

Figure 1: timing-pattern

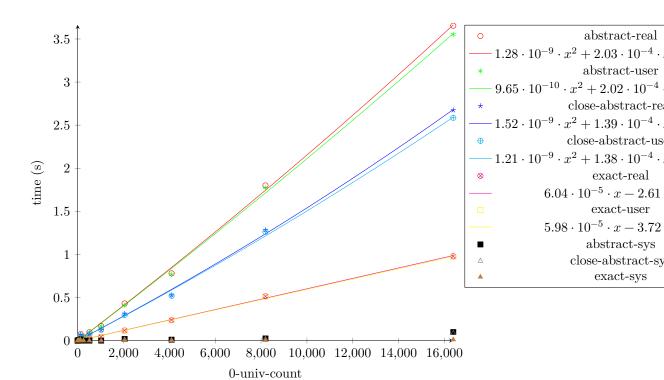


Figure 2: timing-n-polymorphic-universes param-1-n $\,0$

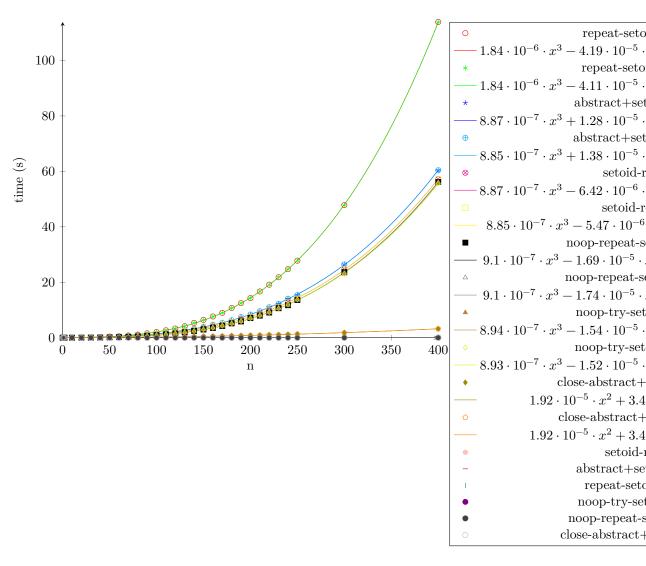
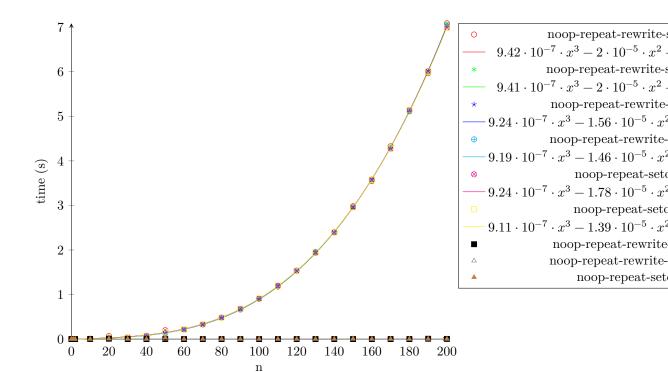


