

Figure 1: timing-pattern

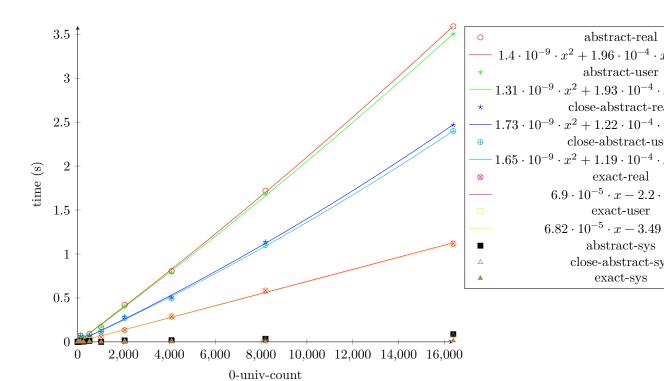


Figure 2: timing-n-polymorphic-universes param-1-n 0

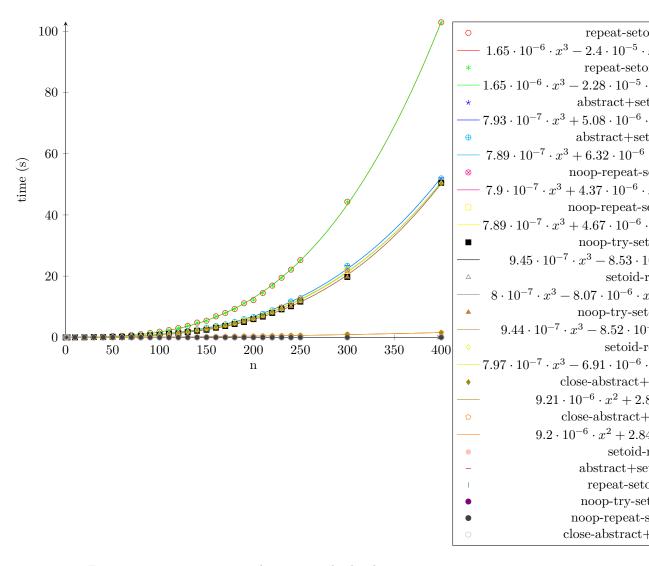


Figure 3: timing-repeat-setoid-rewrite-under-binders

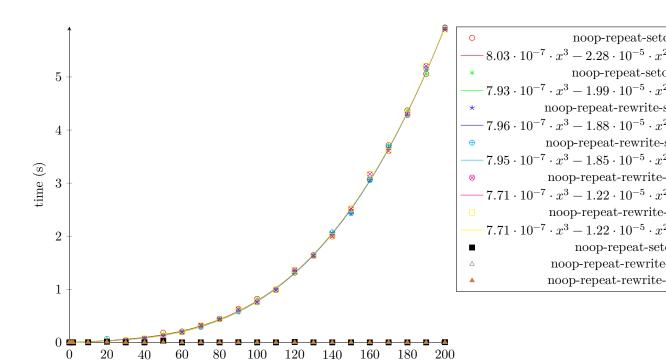


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

