

Figure 1: timing-pattern

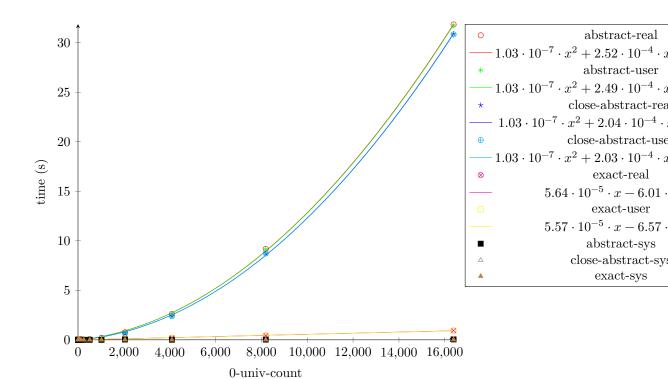


Figure 2: timing-n-polymorphic-universes param-1-n 0

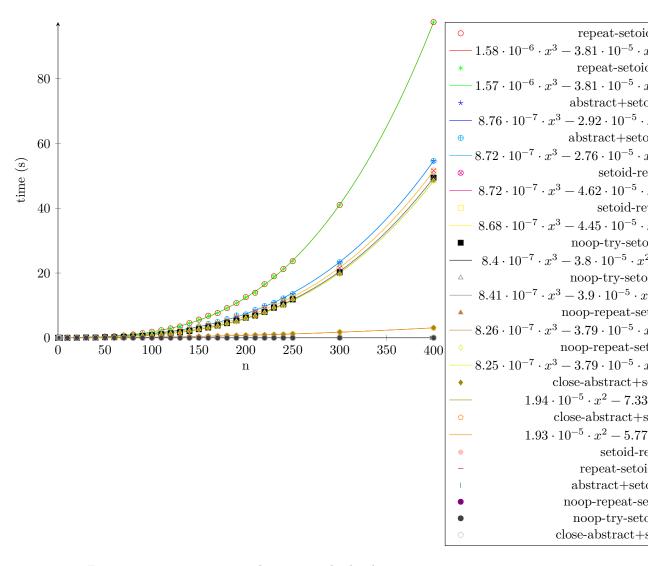
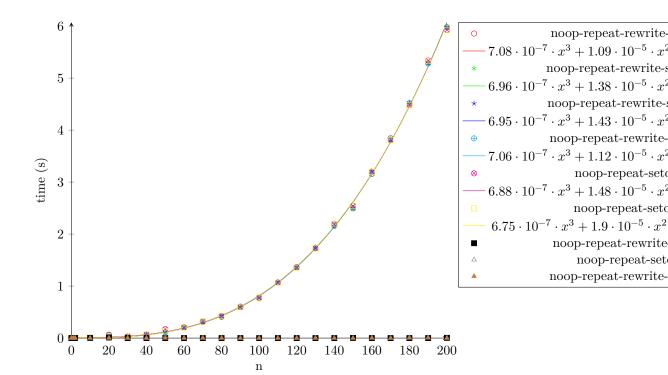


