

Figure 1: timing-pattern

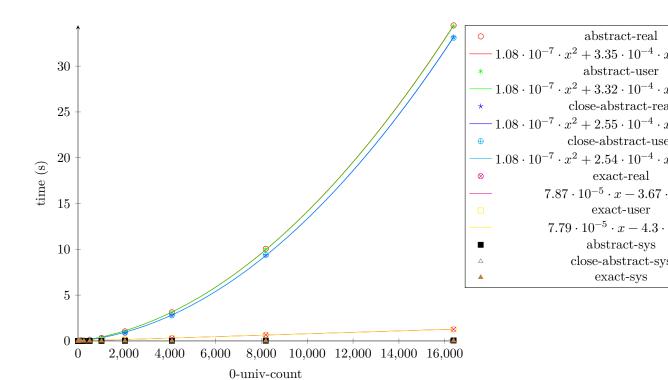


Figure 2: timing-n-polymorphic-universes param-1-n 0

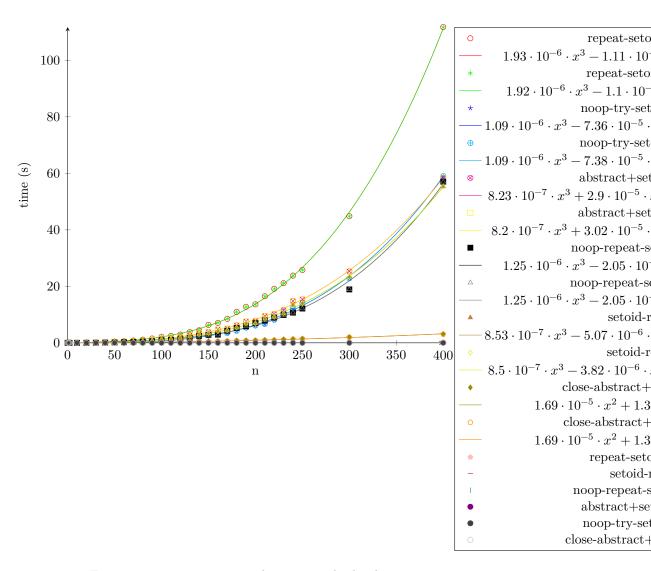


Figure 3: timing-repeat-setoid-rewrite-under-binders

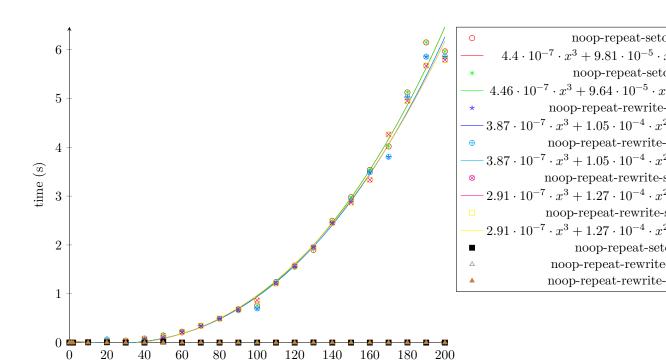


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

