

Figure 1: timing-pattern

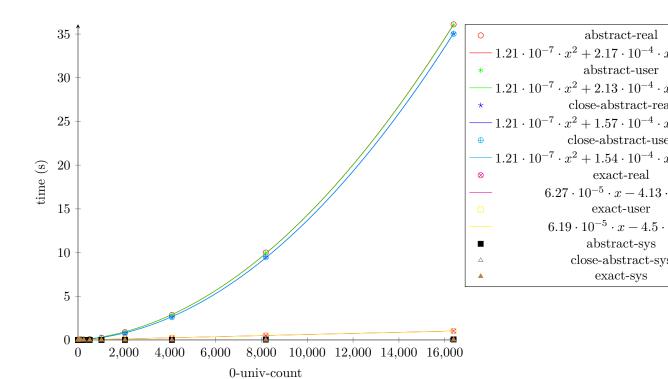


Figure 2: timing-n-polymorphic-universes param-1-n 0

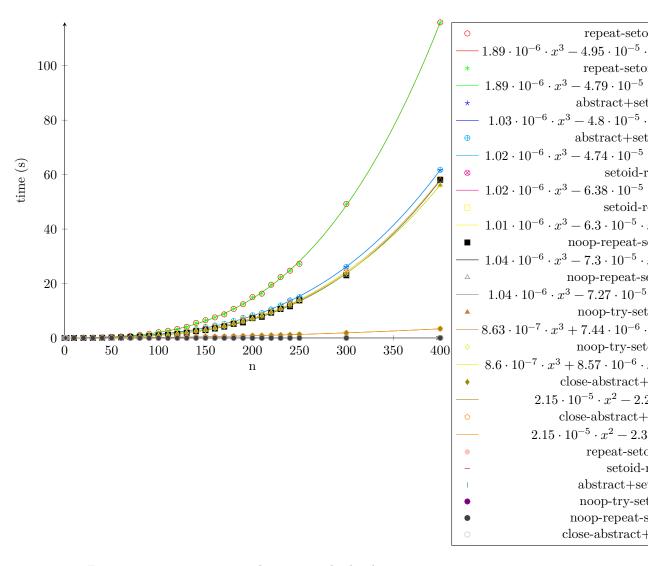
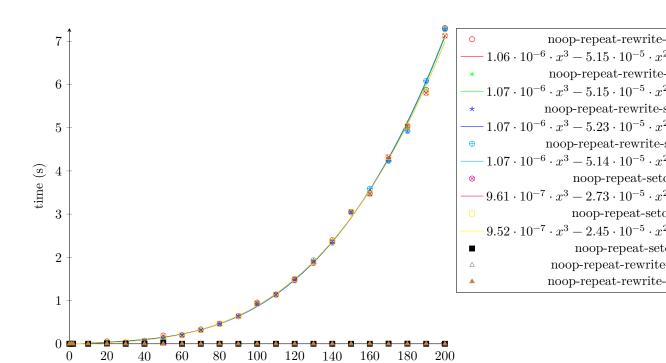


