

Figure 1: timing-pattern

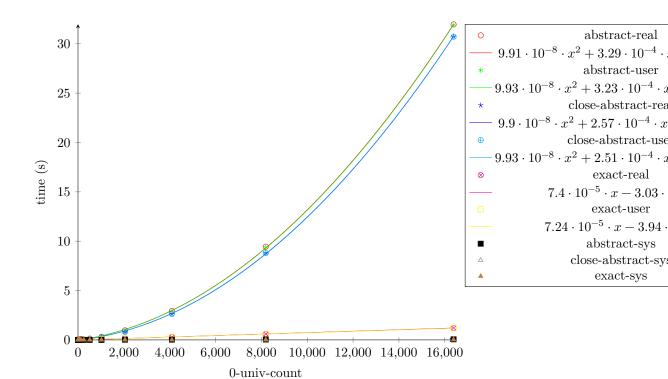


Figure 2: timing-n-polymorphic-universes param-1-n 0

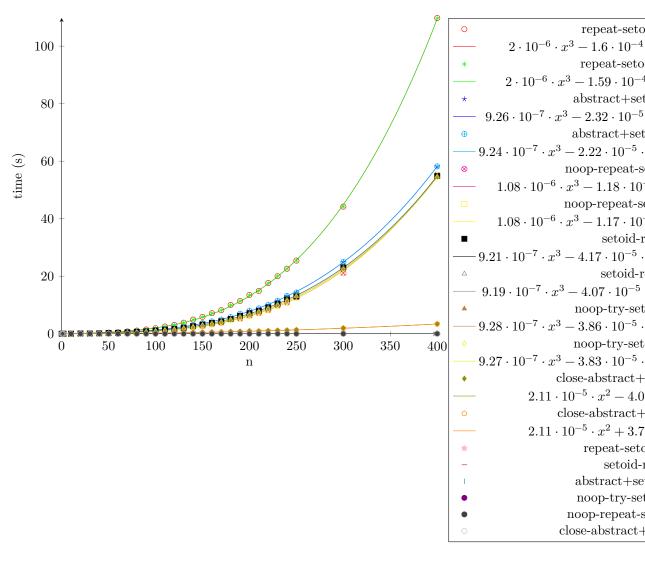
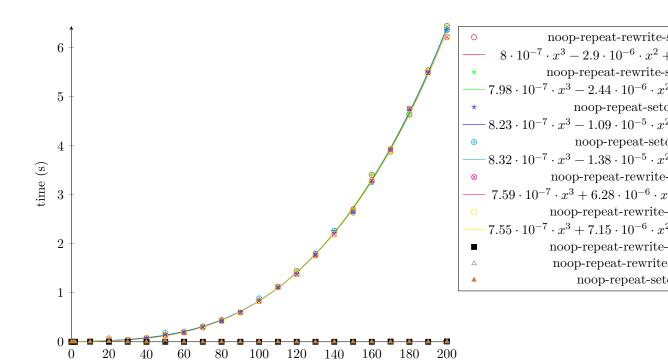


