

Figure 1: timing-pattern

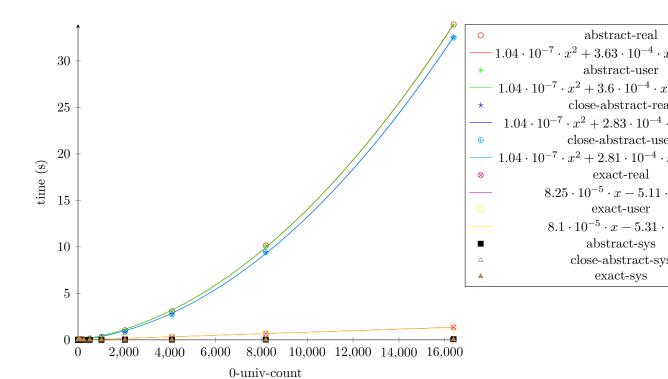


Figure 2: timing-n-polymorphic-universes param-1-n 0

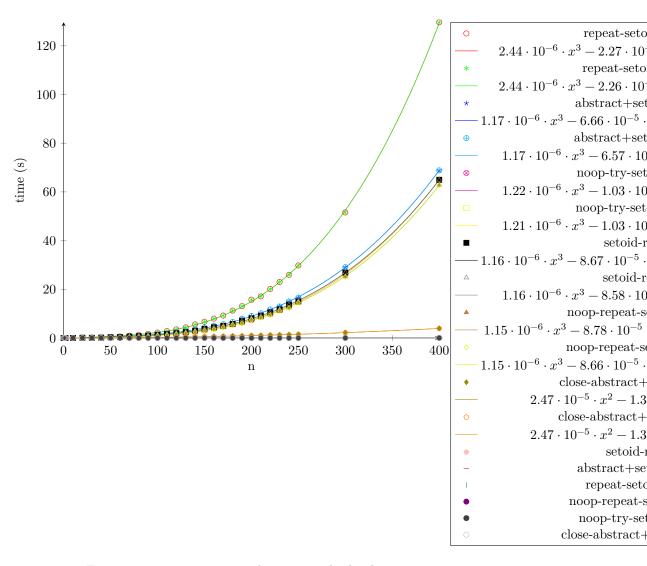


Figure 3: timing-repeat-setoid-rewrite-under-binders

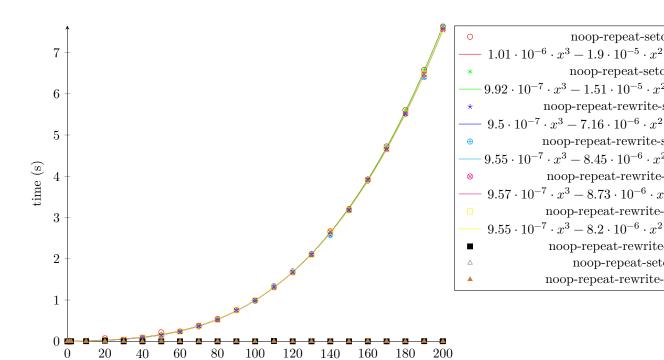


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