n

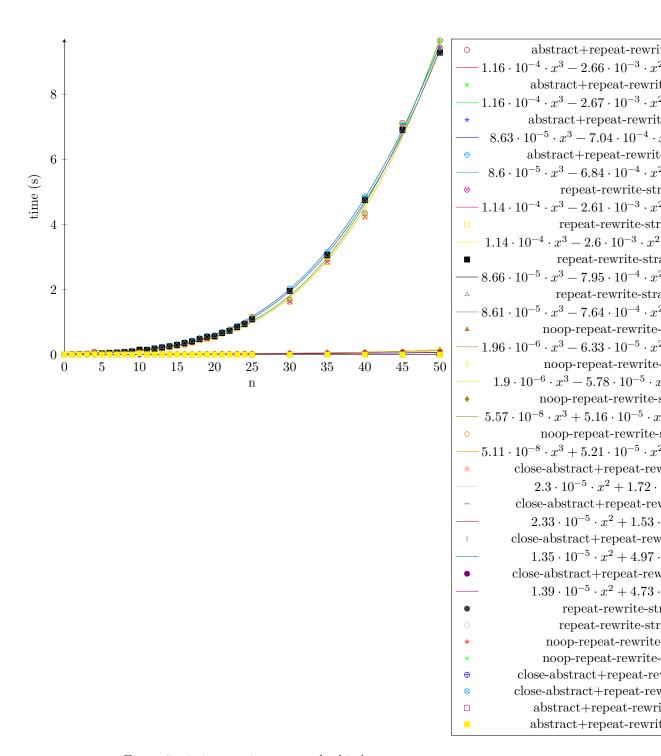
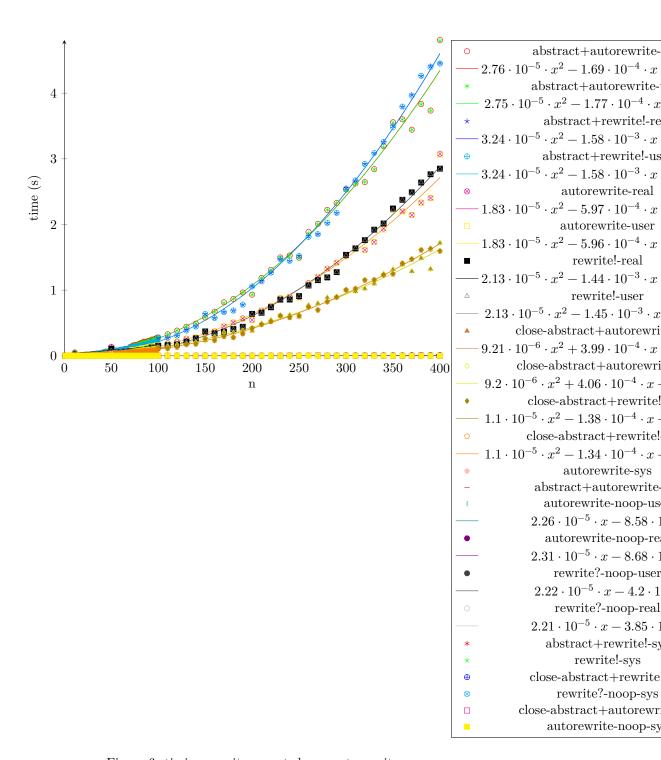


Figure 5: timing-rewrite-strat-under-binders



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

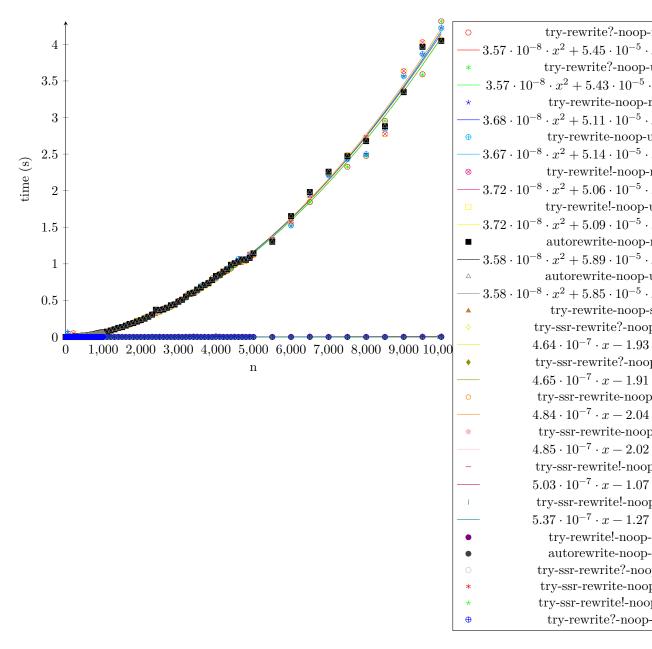
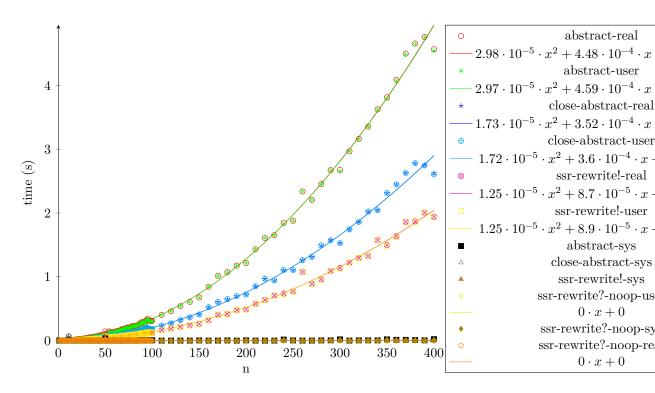