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

n

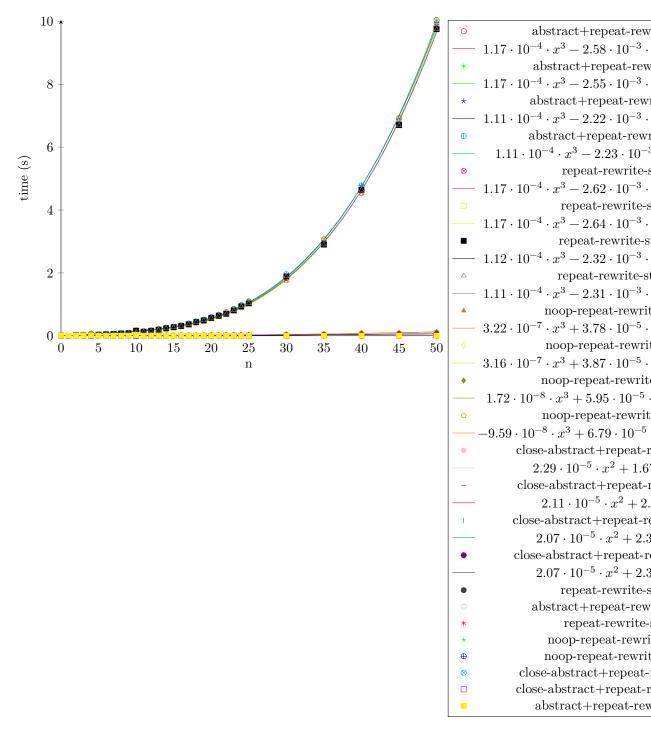
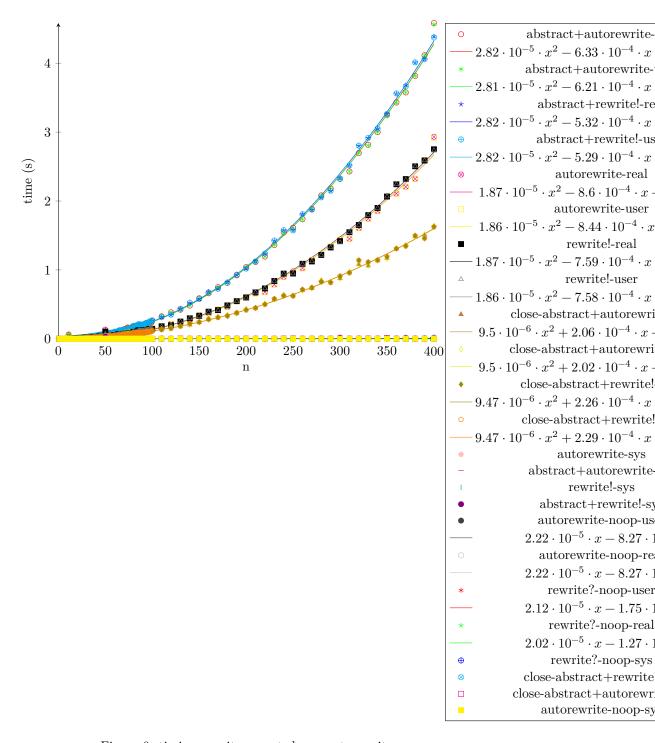


