

Figure 1: timing-pattern

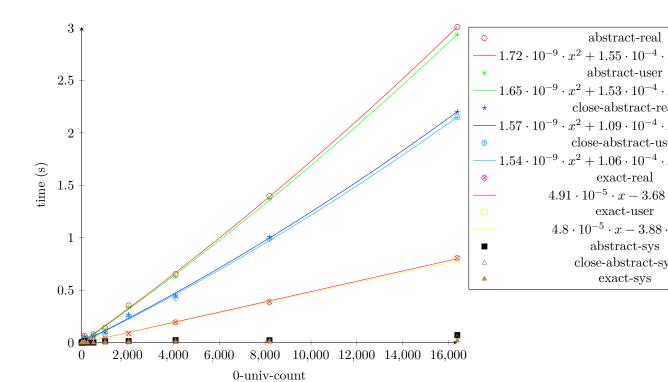


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$

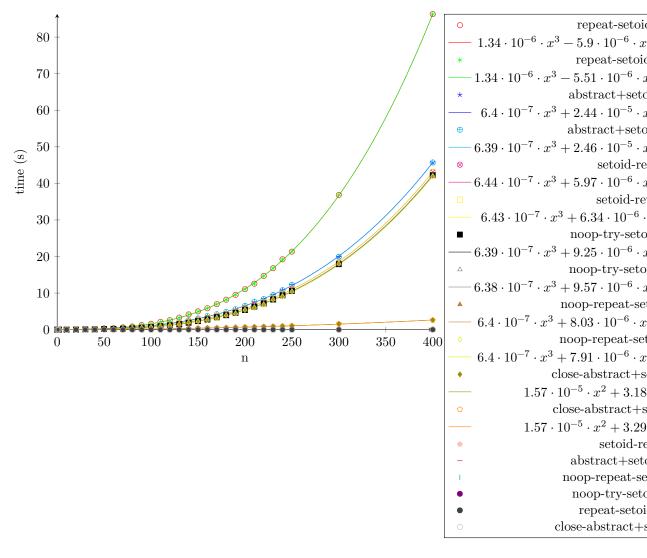
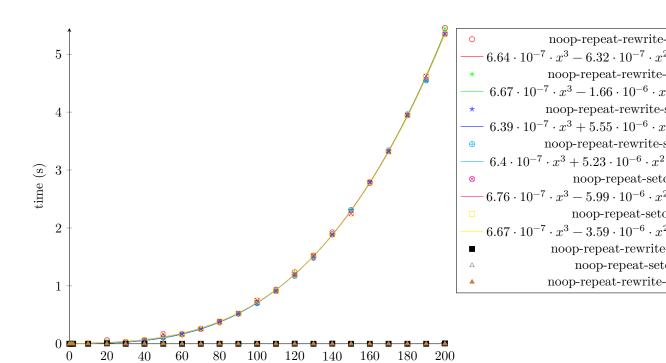


