

Figure 1: timing-pattern

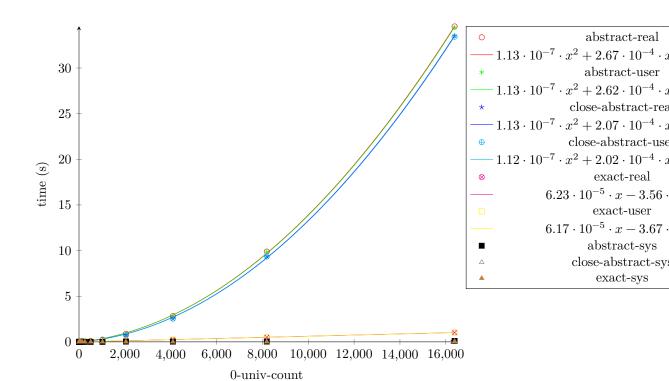


Figure 2: timing-n-polymorphic-universes param-1-n 0

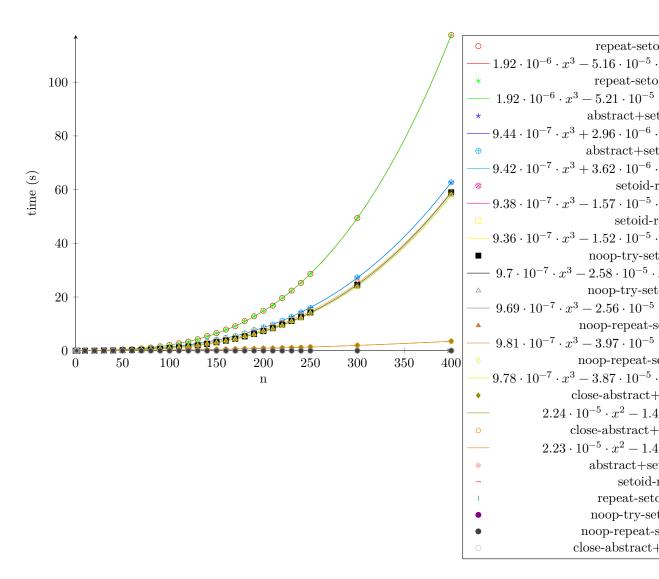
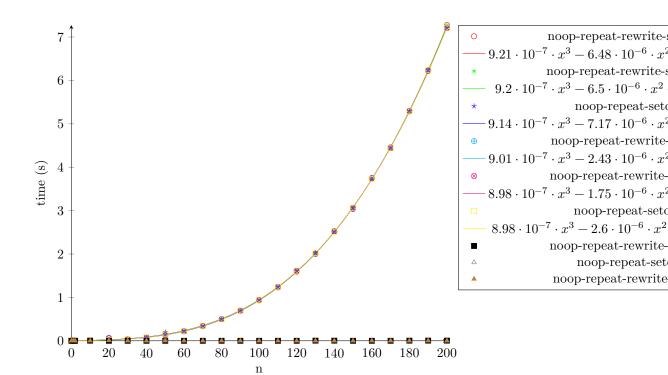