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

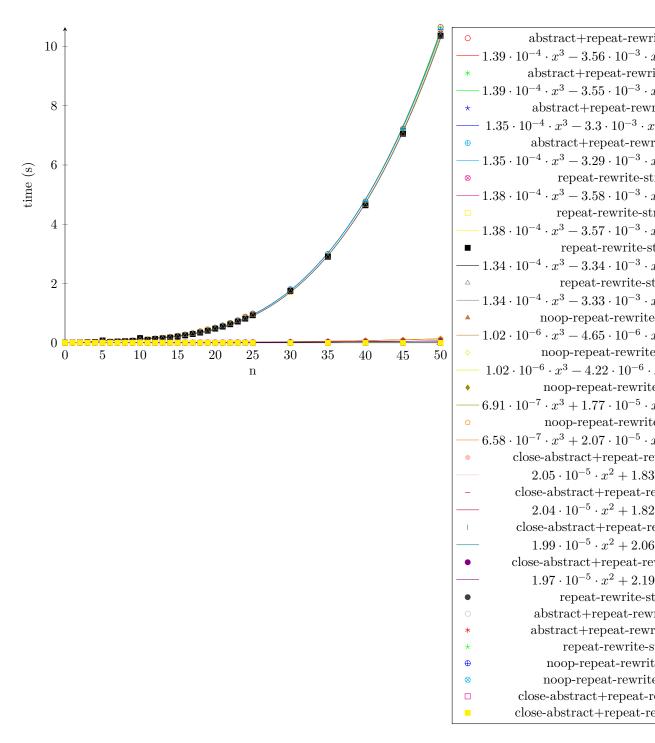
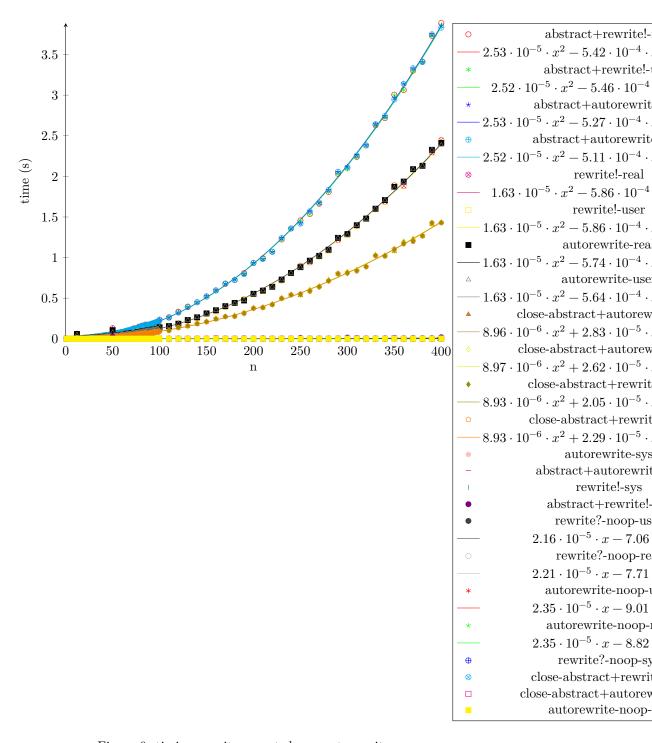


