

Figure 1: timing-pattern

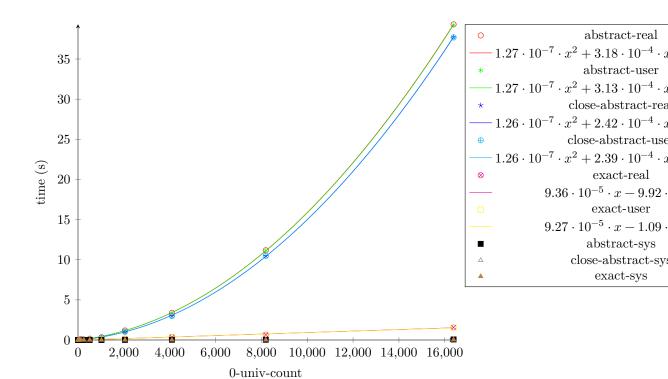


Figure 2: timing-n-polymorphic-universes param-1-n 0

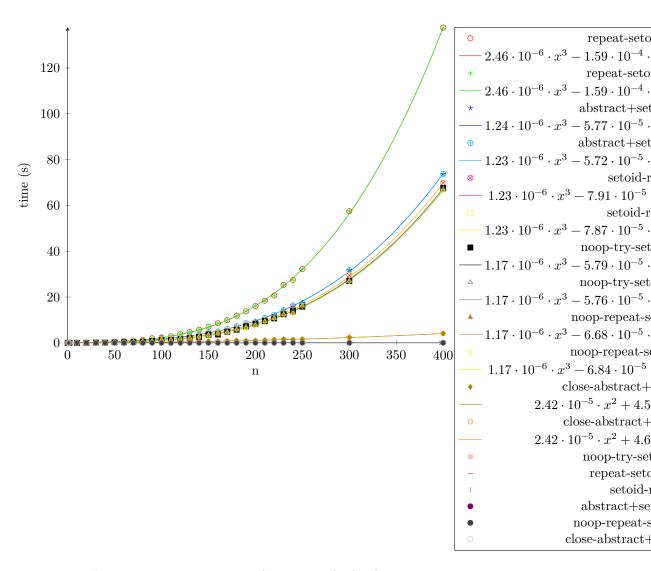
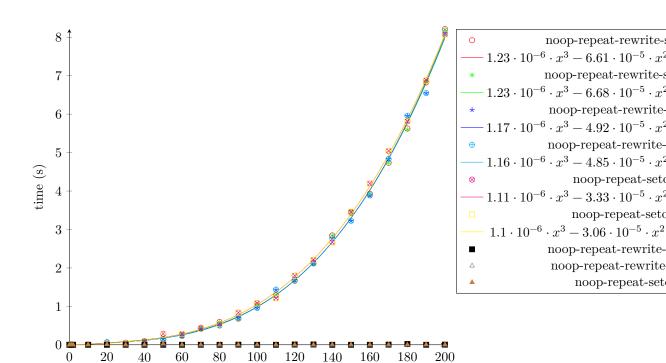