n

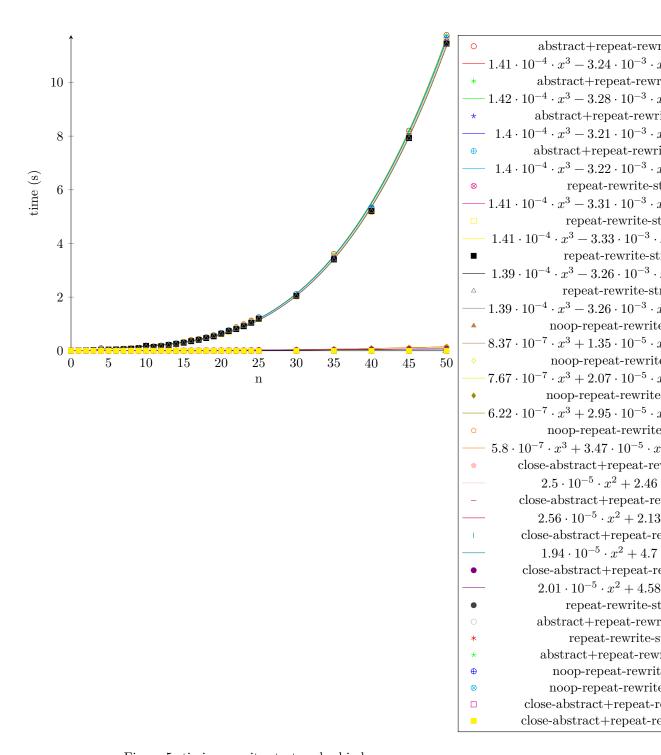


Figure 5: timing-rewrite-strat-under-binders

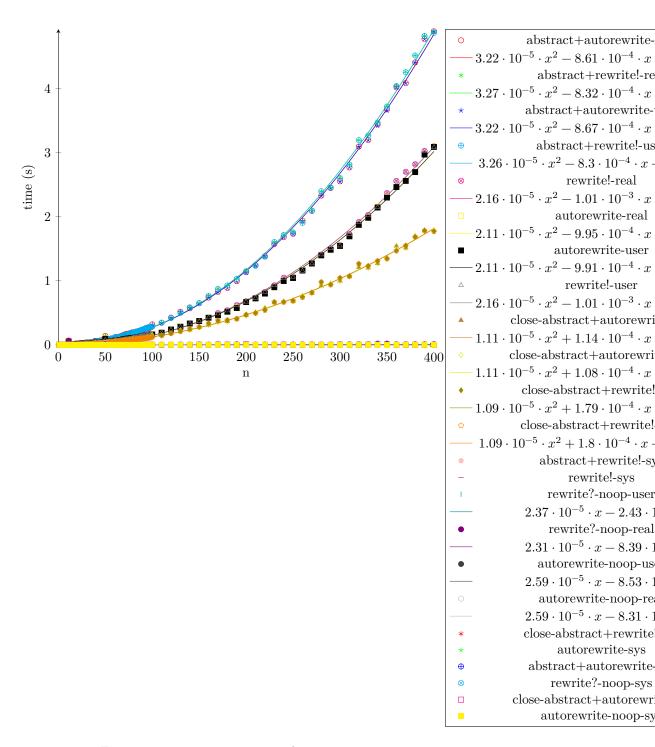


Figure 6: timing-rewrite-repeated-app-autorewrite

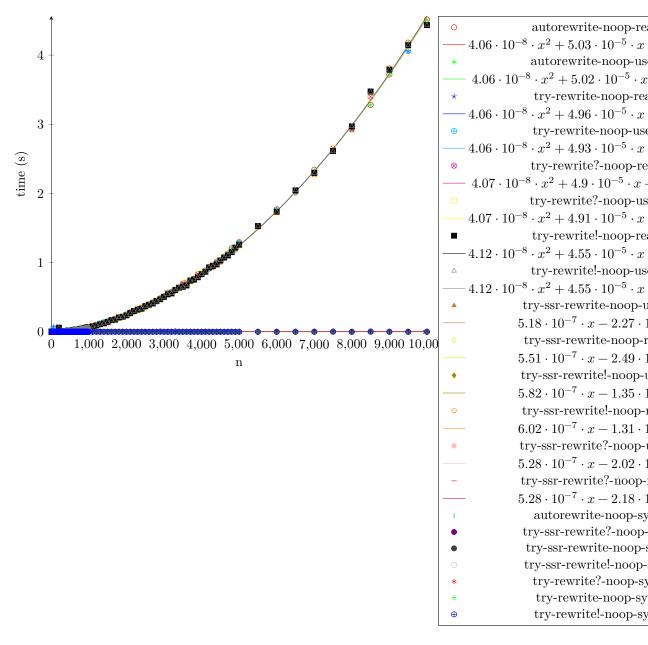
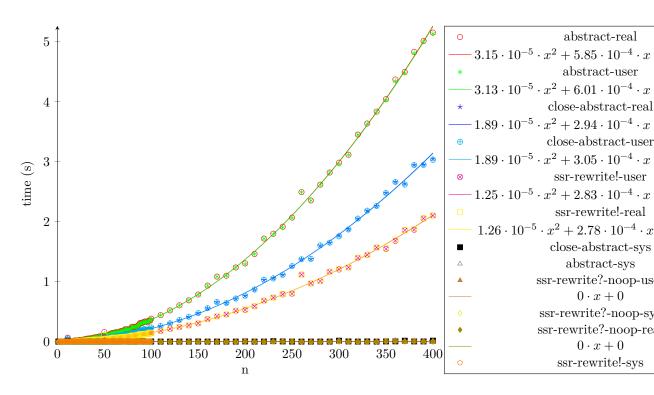