Figure 5: timing-rewrite-strat-under-binders



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

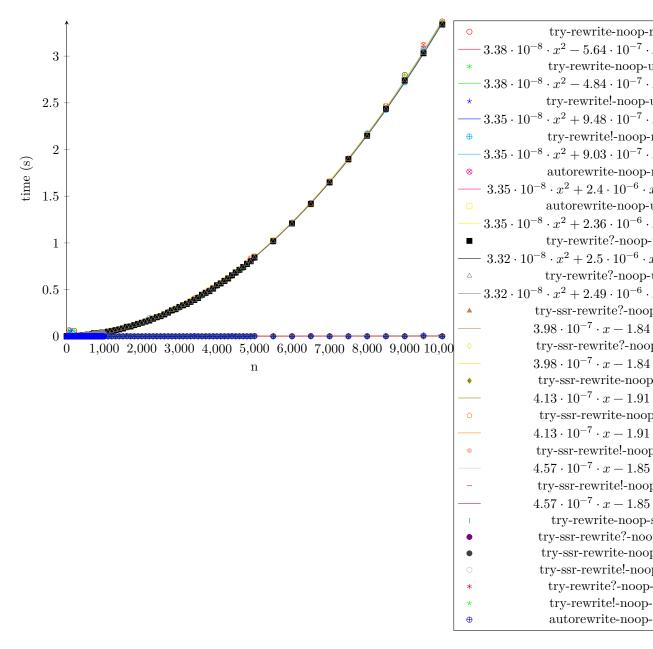


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

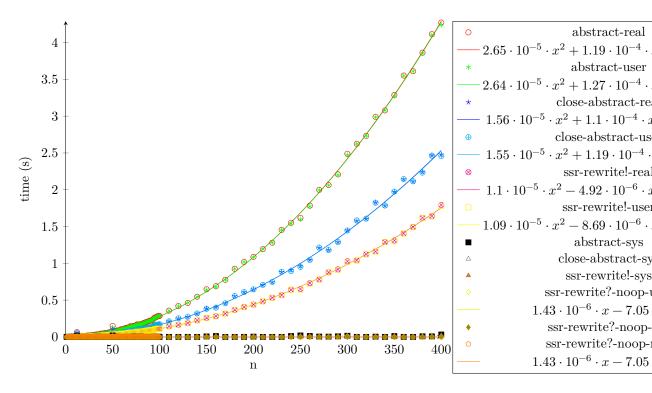


Figure 8: timing-rewrite-repeated-app-ssrrewrite

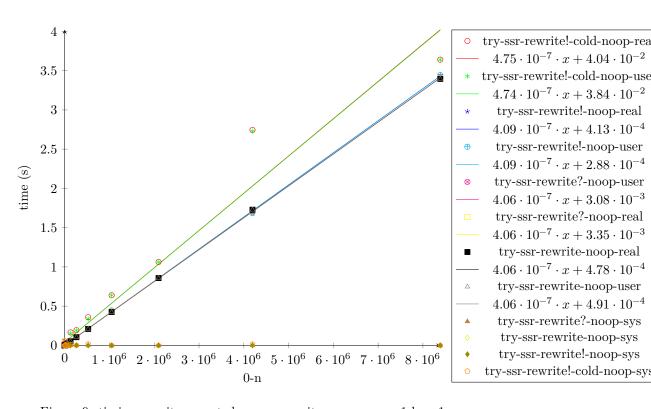


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

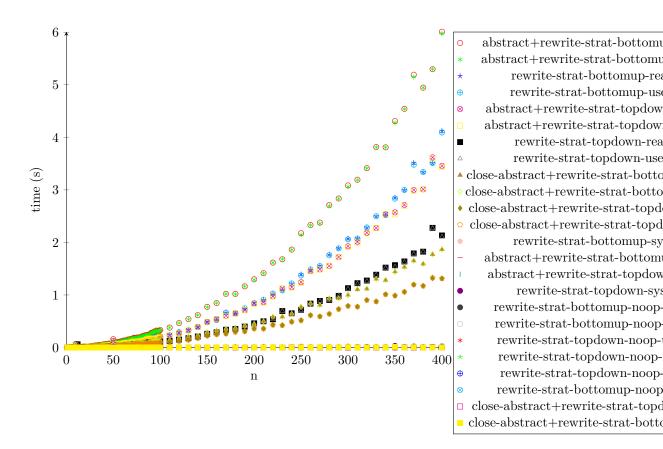


Figure 10: timing-rewrite-repeated-app-rewrite-strat