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

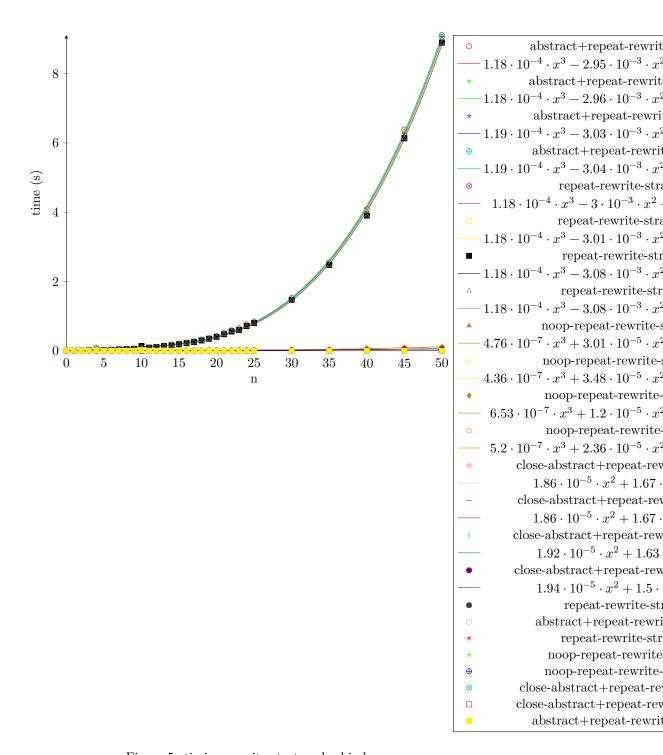


Figure 5: timing-rewrite-strat-under-binders

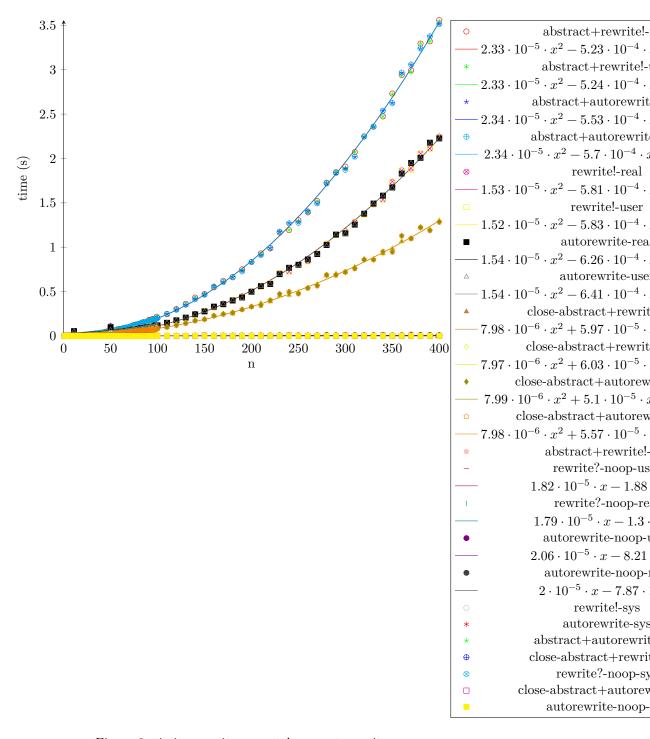


Figure 6: timing-rewrite-repeated-app-autorewrite

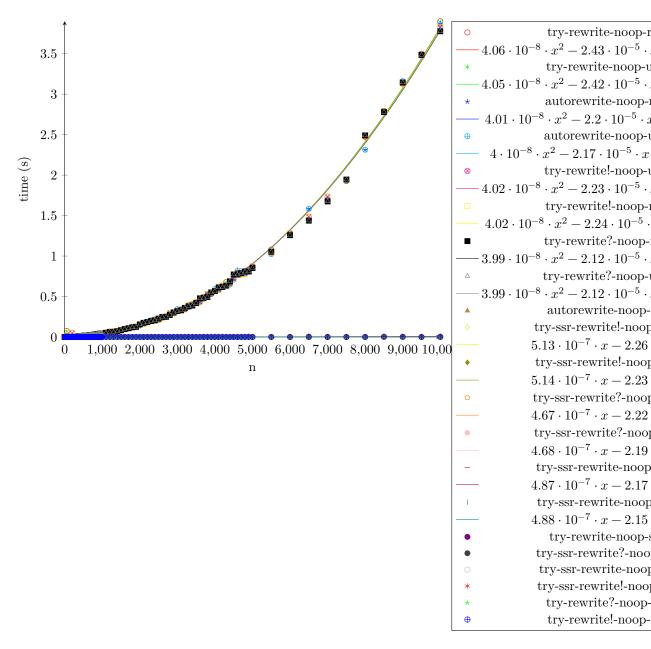


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

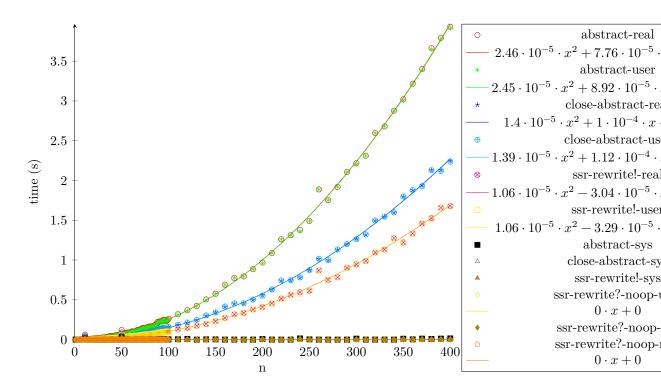