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

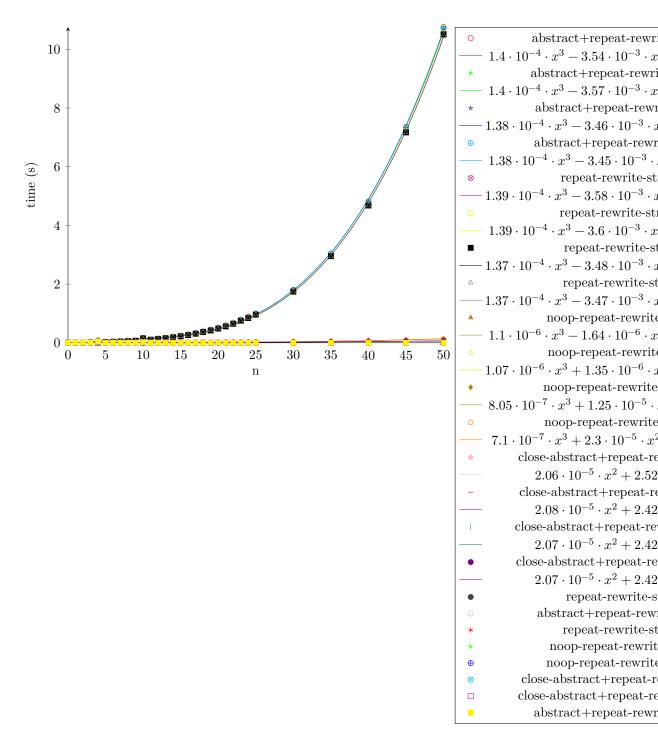


Figure 5: timing-rewrite-strat-under-binders

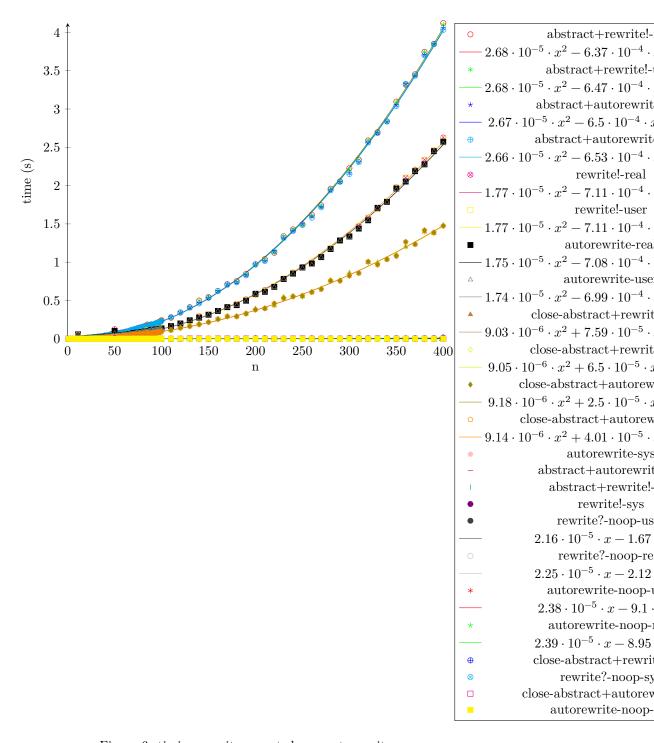


Figure 6: timing-rewrite-repeated-app-autorewrite

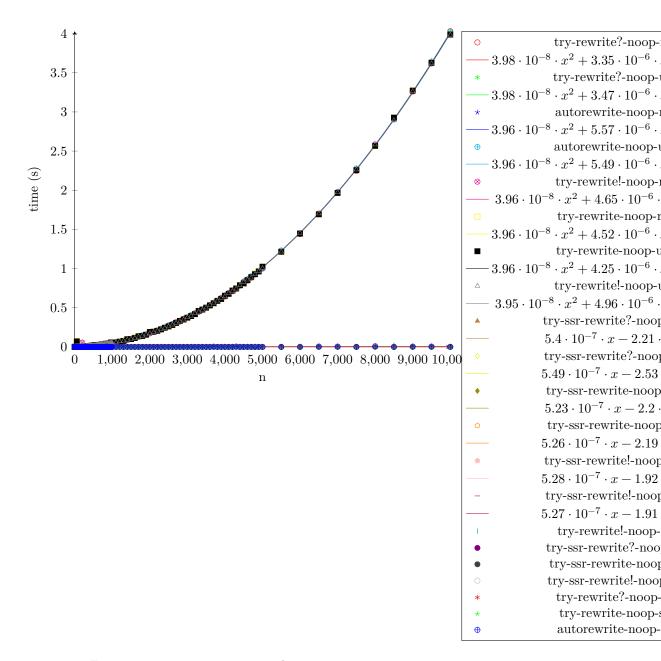


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

