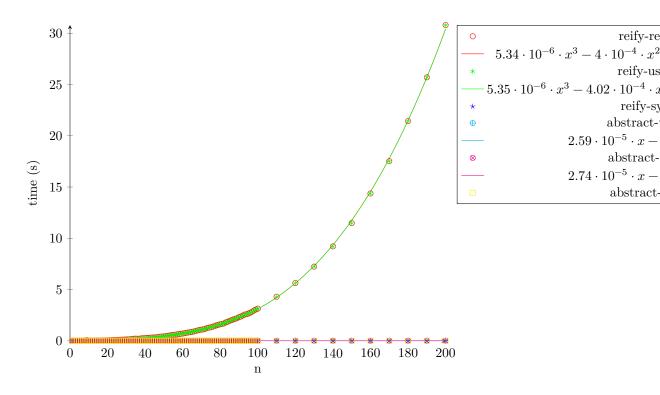


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



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

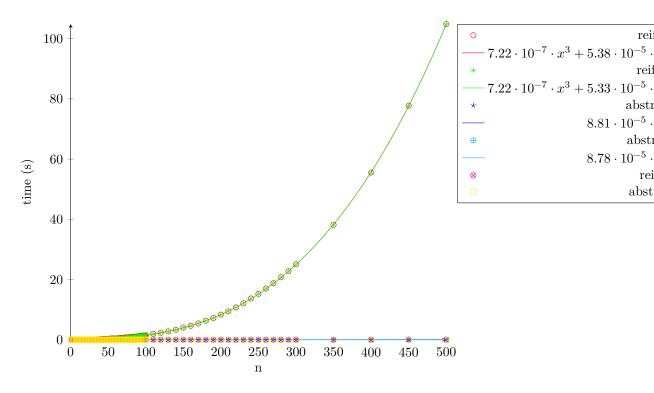
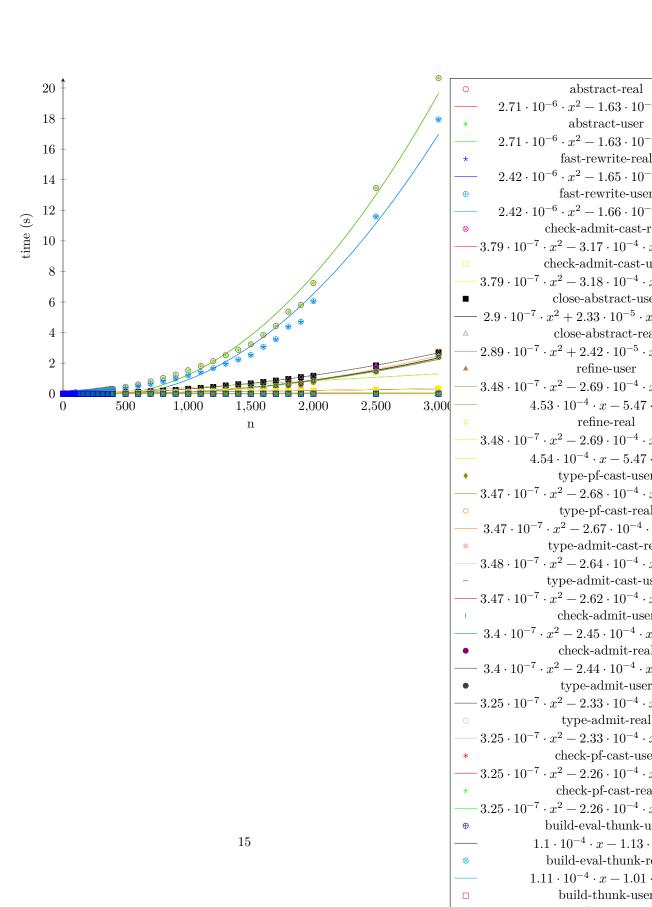


Figure 14: timing-typeclass-reification-let-in-PHOAS



 $abstract\text{-}\mathrm{real}$ 

abstract-user

fast-rewrite-real

fast-rewrite-user

check-admit-cast-r

check-admit-cast-u

close-abstract-use

close-abstract-rea

 $4.53 \cdot 10^{-4} \cdot x - 5.47$ 

 $4.54 \cdot 10^{-4} \cdot x - 5.47 \cdot$ type-pf-cast-user

refine-user

refine-real

type-pf-cast-real

type-admit-cast-re

type-admit-cast-us

check-admit-user

check-admit-real

type-admit-user

type-admit-real

check-pf-cast-use

check-pf-cast-rea

build-eval-thunk-u

 $1.1 \cdot 10^{-4} \cdot x - 1.13$ build-eval-thunk-re  $1.11 \cdot 10^{-4} \cdot x - 1.01 \cdot$ build-thunk-user  $1.09 \cdot 10^{-4} \cdot x - 1.17 \cdot$ build-thunk-real  $1.1 \cdot 10^{-4} \cdot x - 1.04 \cdot$ ob ools I seans