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

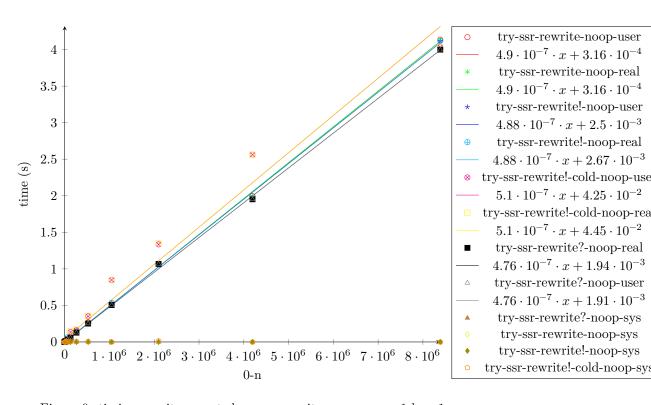


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\ 1$ 

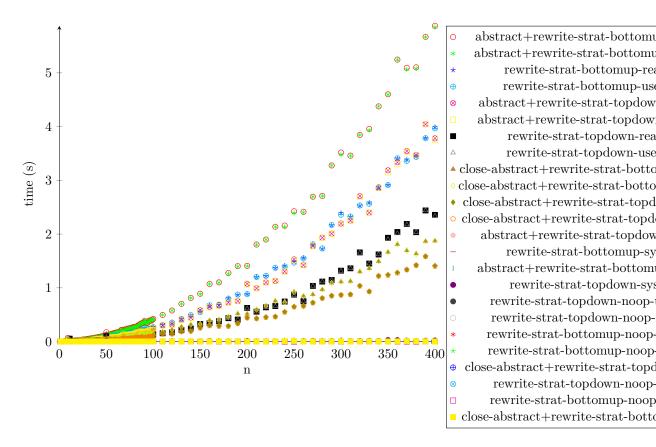


Figure 10: timing-rewrite-repeated-app-rewrite-strat

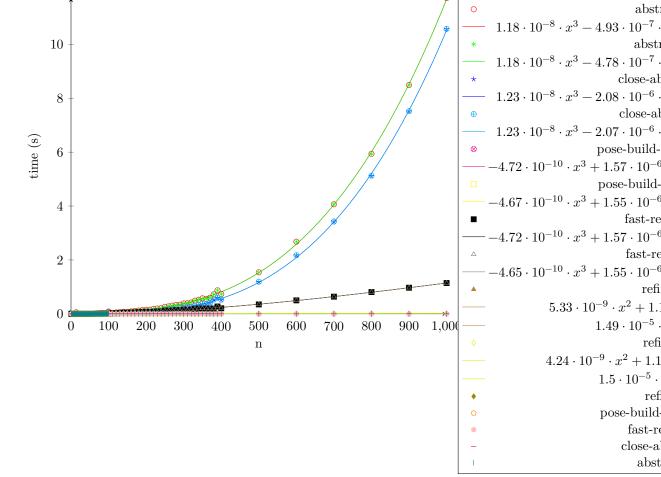
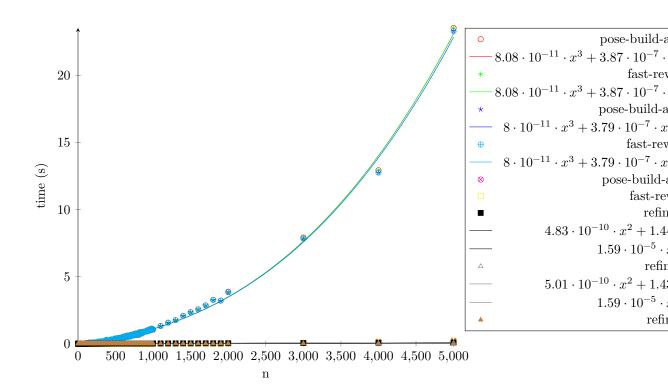
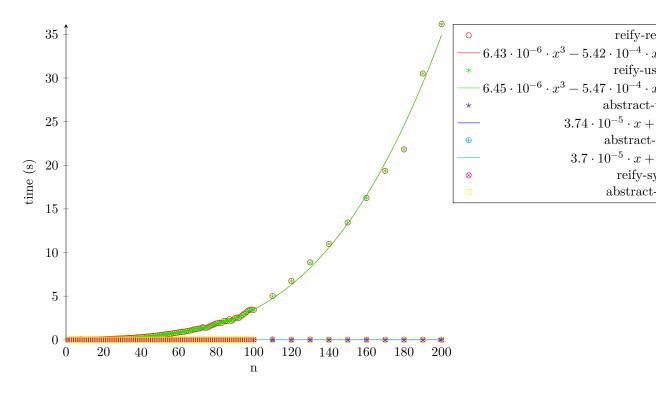