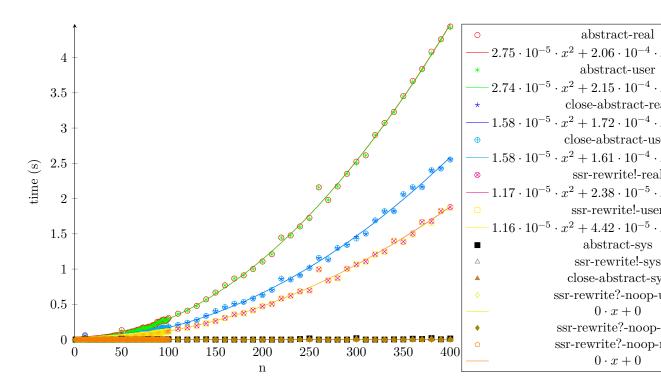


Figure 8: timing-rewrite-repeated-app-ssrrewrite

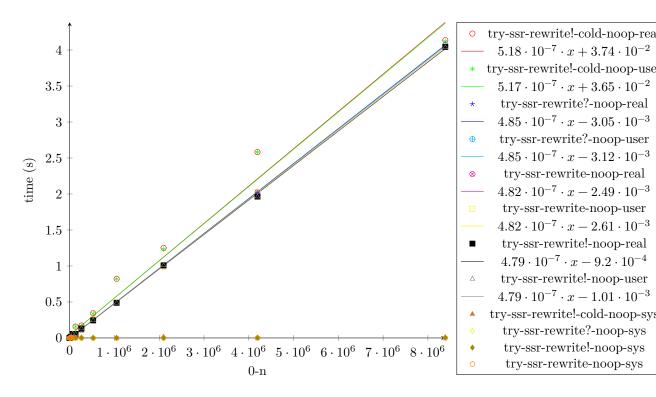


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn  $\ 1$ 

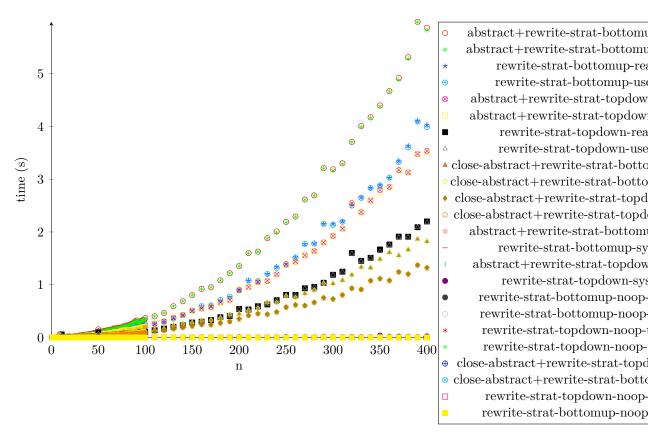


Figure 10: timing-rewrite-repeated-app-rewrite-strat