Figure 8: timing-rewrite-repeated-app-ssrrewrite

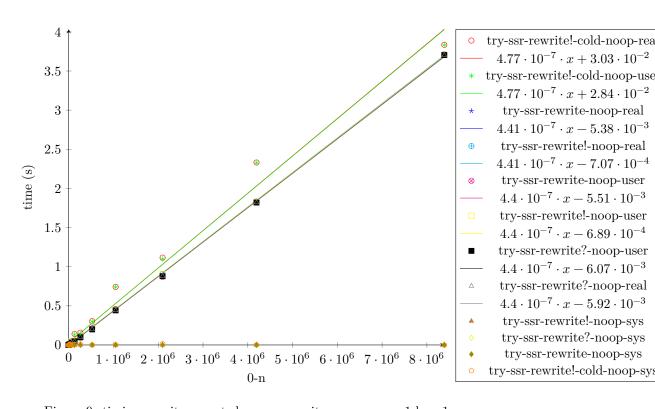


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\ 1$ 

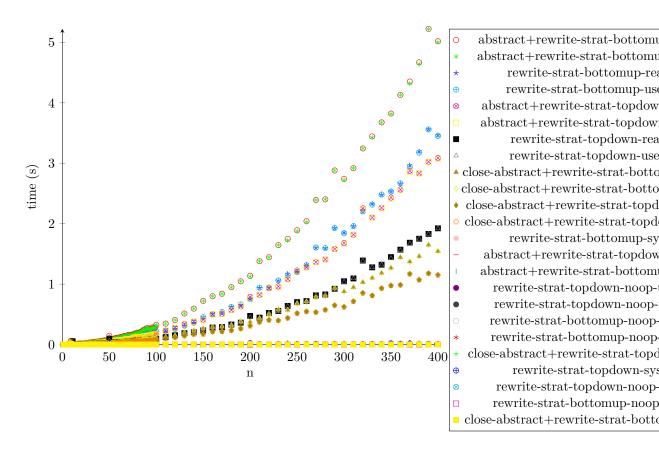


Figure 10: timing-rewrite-repeated-app-rewrite-strat

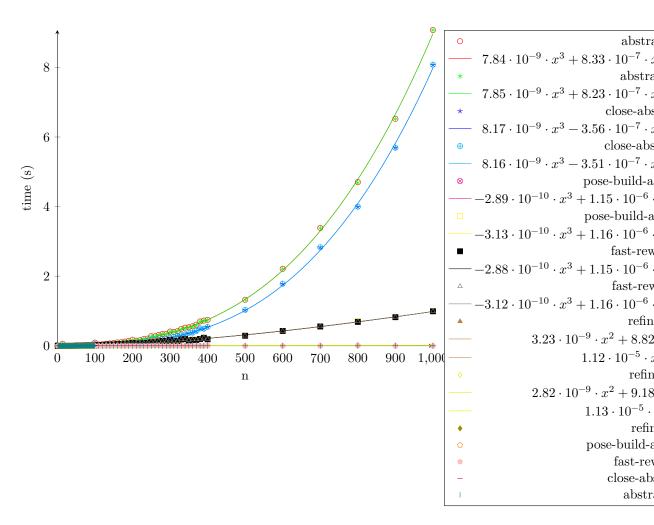
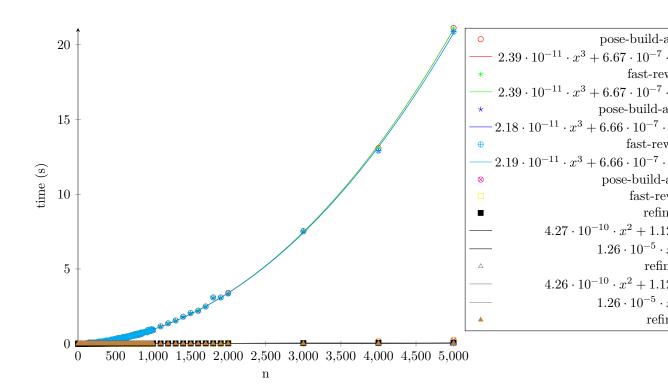
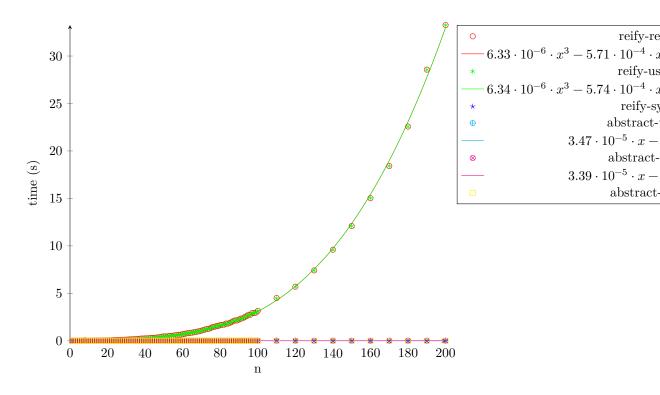