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



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

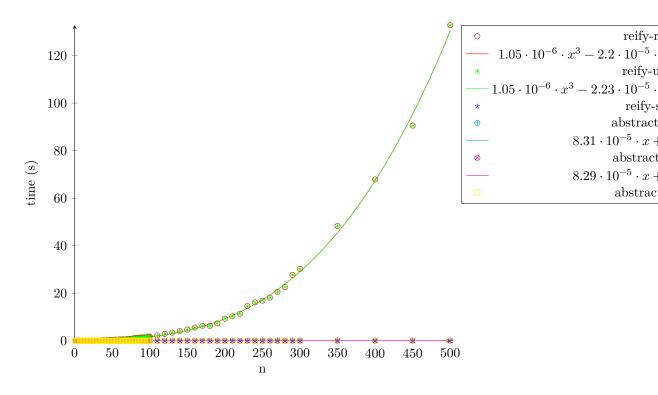
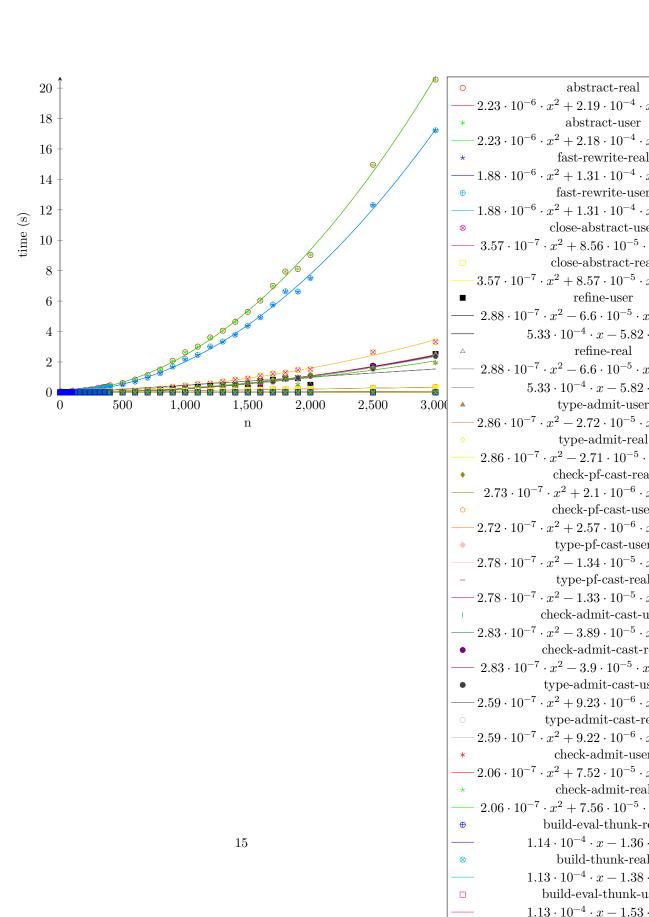


Figure 14: timing-typeclass-reification-let-in-PHOAS



abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

close-abstract-use

close-abstract-rea

refine-user

 $5.33 \cdot 10^{-4} \cdot x - 5.82 \cdot$ refine-real

 $5.33 \cdot 10^{-4} \cdot x - 5.82 \cdot$ 

type-admit-user

type-admit-real

check-pf-cast-rea

check-pf-cast-use

type-pf-cast-user

type-pf-cast-real

check-admit-cast-u

check-admit-cast-r

type-admit-cast-us

type-admit-cast-re

check-admit-user

check-admit-real

build-eval-thunk-re  $1.14 \cdot 10^{-4} \cdot x - 1.36 \cdot$ 

build-thunk-real  $1.13 \cdot 10^{-4} \cdot x - 1.38 \cdot$ build-eval-thunk-u  $1.13 \cdot 10^{-4} \cdot x - 1.53 \cdot$ build-thunk-user  $1.12 \cdot 10^{-4} \cdot x - 1.55 \cdot$ tyne\_I\_user