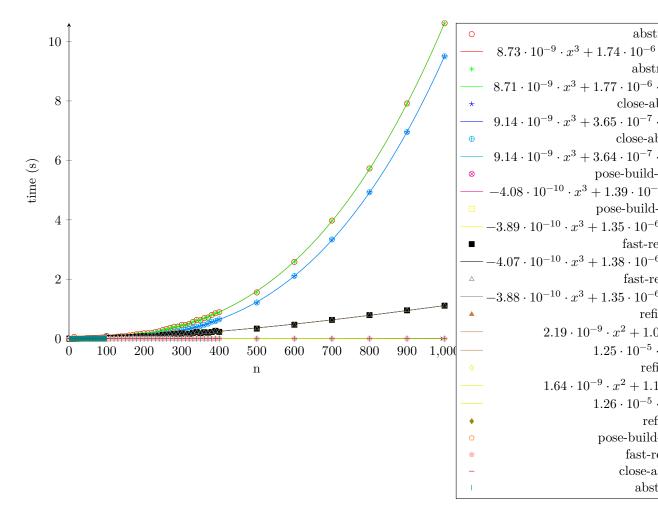
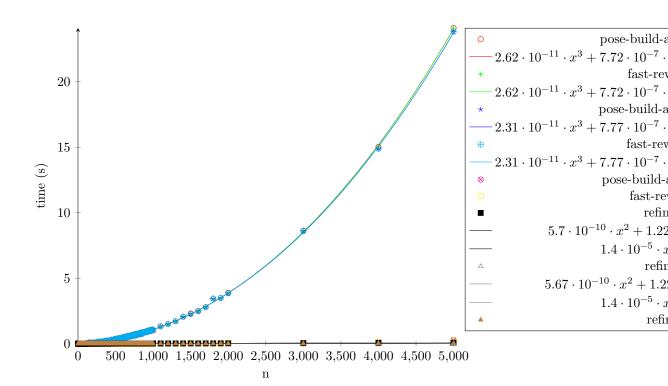
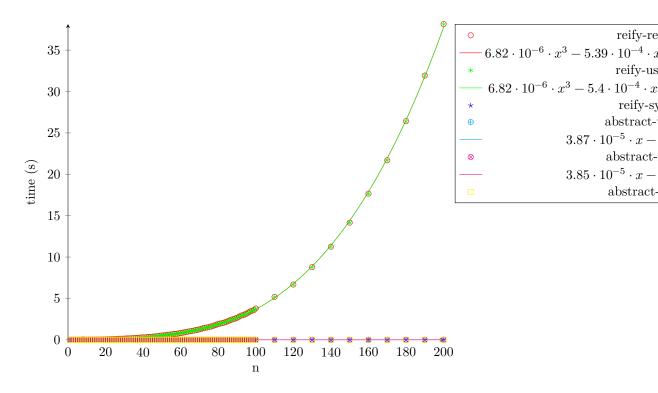


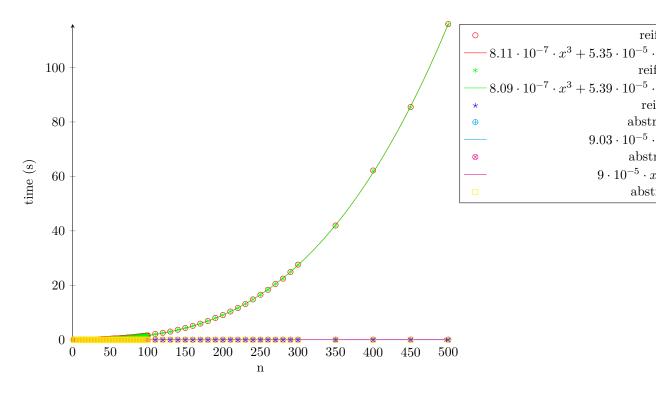
Figure 11: timing-rewrite-repeated-app-fast-rewrite



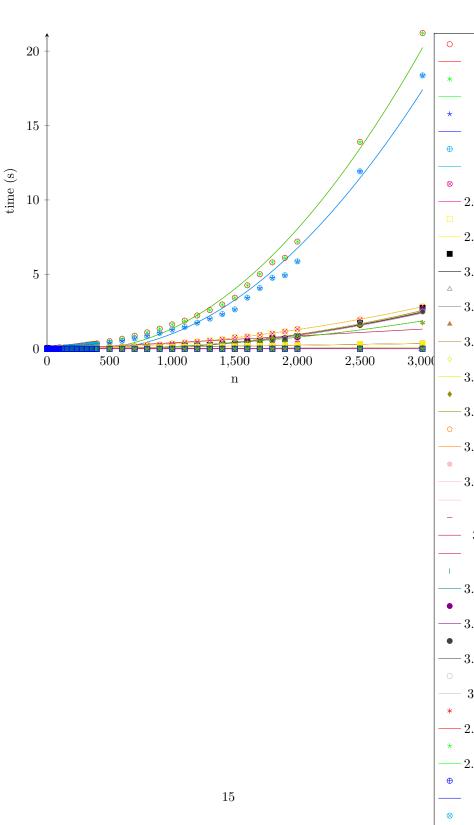
Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