Figure 5: timing-rewrite-strat-under-binders



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

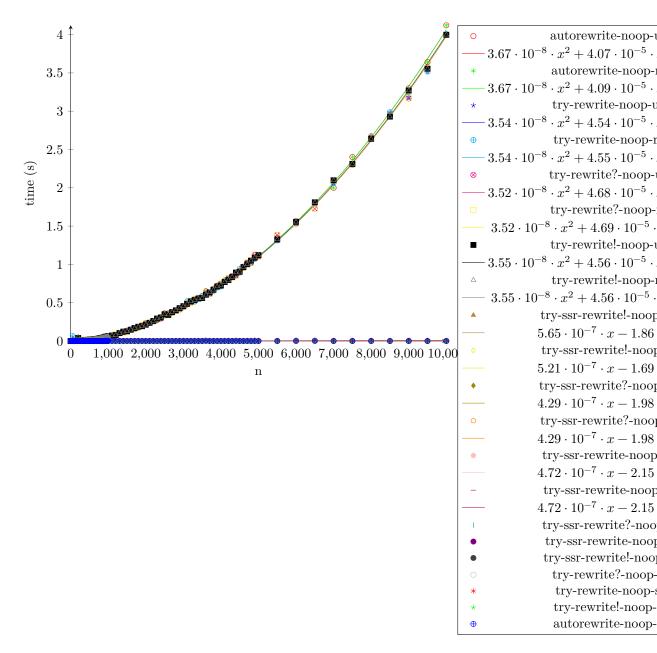


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

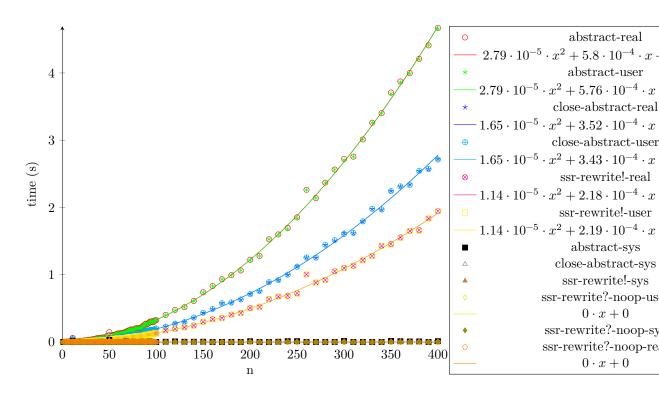


Figure 8: timing-rewrite-repeated-app-ssrrewrite

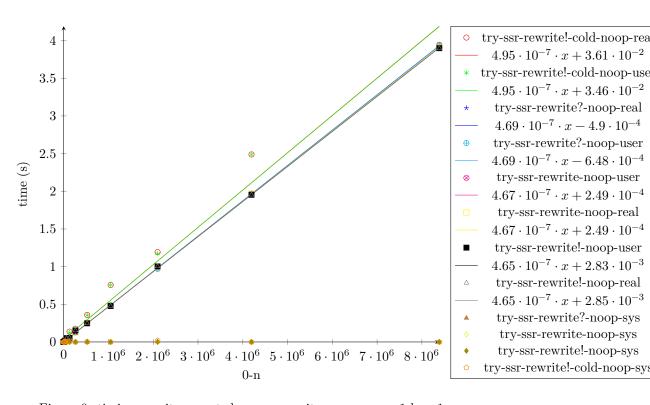


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\ 1$ 

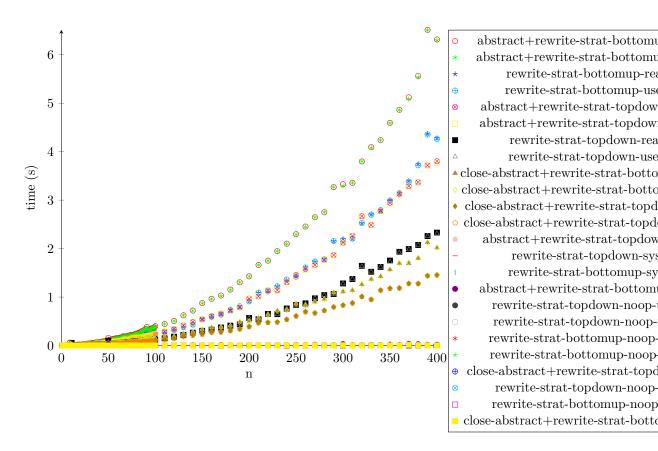


Figure 10: timing-rewrite-repeated-app-rewrite-strat

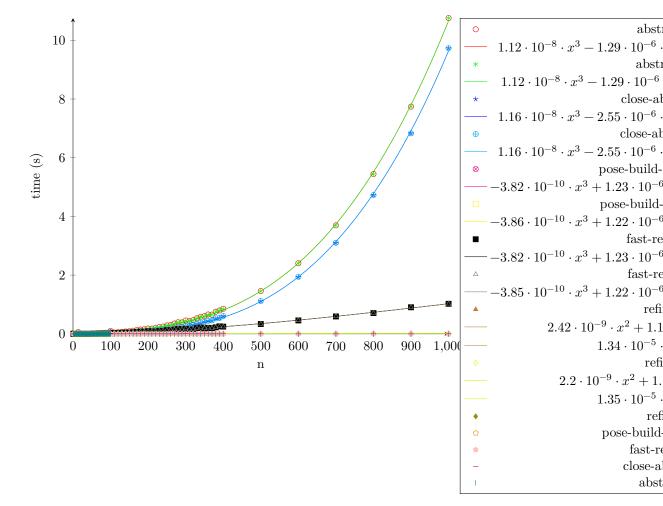
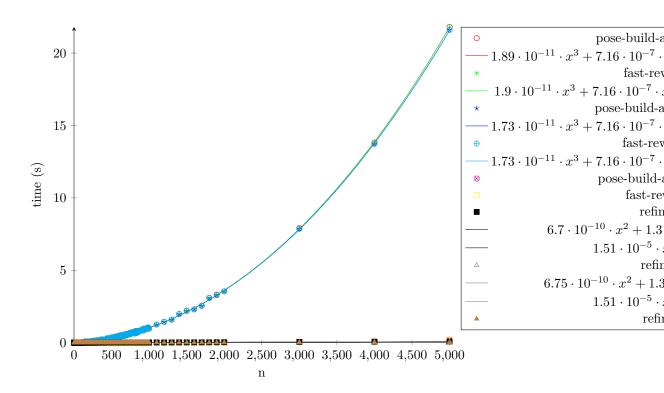
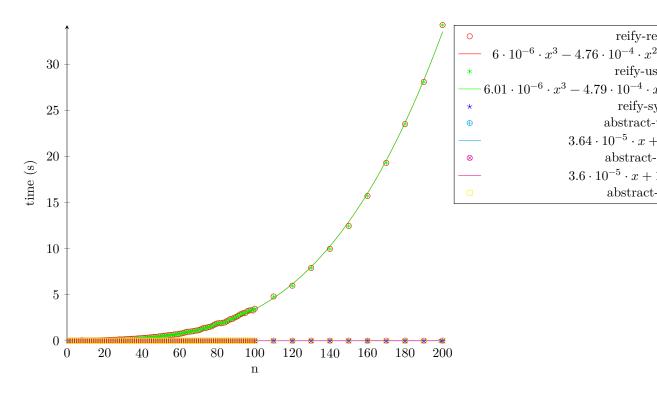