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

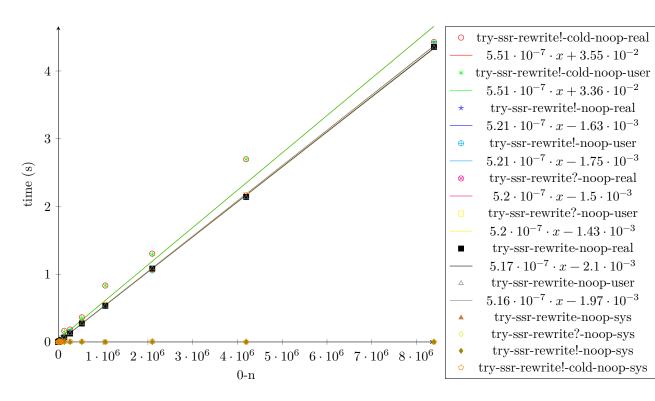


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

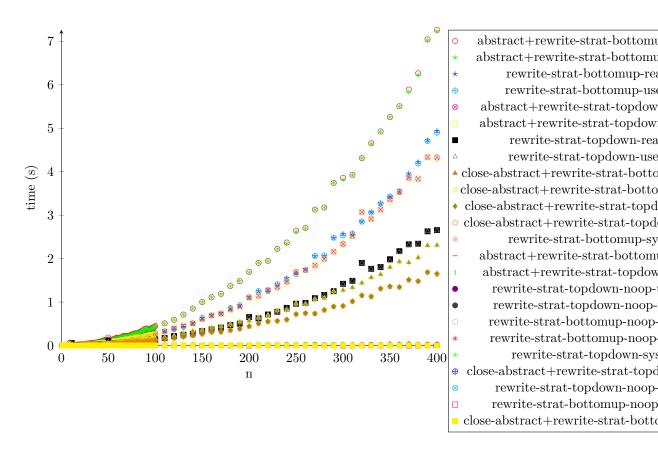


Figure 10: timing-rewrite-repeated-app-rewrite-strat

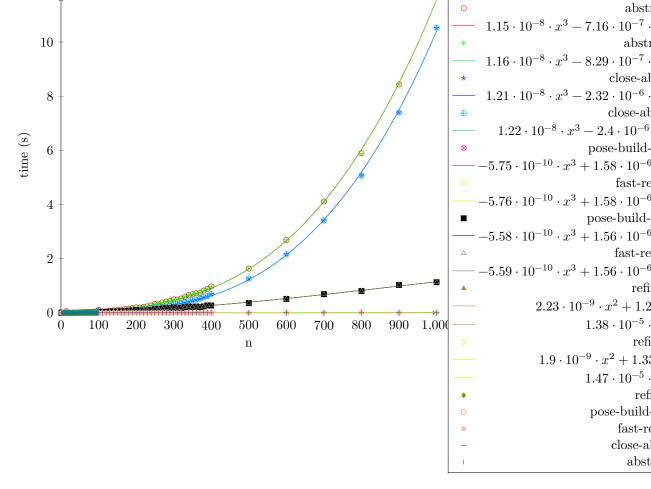