n

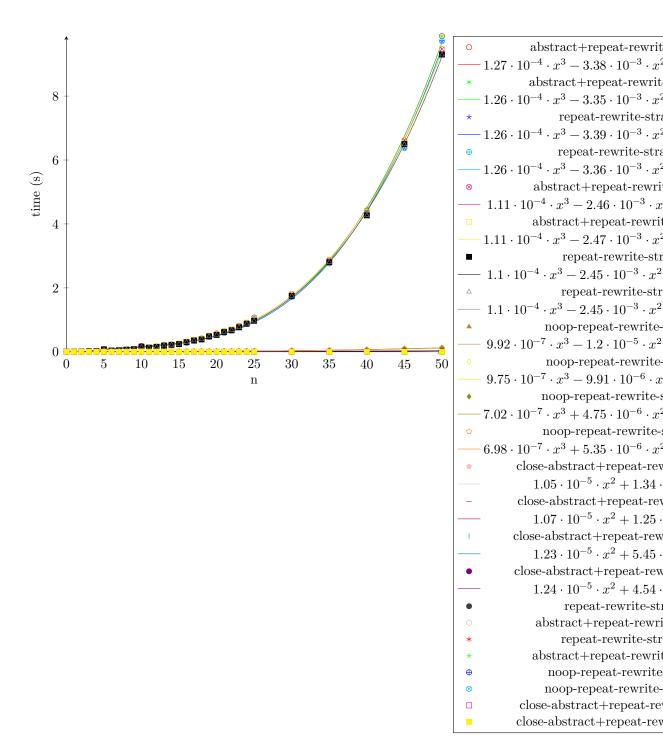


Figure 5: timing-rewrite-strat-under-binders

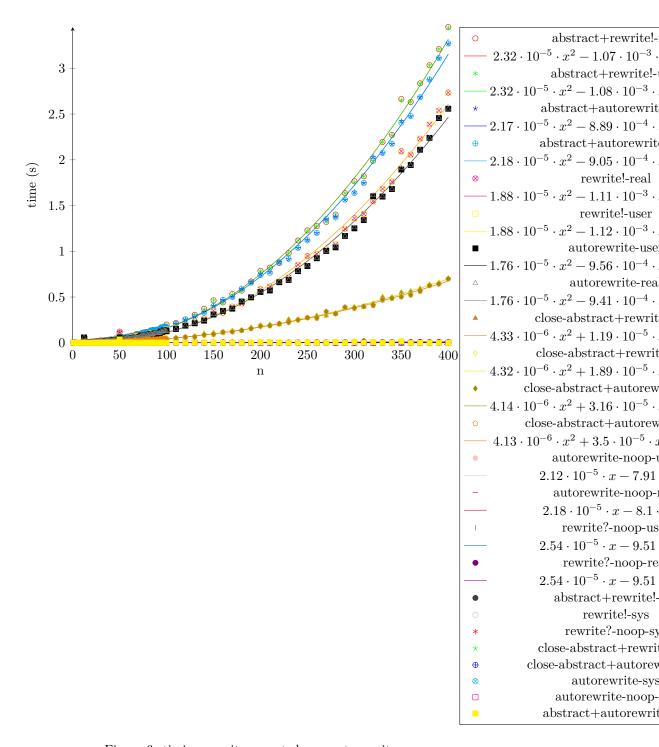


Figure 6: timing-rewrite-repeated-app-autorewrite

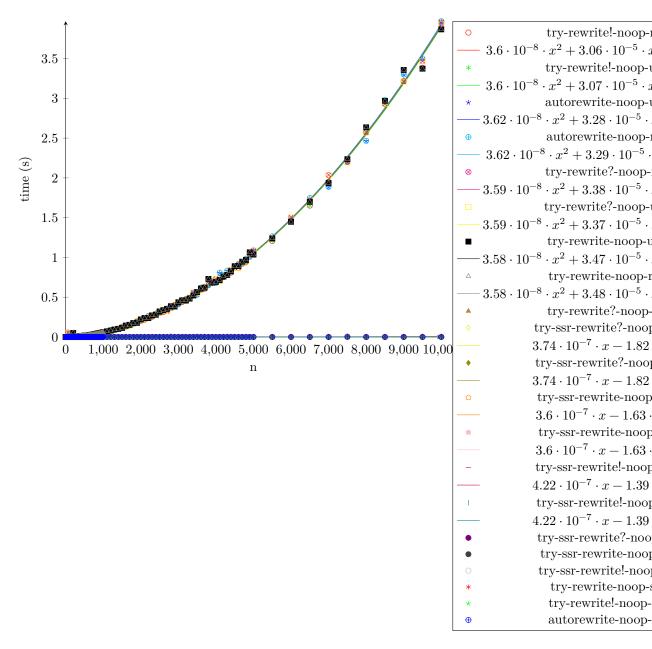


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