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

n

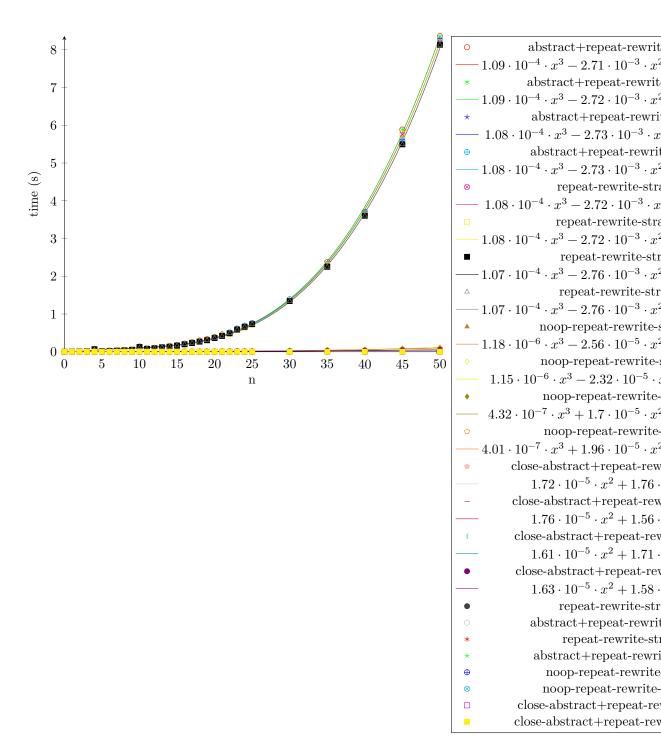
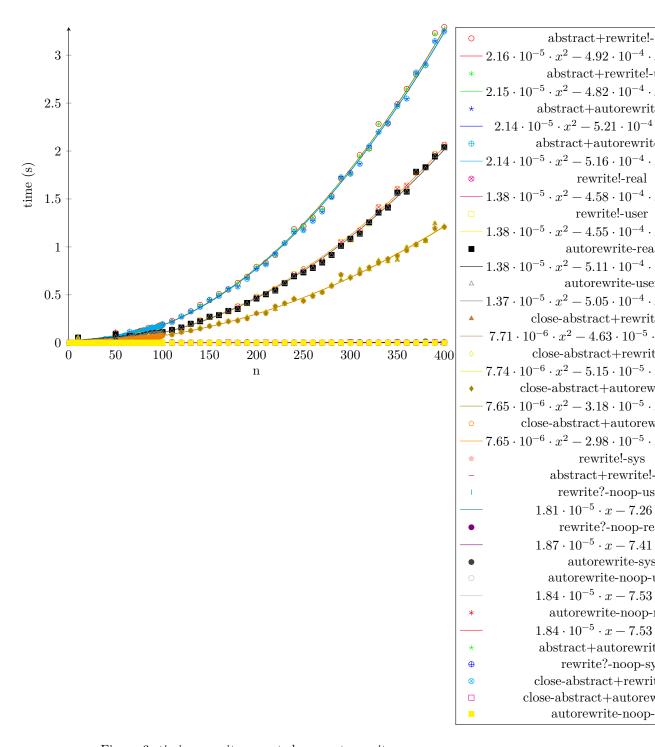


Figure 5: timing-rewrite-strat-under-binders



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

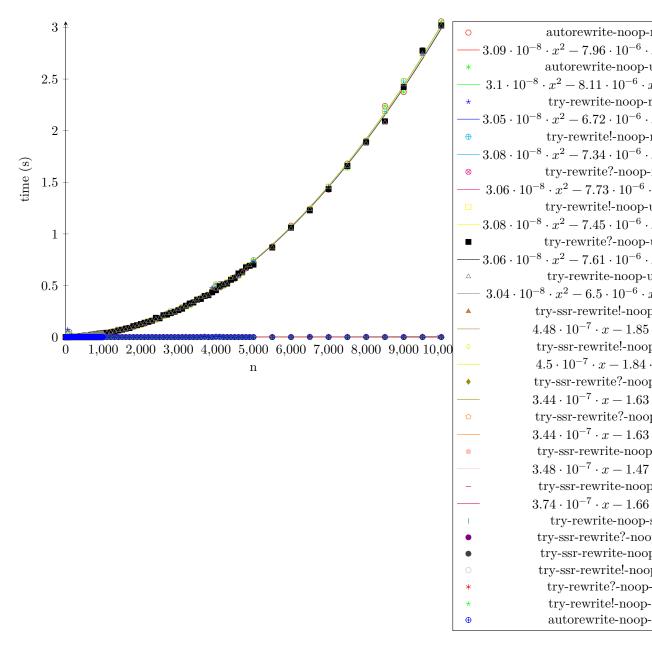
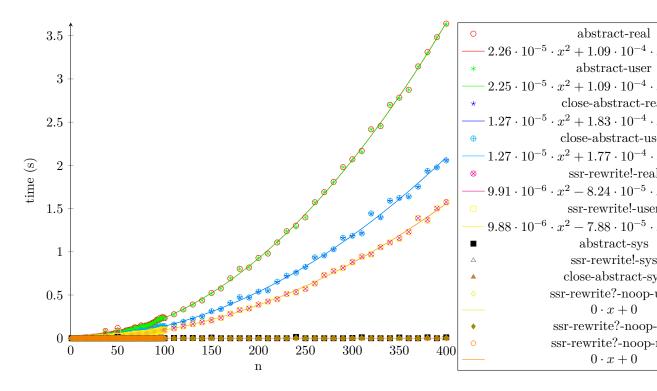