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



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

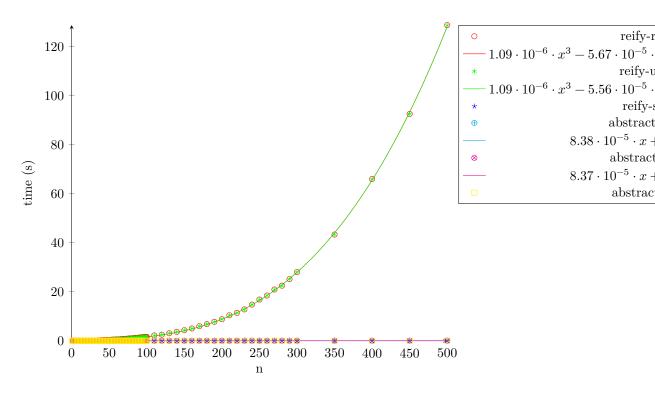
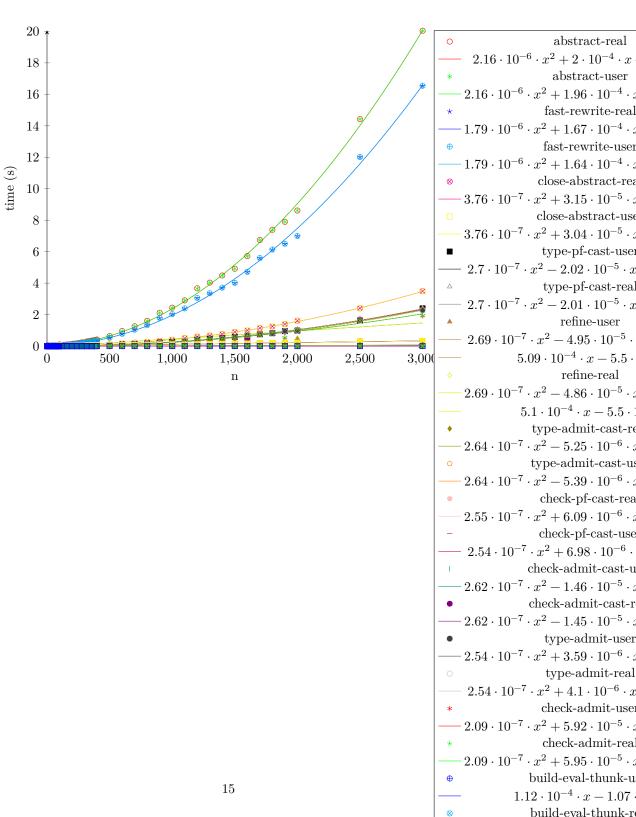


Figure 14: timing-typeclass-reification-let-in-PHOAS



abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

close-abstract-rea

close-abstract-use

type-pf-cast-user

type-pf-cast-real

refine-user

refine-real

 $5.09 \cdot 10^{-4} \cdot x - 5.5 \cdot$ 

 $5.1 \cdot 10^{-4} \cdot x - 5.5 \cdot 1$ type-admit-cast-re

type-admit-cast-us

check-pf-cast-rea

check-pf-cast-use

check-admit-cast-u

check-admit-cast-r

type-admit-user

type-admit-real

check-admit-user

check-admit-real

build-eval-thunk-u

 $1.12 \cdot 10^{-4} \cdot x - 1.07$ build-eval-thunk-re  $1.12 \cdot 10^{-4} \cdot x - 8.47$ build-thunk-user  $1.11 \cdot 10^{-4} \cdot x - 1.17$ build-thunk-real  $1.11 \cdot 10^{-4} \cdot x - 9.3 \cdot$