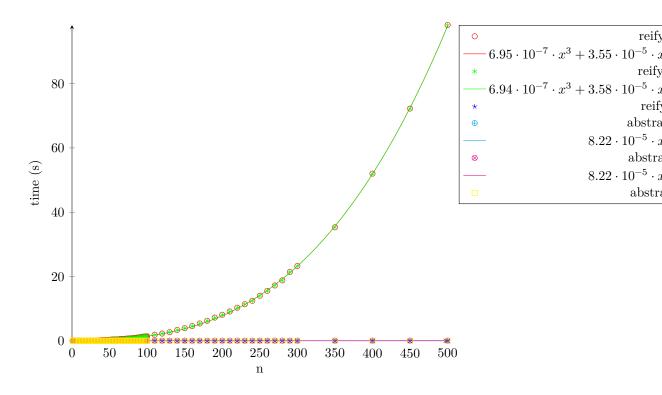
Figure 11: timing-rewrite-repeated-app-fast-rewrite



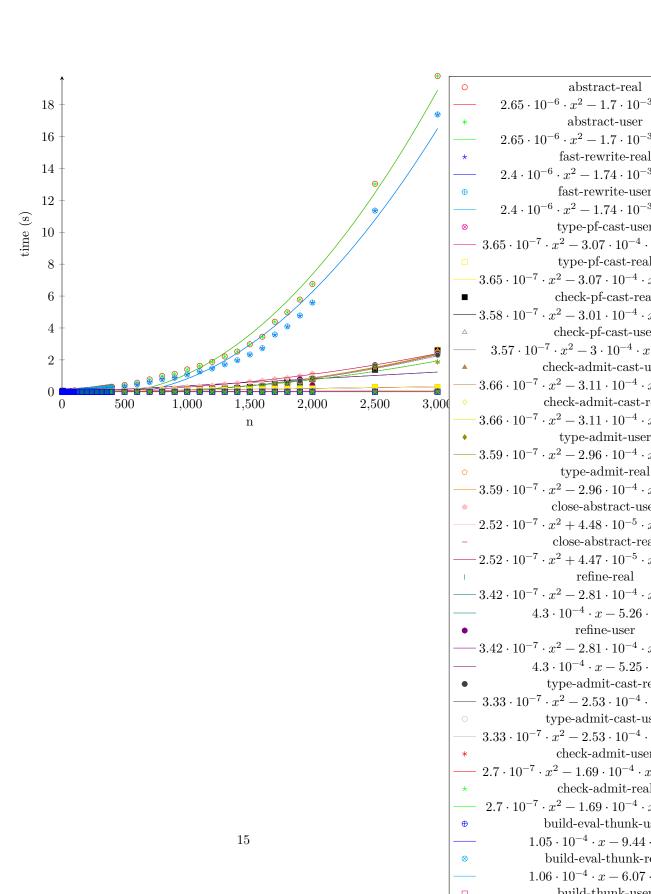
Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



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



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



abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

type-pf-cast-user

type-pf-cast-real

check-pf-cast-rea

check-pf-cast-use

check-admit-cast-u

check-admit-cast-r

type-admit-user

type-admit-real

close-abstract-use

close-abstract-rea

refine-real

 $4.3 \cdot 10^{-4} \cdot x - 5.26 \cdot$ refine-user

 $4.3 \cdot 10^{-4} \cdot x - 5.25 \cdot$ type-admit-cast-re

type-admit-cast-us

check-admit-user

check-admit-real

build-eval-thunk-ua

 $1.05 \cdot 10^{-4} \cdot x - 9.44$ build-eval-thunk-re  $1.06 \cdot 10^{-4} \cdot x - 6.07 \cdot$ build-thunk-user  $1.04 \cdot 10^{-4} \cdot x - 1.06 \cdot$ build-thunk-real  $1.05 \cdot 10^{-4} \cdot x - 7.17$ obook I was