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

n

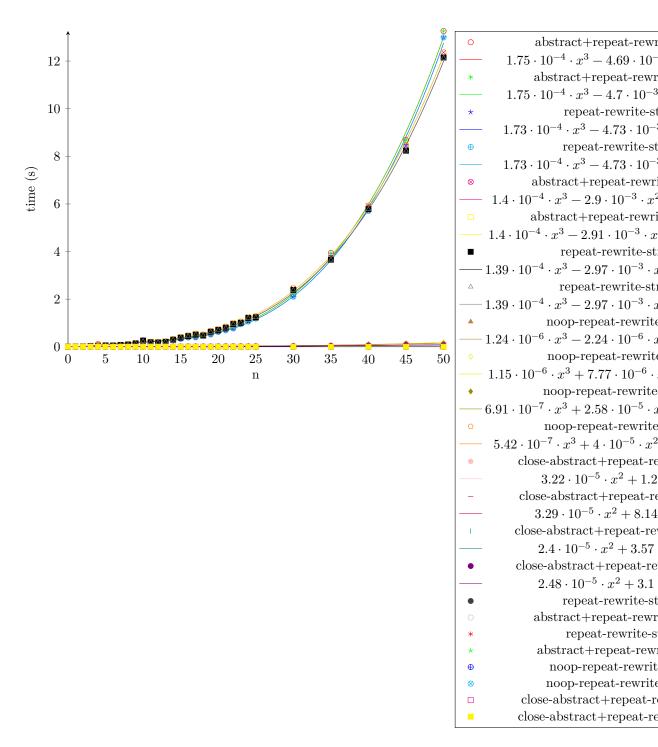
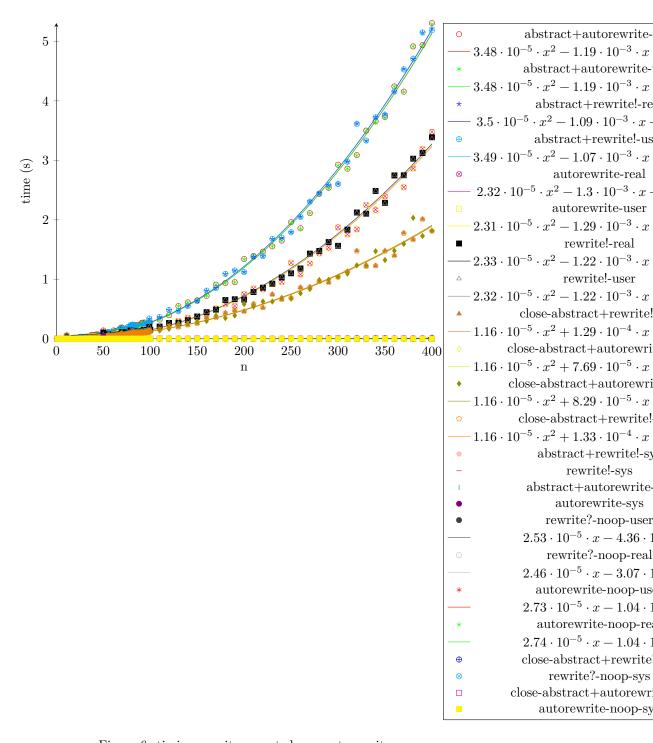


Figure 5: timing-rewrite-strat-under-binders



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

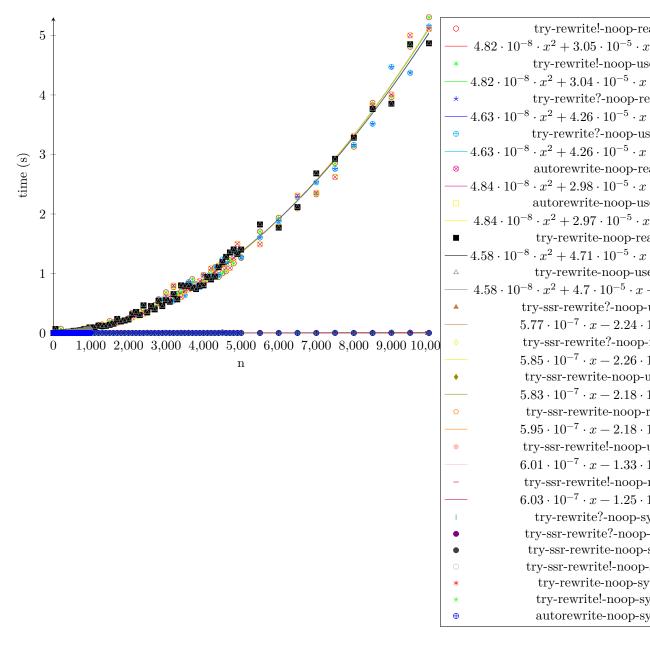
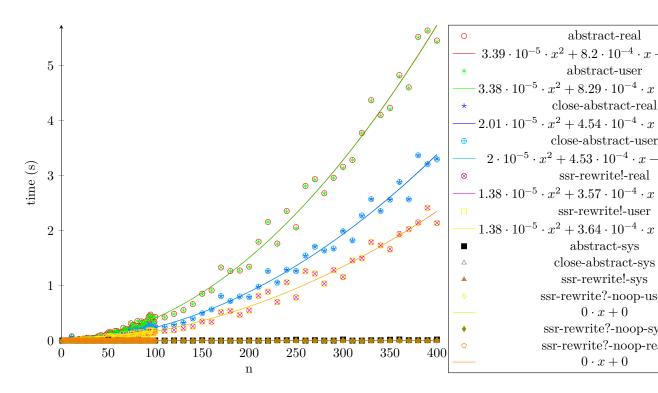