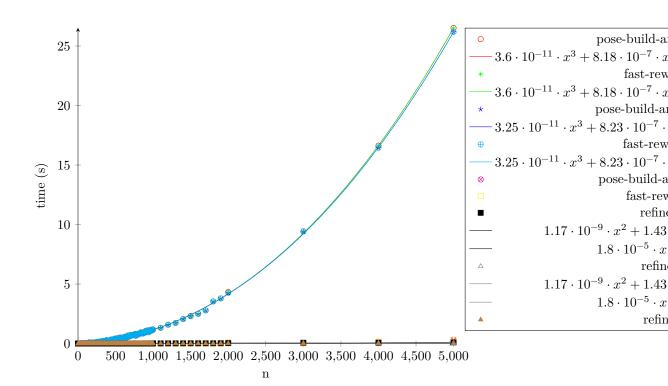
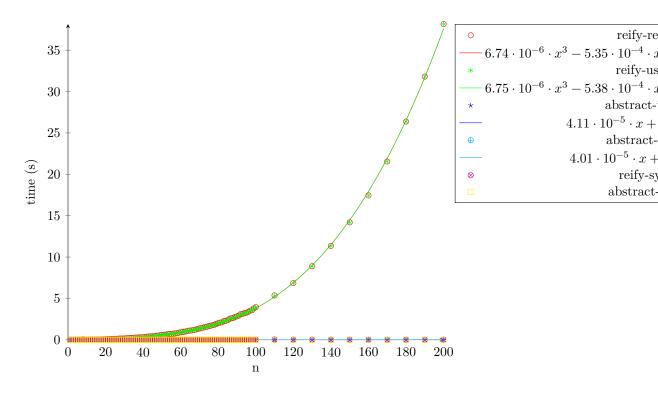


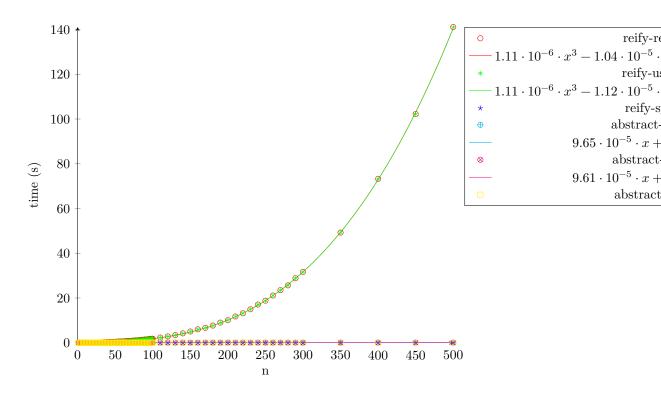
Figure 11: timing-rewrite-repeated-app-fast-rewrite



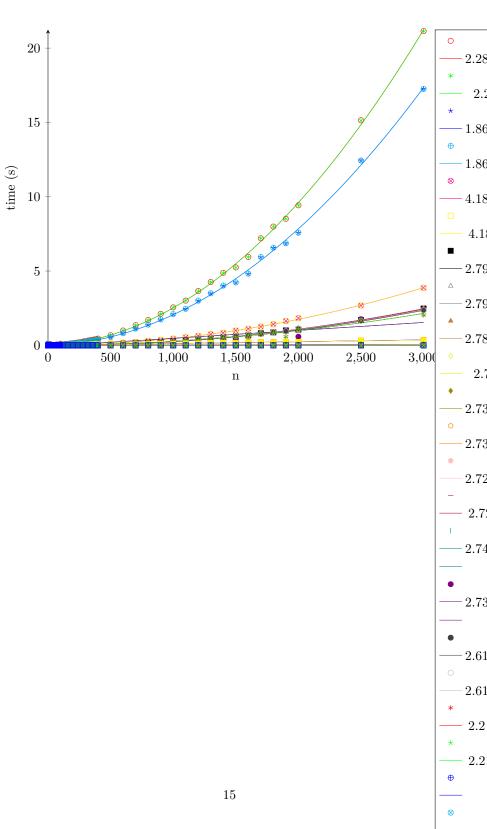
Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