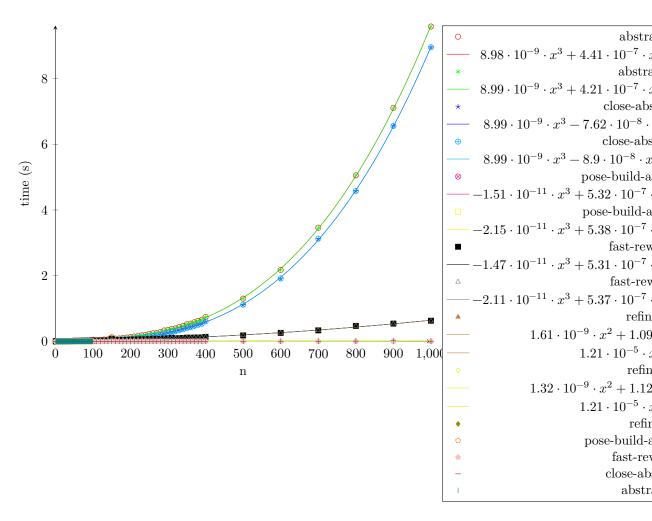
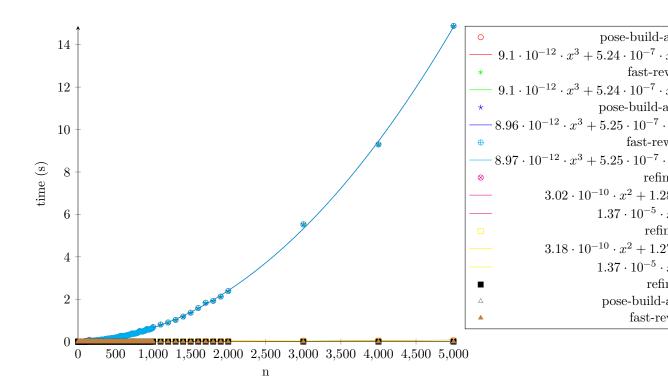
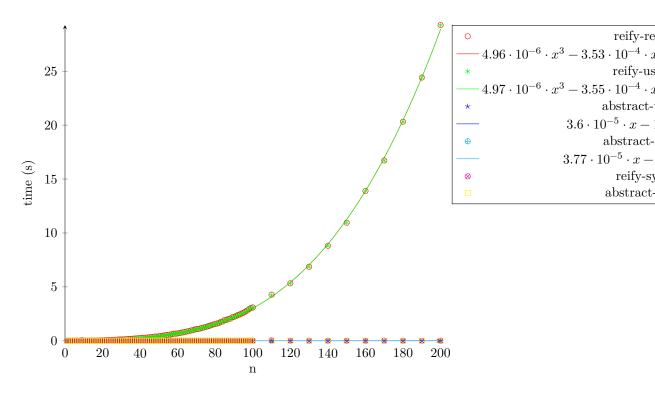


Figure 11: timing-rewrite-repeated-app-fast-rewrite



 ${\bf Figure~12:~timing\text{-}rewrite\text{-}repeated\text{-}app\text{-}fast\text{-}rewrite\text{-}no\text{-}abstract}}$



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

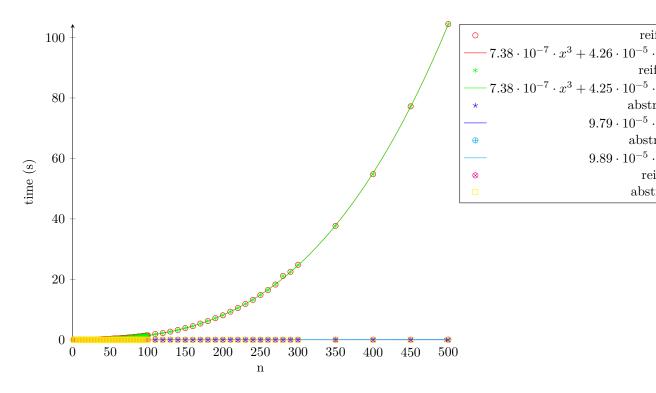
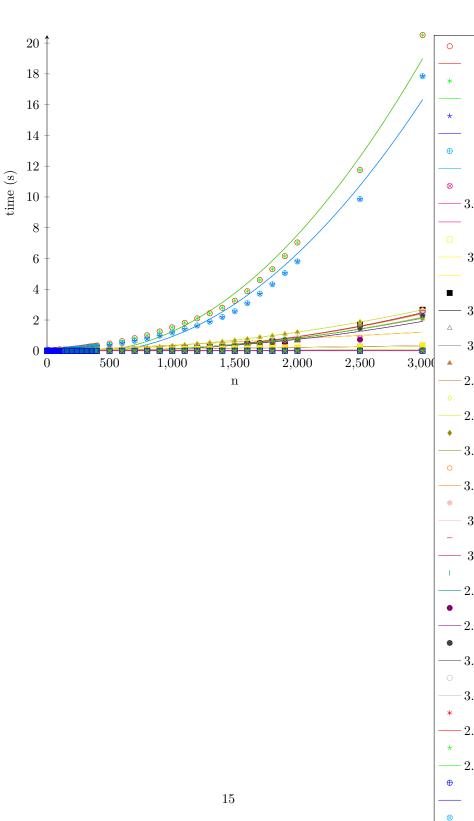