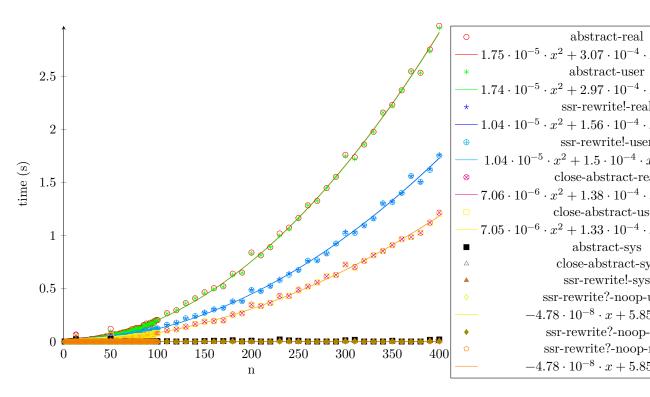


Figure 8: timing-rewrite-repeated-app-ssrrewrite

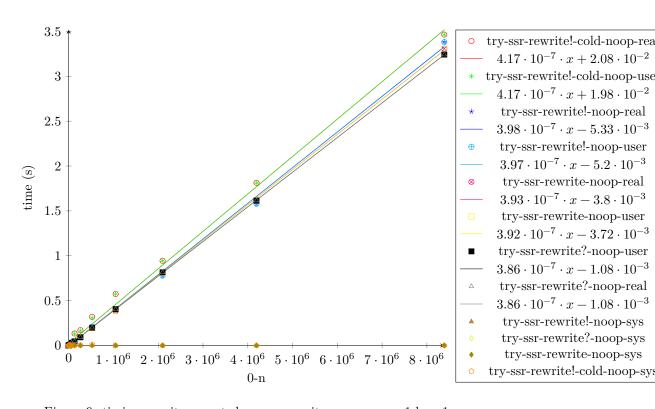


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

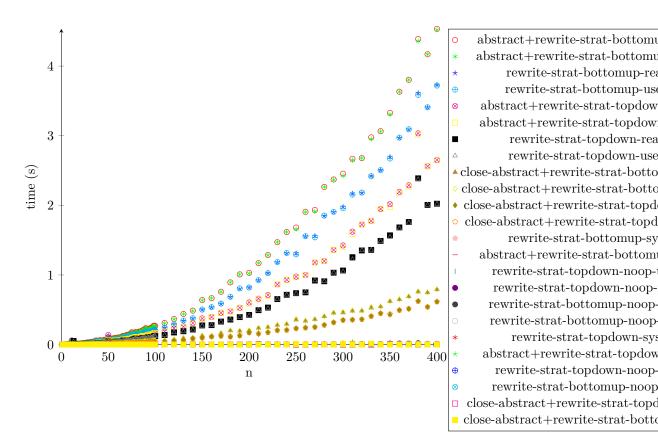


Figure 10: timing-rewrite-repeated-app-rewrite-strat