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

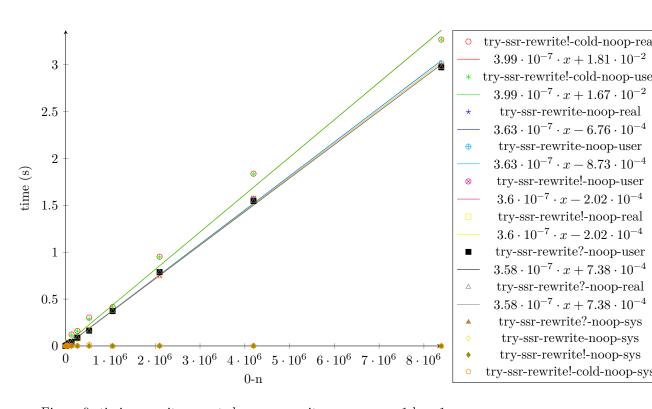


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

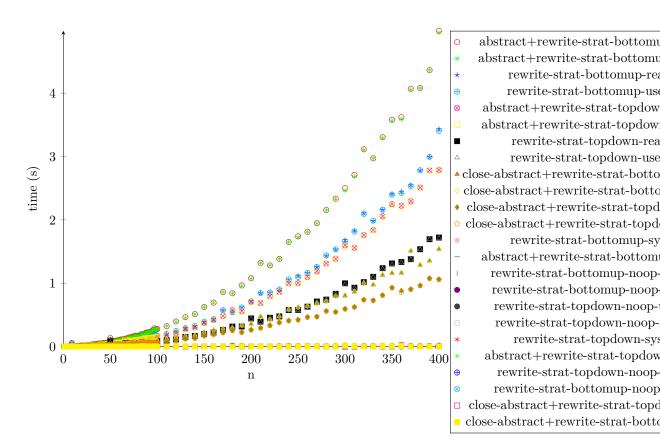
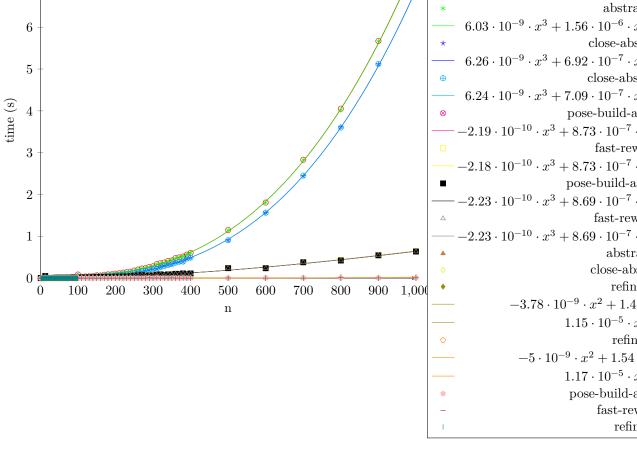


Figure 10: timing-rewrite-repeated-app-rewrite-strat

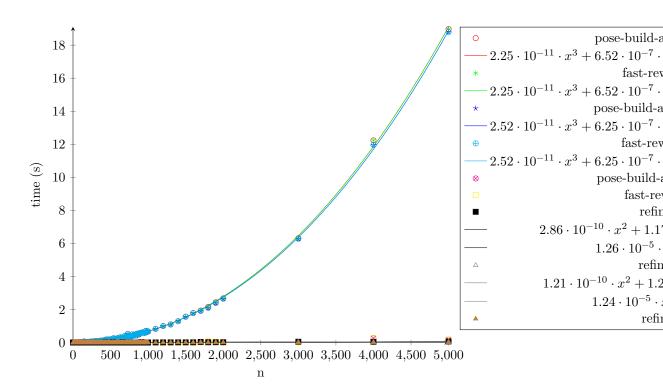


abstra

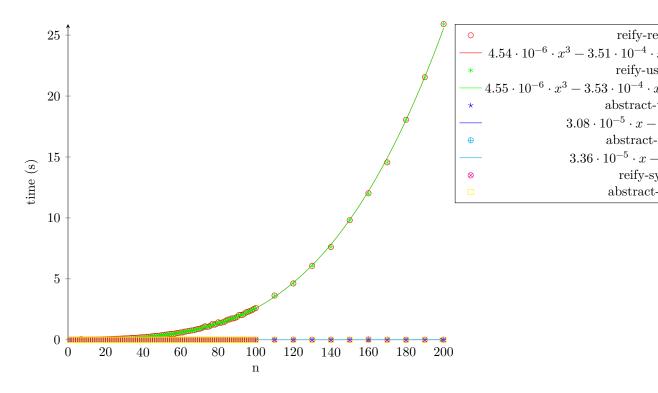
 $6.05 \cdot 10^{-9} \cdot x^3 + 1.55 \cdot 10^{-6} \cdot x^3$