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

n

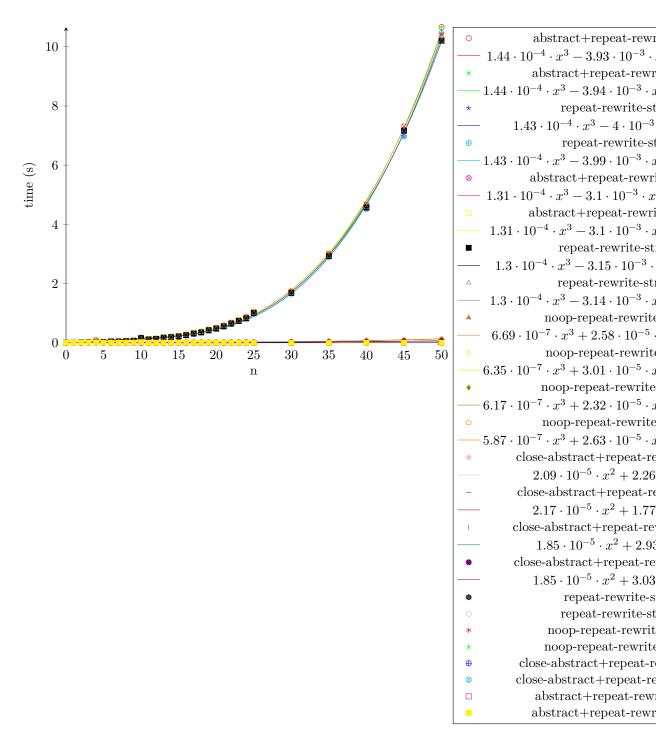
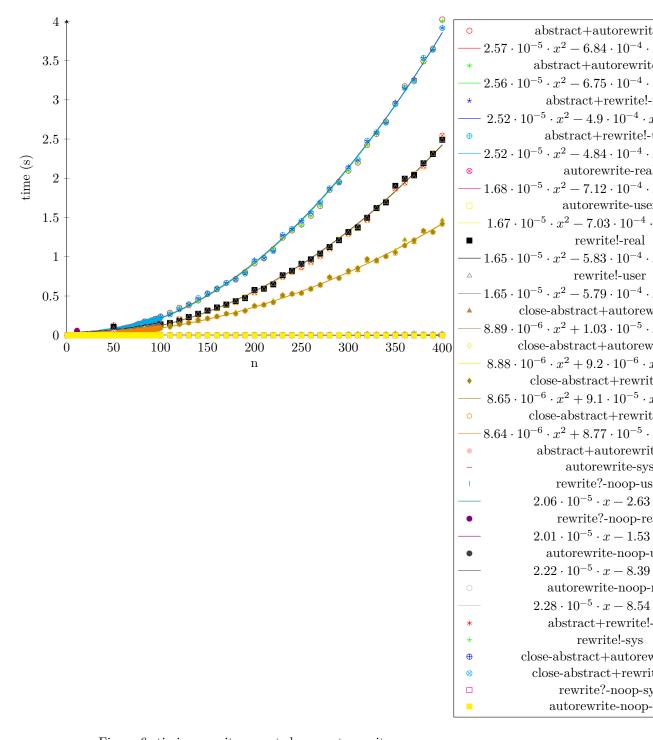


Figure 5: timing-rewrite-strat-under-binders



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

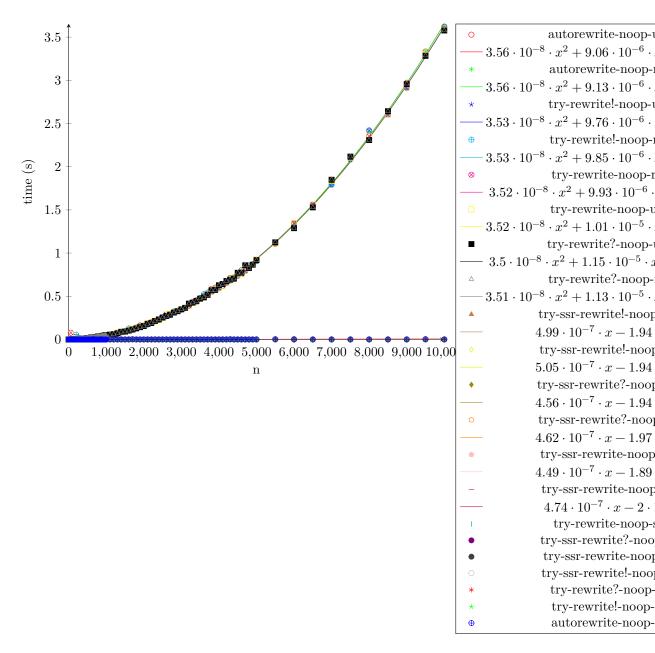
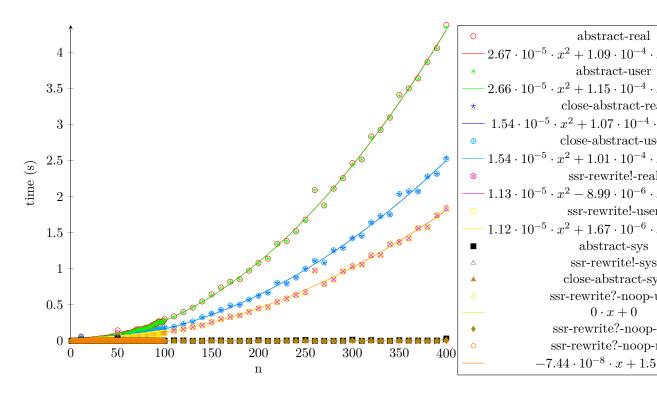