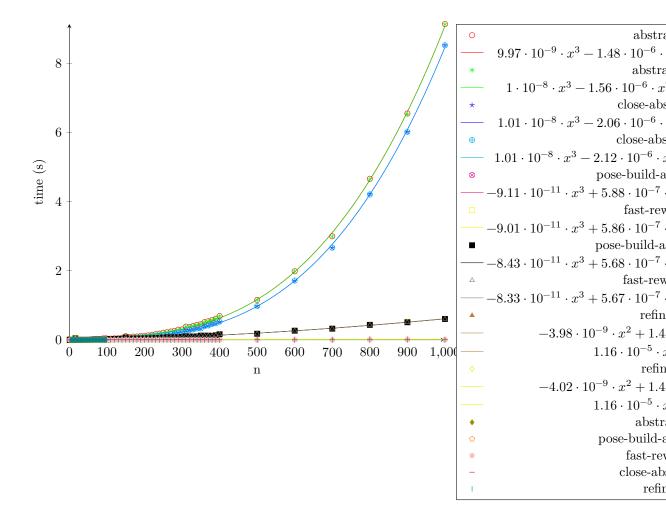
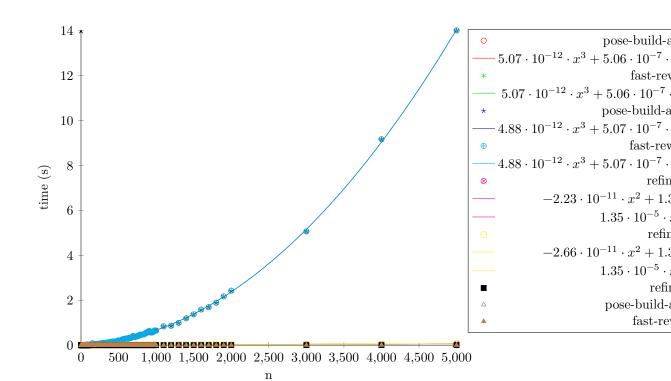
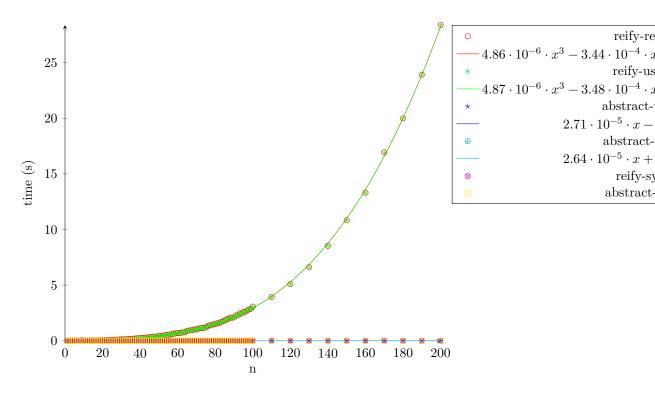


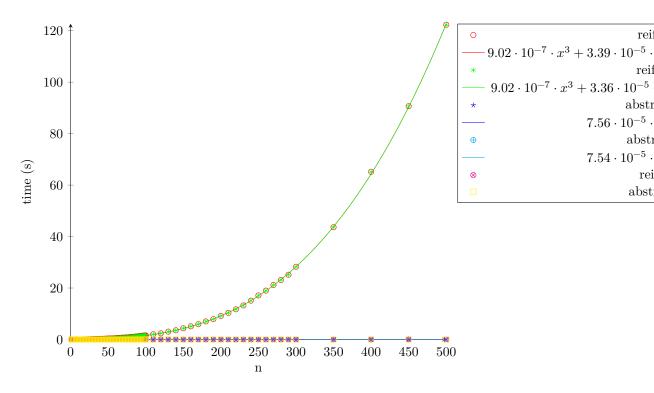
Figure 11: timing-rewrite-repeated-app-fast-rewrite



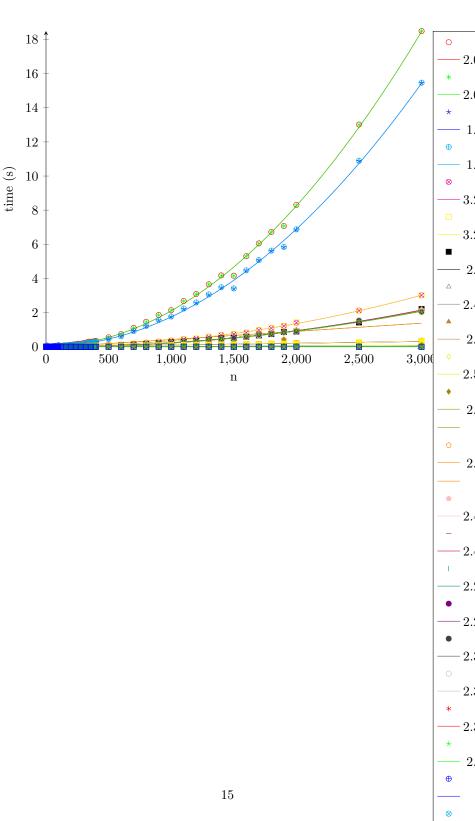
Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