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



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



 $2.75 \cdot 10^{-6} \cdot x^2 - 1.54 \cdot 10^{-6}$  $2.75 \cdot 10^{-6} \cdot x^2 - 1.55 \cdot 10^{-6}$  $2.45 \cdot 10^{-6} \cdot x^2 - 1.59 \cdot 10^{-6}$  $2.45 \cdot 10^{-6} \cdot x^2 - 1.59 \cdot 10^{-6}$  $2.99 \cdot 10^{-7} \cdot x^2 + 4.55 \cdot 10^{-5} \cdot 10^{-5} \cdot x^2 + 4.55 \cdot 10^{-5} \cdot x^2 + 4.55 \cdot 10^$  $2.99 \cdot 10^{-7} \cdot x^2 + 4.48 \cdot 10^{-5} \cdot x^2$  $3.81 \cdot 10^{-7} \cdot x^2 - 2.92 \cdot 10^{-4} \cdot x^2$  $3.81 \cdot 10^{-7} \cdot x^2 - 2.92 \cdot 10^{-4} \cdot x^2$  $3.76 \cdot 10^{-7} \cdot x^2 - 2.86 \cdot 10^{-4} \cdot x^2$  $3.76 \cdot 10^{-7} \cdot x^2 - 2.86 \cdot 10^{-4} \cdot x^2$  $3.66 \cdot 10^{-7} \cdot x^2 - 2.74 \cdot 10^{-4} \cdot x^2$  $3.66 \cdot 10^{-7} \cdot x^2 - 2.74 \cdot 10^{-4} \cdot x^2$  $3.66 \cdot 10^{-7} \cdot x^2 - 2.99 \cdot 10^{-4} \cdot x^2$  $3.66 \cdot 10^{-7} \cdot x^2 - 3 \cdot 10^{-4} \cdot x$  $3.67 \cdot 10^{-7} \cdot x^2 - 2.85 \cdot 10^{-4} \cdot x^2$  $3.67 \cdot 10^{-7} \cdot x^2 - 2.84 \cdot 10^{-4} \cdot x^2$  $3.51 \cdot 10^{-7} \cdot x^2 - 2.61 \cdot 10^{-4} \cdot x^2$  $3.51 \cdot 10^{-7} \cdot x^2 - 2.6 \cdot 10^{-4} \cdot x$  $2.39 \cdot 10^{-7} \cdot x^2 - 9.35 \cdot 10^{-5} \cdot x^2$  $2.38 \cdot 10^{-7} \cdot x^2 - 9.27 \cdot 10^{-5} \cdot x^2$  $1.19 \cdot 10^{-4} \cdot x - 9.41 \cdot$ 

ob ools I see

abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

close-abstract-rea

close-abstract-use

check-pf-cast-use

check-pf-cast-rea

type-pf-cast-real

type-pf-cast-user

type-admit-cast-us

type-admit-cast-re

 $4.6 \cdot 10^{-4} \cdot x - 5.55 \cdot$ refine-user

 $4.6 \cdot 10^{-4} \cdot x - 5.55 \cdot$ type-admit-user

type-admit-real

check-admit-cast-u

check-admit-cast-r

check-admit-real

check-admit-user

build-eval-thunk-ua

build-eval-thunk-re

build-thunk-user

refine-real