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

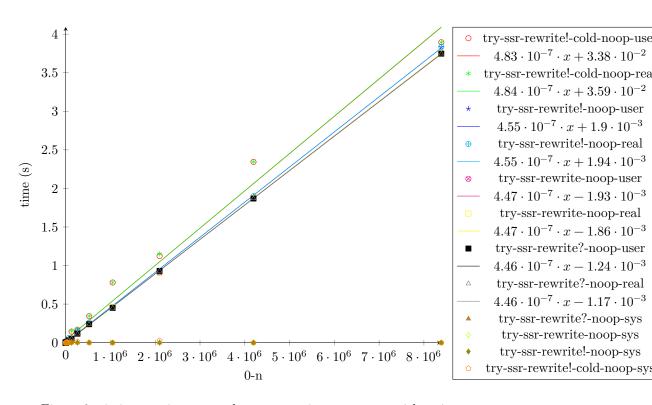


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\,1\,$

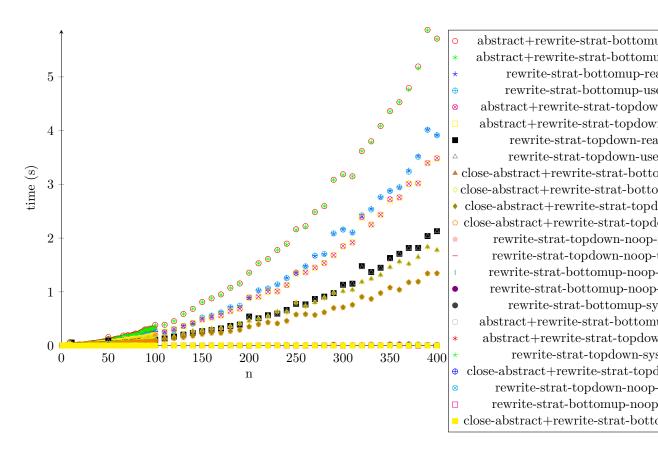


Figure 10: timing-rewrite-repeated-app-rewrite-strat

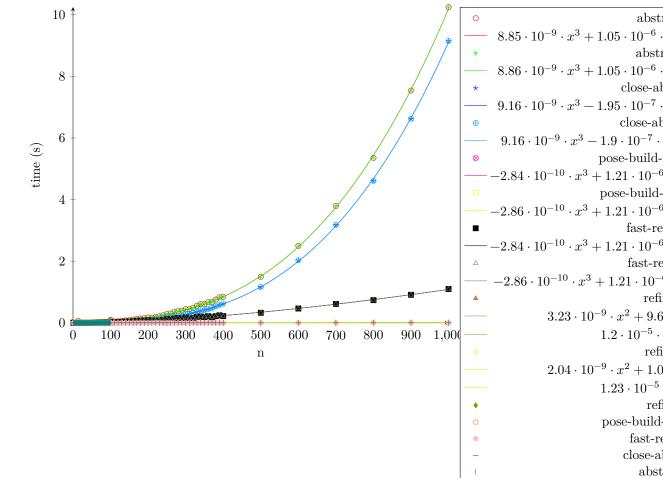
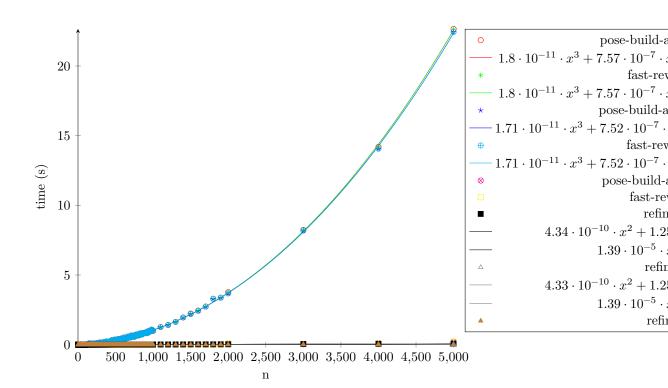
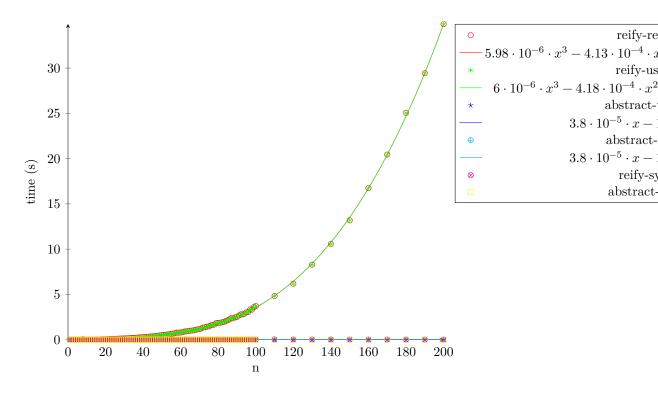