Figure 14: timing-typeclass-reification-let-in-PHOAS



 $2.59 \cdot 10^{-6} \cdot x^2 - 1.5 \cdot 10^{-3}$ $2.59 \cdot 10^{-6} \cdot x^2 - 1.5 \cdot 10^{-3}$ $2.31 \cdot 10^{-6} \cdot x^2 - 1.53 \cdot 10^{-6}$ $2.31 \cdot 10^{-6} \cdot x^2 - 1.53 \cdot 10^{-6}$ $3.28 \cdot 10^{-7} \cdot x^2 - 2.61 \cdot 10^{-4} \cdot x^2$ $3.28\cdot 10^{-7}\cdot x^2 - 2.6\cdot 10^{-4}\cdot x$ $3.78 \cdot 10^{-7} \cdot x^2 - 3.15 \cdot 10^{-4}$ $3.78 \cdot 10^{-7} \cdot x^2 - 3.15 \cdot 10^{-4}$ $2.84 \cdot 10^{-7} \cdot x^2 + 3.66 \cdot 10^{-5} \cdot x^2$ $2.84 \cdot 10^{-7} \cdot x^2 + 3.71 \cdot 10^{-5} \cdot x^2$ $3.58 \cdot 10^{-7} \cdot x^2 - 2.78 \cdot 10^{-4} \cdot x^2$ $3.58 \cdot 10^{-7} \cdot x^2 - 2.77 \cdot 10^{-4} \cdot x^2$ $3.65 \cdot 10^{-7} \cdot x^2 - 2.8 \cdot 10^{-4} \cdot x$ $3.65 \cdot 10^{-7} \cdot x^2 - 2.8 \cdot 10^{-4} \cdot x$ $2.68 \cdot 10^{-7} \cdot x^2 - 1.72 \cdot 10^{-4} \cdot x^2$ $2.68 \cdot 10^{-7} \cdot x^2 - 1.71 \cdot 10^{-4} \cdot x^2$ $3.14 \cdot 10^{-7} \cdot x^2 - 2.24 \cdot 10^{-4} \cdot x^2$ $3.14 \cdot 10^{-7} \cdot x^2 - 2.24 \cdot 10^{-4} \cdot x^2$ $2.92 \cdot 10^{-7} \cdot x^2 - 1.75 \cdot 10^{-4} \cdot x^2$ $2.92 \cdot 10^{-7} \cdot x^2 - 1.75 \cdot 10^{-4} \cdot x^2$ $1.09 \cdot 10^{-4} \cdot x - 7.31 \cdot$

abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

refine-user

refine-real

 $4.2 \cdot 10^{-4} \cdot x - 5.01 \cdot$

 $4.2 \cdot 10^{-4} \cdot x - 5.01 \cdot$

check-pf-cast-use

check-pf-cast-rea

close-abstract-rea

close-abstract-use

type-admit-real

type-admit-user

check-admit-user

check-admit-real

type-pf-cast-real

type-pf-cast-user

type-admit-cast-us

type-admit-cast-re

check-admit-cast-u

check-admit-cast-r

build-eval-thunk-ua

build-thunk-user $1.08 \cdot 10^{-4} \cdot x - 8.58 \cdot$ build-thunk-real $1.08 \cdot 10^{-4} \cdot x - 7.75 \cdot$

 $1.08 \cdot 10^{-4} \cdot x - 8.08 \cdot$ build-eval-thunk-re