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

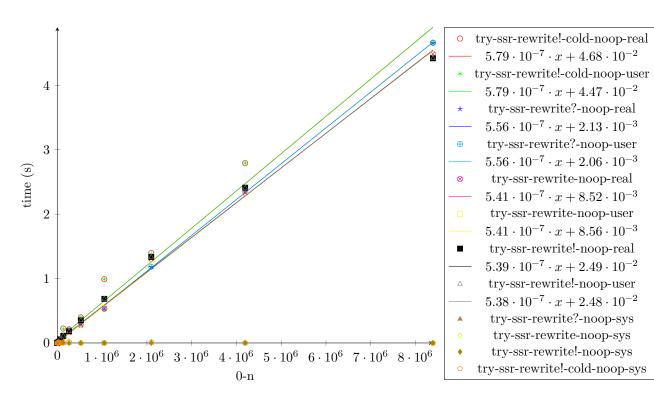


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

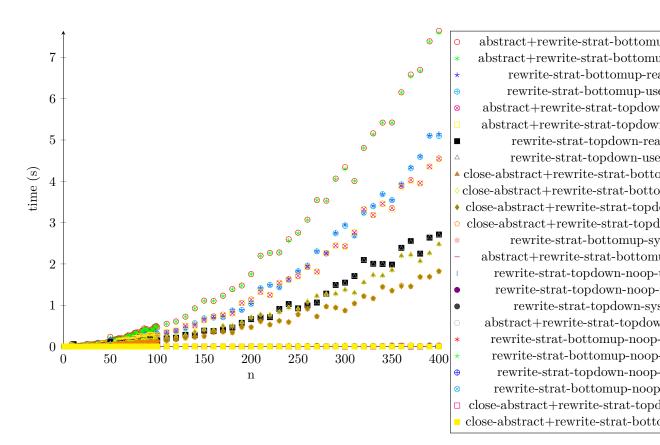


Figure 10: timing-rewrite-repeated-app-rewrite-strat

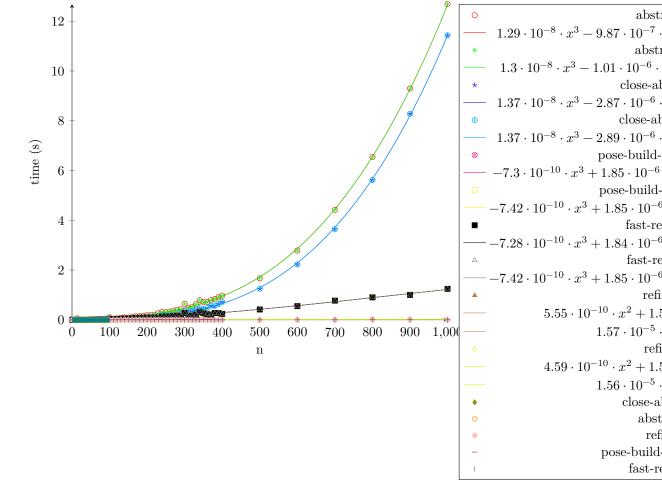
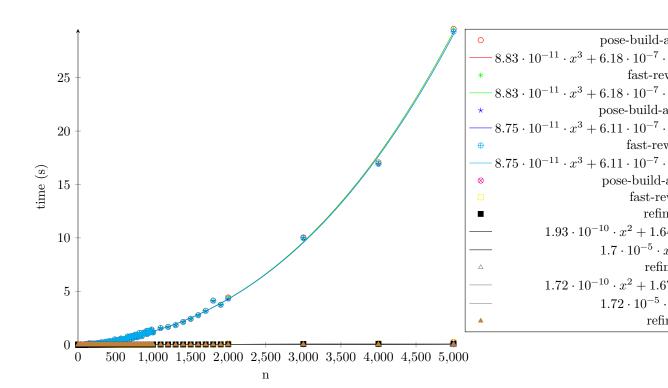
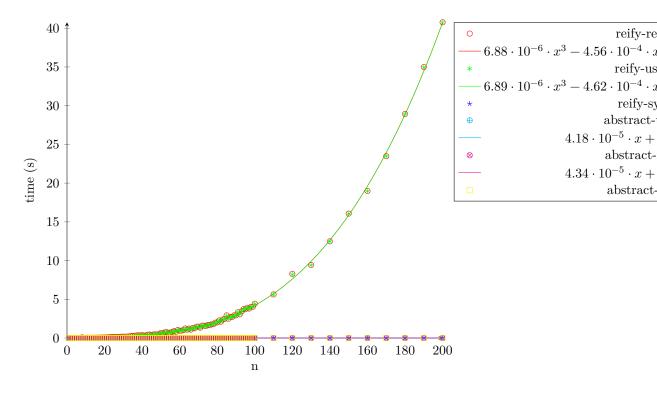