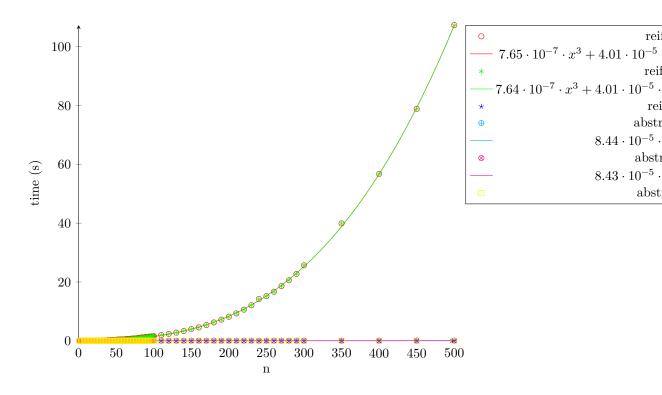
Figure 11: timing-rewrite-repeated-app-fast-rewrite



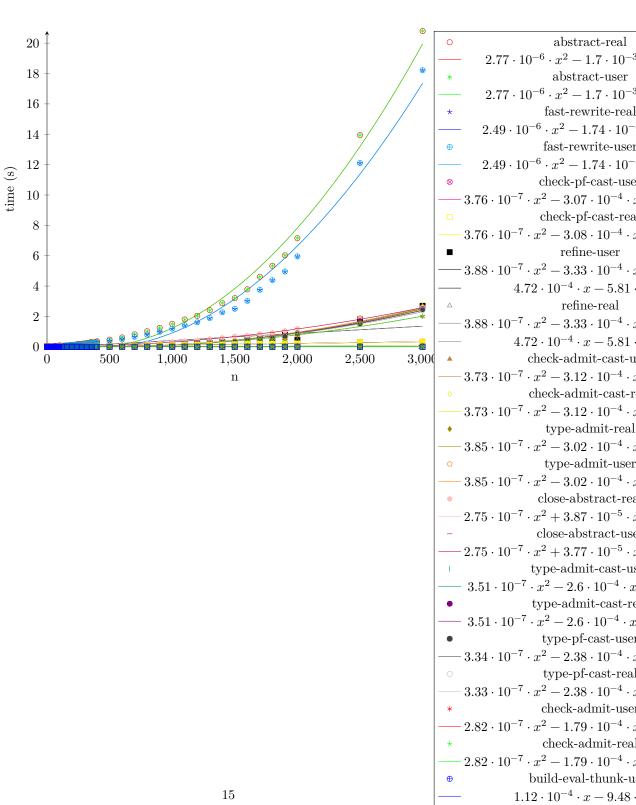
Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



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



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



abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

check-pf-cast-use

check-pf-cast-rea

 $4.72 \cdot 10^{-4} \cdot x - 5.81 \cdot$ refine-real

 $4.72 \cdot 10^{-4} \cdot x - 5.81 \cdot$

check-admit-cast-u

check-admit-cast-r

type-admit-real

type-admit-user

close-abstract-rea

close-abstract-use

type-admit-cast-us

type-admit-cast-re

type-pf-cast-user

type-pf-cast-real

check-admit-user

check-admit-real

build-eval-thunk-u

 $1.12 \cdot 10^{-4} \cdot x - 9.48$ build-eval-thunk-re $1.12 \cdot 10^{-4} \cdot x - 7.36 \cdot$ build-thunk-user $1.11 \cdot 10^{-4} \cdot x - 1.05$ build-thunk-real $1.11 \cdot 10^{-4} \cdot x - 8.46 \cdot$

refine-user

 $2.77 \cdot 10^{-6} \cdot x^2 - 1.7 \cdot 10^{-3}$

 $2.77 \cdot 10^{-6} \cdot x^2 - 1.7 \cdot 10^{-3}$

 $2.49 \cdot 10^{-6} \cdot x^2 - 1.74 \cdot 10^{-6}$

 $2.49 \cdot 10^{-6} \cdot x^2 - 1.74 \cdot 10^{-6}$