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

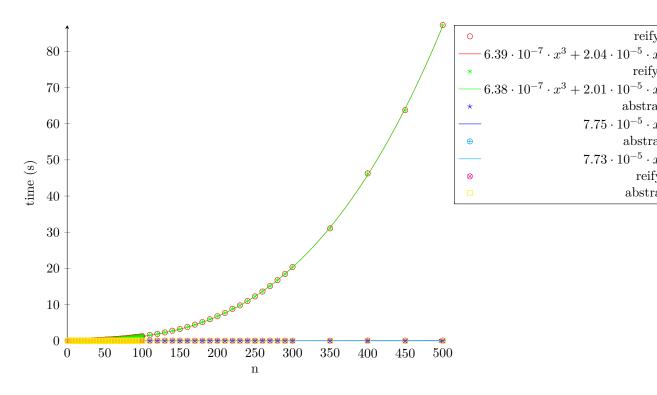
7



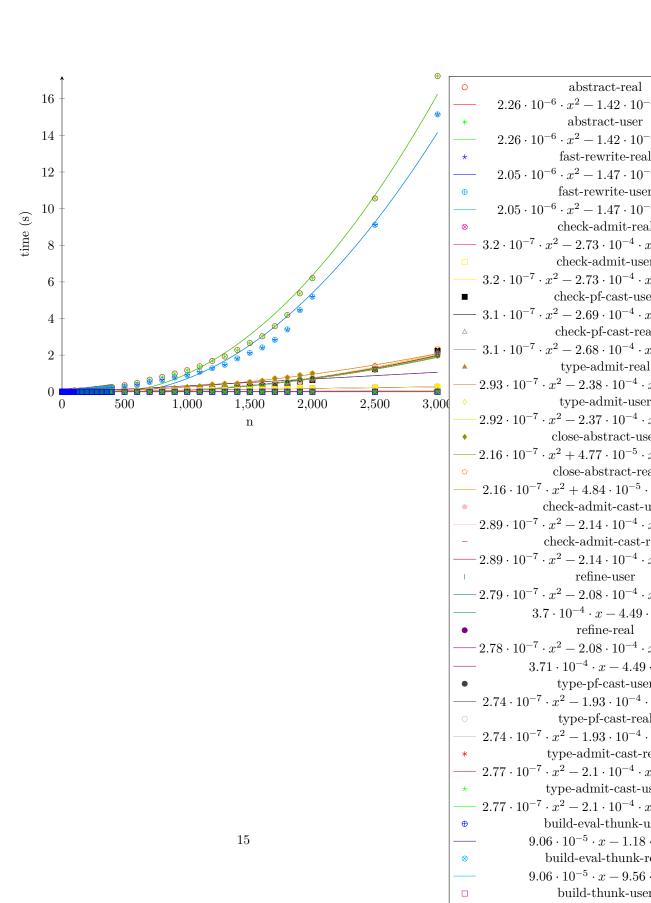
 $\label{prop:figure 12:timing-rewrite-repeated-app-fast-rewrite-no-abstract} Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract$



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



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



 $abstract\text{-}\mathrm{real}$

abstract-user

fast-rewrite-real

fast-rewrite-user

check-admit-real

check-admit-user

check-pf-cast-use

check-pf-cast-rea

type-admit-real

type-admit-user

close-abstract-use

close-abstract-rea

check-admit-cast-u

check-admit-cast-r

 $3.7 \cdot 10^{-4} \cdot x - 4.49 \cdot$ refine-real

 $3.71 \cdot 10^{-4} \cdot x - 4.49 \cdot$ type-pf-cast-user

type-pf-cast-real

type-admit-cast-re

type-admit-cast-us

build-eval-thunk-u

 $9.06 \cdot 10^{-5} \cdot x - 1.18 \cdot$ build-eval-thunk-re $9.06 \cdot 10^{-5} \cdot x - 9.56 \cdot$ build-thunk-user $8.98 \cdot 10^{-5} \cdot x - 1.22 \cdot$ build-thunk-real $8.98 \cdot 10^{-5} \cdot x - 1.01 \cdot$ shoole I wasn

refine-user