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



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

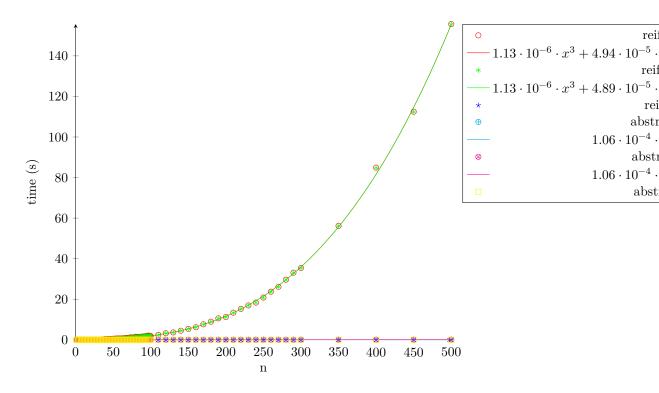
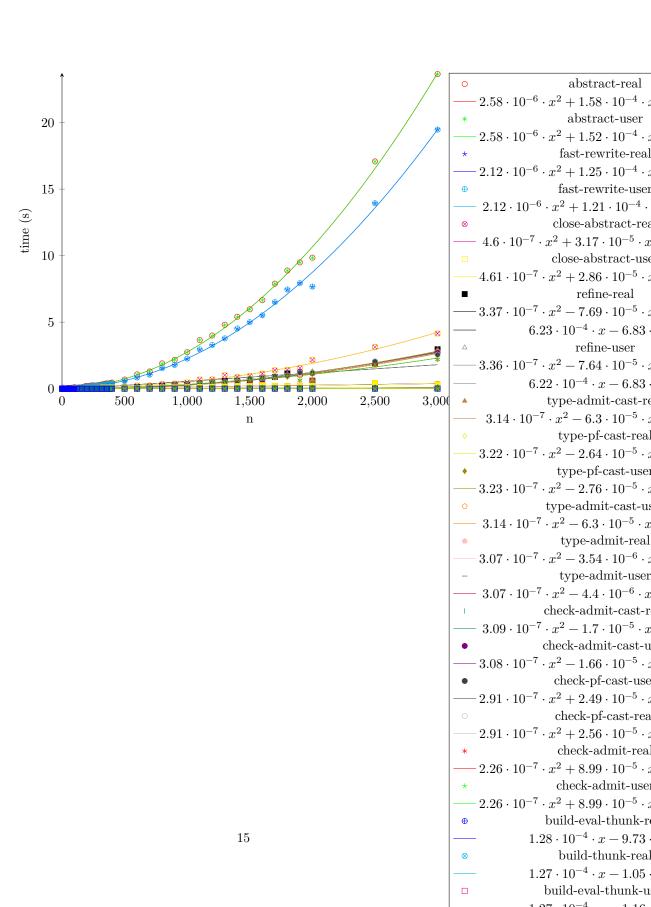


Figure 14: timing-typeclass-reification-let-in-PHOAS



abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

close-abstract-rea

close-abstract-use

refine-real

 $6.23 \cdot 10^{-4} \cdot x - 6.83 \cdot$ refine-user

 $6.22 \cdot 10^{-4} \cdot x - 6.83 \cdot$

type-admit-cast-re

type-pf-cast-real

type-pf-cast-user

type-admit-cast-us

type-admit-real

type-admit-user

check-admit-cast-r

check-admit-cast-u

check-pf-cast-use

check-pf-cast-rea

check-admit-real

check-admit-user

build-eval-thunk-re

 $1.28 \cdot 10^{-4} \cdot x - 9.73 \cdot$ build-thunk-real $1.27 \cdot 10^{-4} \cdot x - 1.05 \cdot$ build-eval-thunk-u $1.27 \cdot 10^{-4} \cdot x - 1.16$ build-thunk-user $1.26 \cdot 10^{-4} \cdot x - 1.23 \cdot$ aboalt I ugan