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



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



 $2.03 \cdot 10^{-6} \cdot x^2 + 6.56 \cdot 10^{-5} \cdot x^2$ $2.03 \cdot 10^{-6} \cdot x^2 + 6.05 \cdot 10^{-5} \cdot 10$ $1.7 \cdot 10^{-6} \cdot x^2 + 3.61 \cdot 10^{-5} \cdot x$ $1.7 \cdot 10^{-6} \cdot x^2 + 4.03 \cdot 10^{-5} \cdot x$ $3.28 \cdot 10^{-7} \cdot x^2 + 2.25 \cdot 10^{-5} \cdot x^2 + 2.25 \cdot 10^{-5}$ $3.28 \cdot 10^{-7} \cdot x^2 + 2.37 \cdot 10^{-5} \cdot x^2$ $2.44 \cdot 10^{-7} \cdot x^2 - 1.5 \cdot 10^{-5} \cdot x$ $2.44\cdot 10^{-7}\cdot x^2 - 1.45\cdot 10^{-5}\cdot x$ $2.53 \cdot 10^{-7} \cdot x^2 - 4.25 \cdot 10^{-5} \cdot$ $2.53 \cdot 10^{-7} \cdot x^2 - 4.17 \cdot 10^{-5} \cdot x^2 = 4.17 \cdot 10^{-5} \cdot x^2 + 4.17 \cdot 10^{-5} \cdot x^2 = 4.17 \cdot 10^{-5} \cdot x^2 + 4.17 \cdot 10^{-5} \cdot x^2 = 4.17 \cdot 10^{-5} \cdot x^2$ $2.5 \cdot 10^{-7} \cdot x^2 - 4.06 \cdot 10^{-5} \cdot x$ $2.5 \cdot 10^{-7} \cdot x^2 - 4.03 \cdot 10^{-5} \cdot x$ $2.44 \cdot 10^{-7} \cdot x^2 - 1.38 \cdot 10^{-5} \cdot x^2 = 1.38 \cdot 10^{-5} \cdot x^2 + 1.38 \cdot 10^{-5} \cdot x^2$ $2.44 \cdot 10^{-7} \cdot x^2 - 1.37 \cdot 10^{-5} \cdot x^2$ $2.27 \cdot 10^{-7} \cdot x^2 + 1.59 \cdot 10^{-5} \cdot x^2$ $2.27 \cdot 10^{-7} \cdot x^2 + 1.64 \cdot 10^{-5} \cdot x^2$ $2.32 \cdot 10^{-7} \cdot x^2 + 5.32 \cdot 10^{-7} \cdot x^2$ $2.32 \cdot 10^{-7} \cdot x^2 + 5.56 \cdot 10^{-7} \cdot x^2$ $2.31 \cdot 10^{-7} \cdot x^2 - 7.64 \cdot 10^{-7} \cdot x^2$ $2.31 \cdot 10^{-7} \cdot x^2 - 3.42 \cdot 10^{-7}$

abstract-real

abstract-user

fast-rewrite-user

fast-rewrite-real

close-abstract-use

close-abstract-rea

type-admit-cast-us

type-admit-cast-re

check-admit-cast-r

check-admit-cast-u

 $4.78 \cdot 10^{-4} \cdot x - 5.24 \cdot$ refine-real

 $4.78 \cdot 10^{-4} \cdot x - 5.23 \cdot$ check-admit-user

check-admit-real

check-pf-cast-use

check-pf-cast-rea

type-admit-user

type-admit-real

type-pf-cast-user

type-pf-cast-real

build-eval-thunk-u

 $1.05 \cdot 10^{-4} \cdot x - 1.7$ build-eval-thunk-re $1.05 \cdot 10^{-4} \cdot x - 1.48 \cdot$ build-thunk-user $1.04 \cdot 10^{-4} \cdot x - 1.71 \cdot$ build-thunk-real $1.04 \cdot 10^{-4} \cdot x - 1.49$ abaal. I ...aa.

refine-user