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



Figure~14:~timing-type class-reification-let-in-PHOAS



 $2.28 \cdot 10^{-6} \cdot x^2 + 2.36 \cdot 10^{-4} \cdot x^2$ $2.28 \cdot 10^{-6} \cdot x^2 + 2.37 \cdot 10^{-4}$ $1.86 \cdot 10^{-6} \cdot x^2 + 1.93 \cdot 10^{-4} \cdot x^2$ $1.86 \cdot 10^{-6} \cdot x^2 + 1.95 \cdot 10^{-4} \cdot x^2$ $4.18 \cdot 10^{-7} \cdot x^2 + 4.06 \cdot 10^{-5} \cdot x^2$ $4.18 \cdot 10^{-7} \cdot x^2 + 4.1 \cdot 10^{-5} \cdot x$ $2.79 \cdot 10^{-7} \cdot x^2 - 1.48 \cdot 10^{-5} \cdot x^2$ $2.79 \cdot 10^{-7} \cdot x^2 - 1.46 \cdot 10^{-5} \cdot x^2 - 1.46 \cdot 10^{-5} \cdot x^2 + 1.46 \cdot 10^{-5} \cdot x^2$ $2.78 \cdot 10^{-7} \cdot x^2 - 2.17 \cdot 10^{-5} \cdot x^2$ $2.78 \cdot 10^{-7} \cdot x^2 - 2.13 \cdot 10^{-5}$ $2.73 \cdot 10^{-7} \cdot x^2 - 6.92 \cdot 10^{-6} \cdot x^2$ $2.73 \cdot 10^{-7} \cdot x^2 - 6.85 \cdot 10^{-6} \cdot x^2$ $2.72 \cdot 10^{-7} \cdot x^2 + 4.38 \cdot 10^{-7} \cdot x^2$ $2.72 \cdot 10^{-7} \cdot x^2 + 7.84 \cdot 10^{-7}$ $2.74 \cdot 10^{-7} \cdot x^2 - 3.64 \cdot 10^{-5} \cdot x^2$ $5.33 \cdot 10^{-4} \cdot x - 5.73 \cdot$ $2.73 \cdot 10^{-7} \cdot x^2 - 3.56 \cdot 10^{-5} \cdot x^2$ $5.32 \cdot 10^{-4} \cdot x - 5.73 \cdot$ $2.61 \cdot 10^{-7} \cdot x^2 + 1.32 \cdot 10^{-5} \cdot x^2$ $2.61 \cdot 10^{-7} \cdot x^2 + 1.29 \cdot 10^{-5} \cdot x^2$ $2.2 \cdot 10^{-7} \cdot x^2 + 5.71 \cdot 10^{-5} \cdot x$ $2.21 \cdot 10^{-7} \cdot x^2 + 5.7 \cdot 10^{-5} \cdot x$ $1.23 \cdot 10^{-4} \cdot x - 8.47 \cdot$ $1.22 \cdot 10^{-4} \cdot x - 9.32 \cdot$

abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

close-abstract-use

close-abstract-rea

check-pf-cast-use

check-pf-cast-rea

check-admit-cast-r

check-admit-cast-u

type-admit-real

type-admit-user

type-admit-cast-re

type-admit-cast-us

refine-real

refine-user

type-pf-cast-user

type-pf-cast-real

check-admit-user

check-admit-real

build-thunk-real

build-eval-thunk-re

build-eval-thunk-u $1.22 \cdot 10^{-4} \cdot x - 1.15 \cdot$ build-thunk-user $1.21 \cdot 10^{-4} \cdot x - 1.23 \cdot$ abook Lugar