

Figure 1: timing-pattern

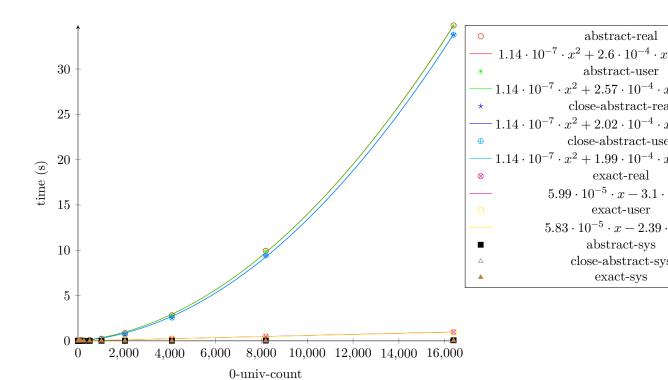


Figure 2: timing-n-polymorphic-universes param-1-n 0

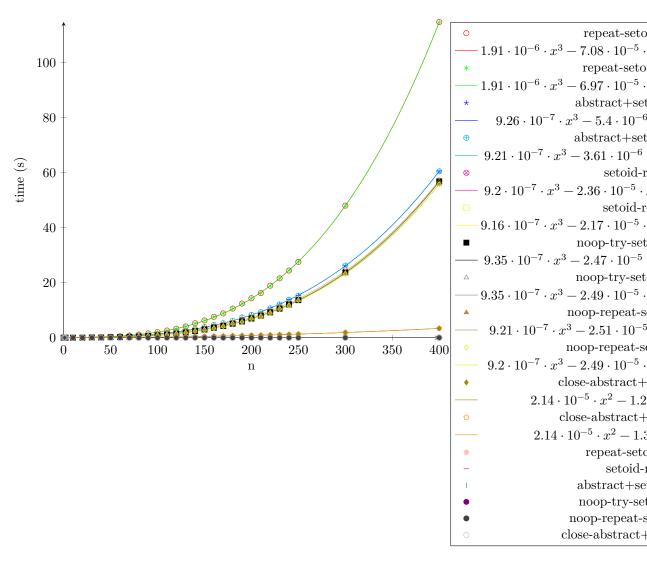
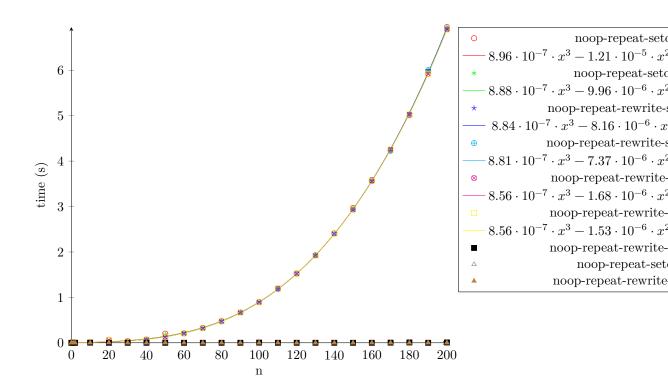


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

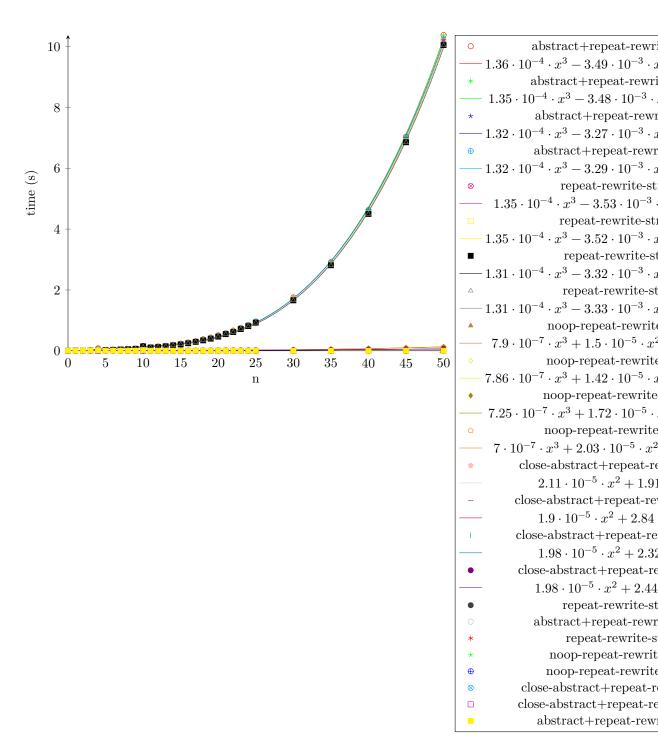


Figure 5: timing-rewrite-strat-under-binders

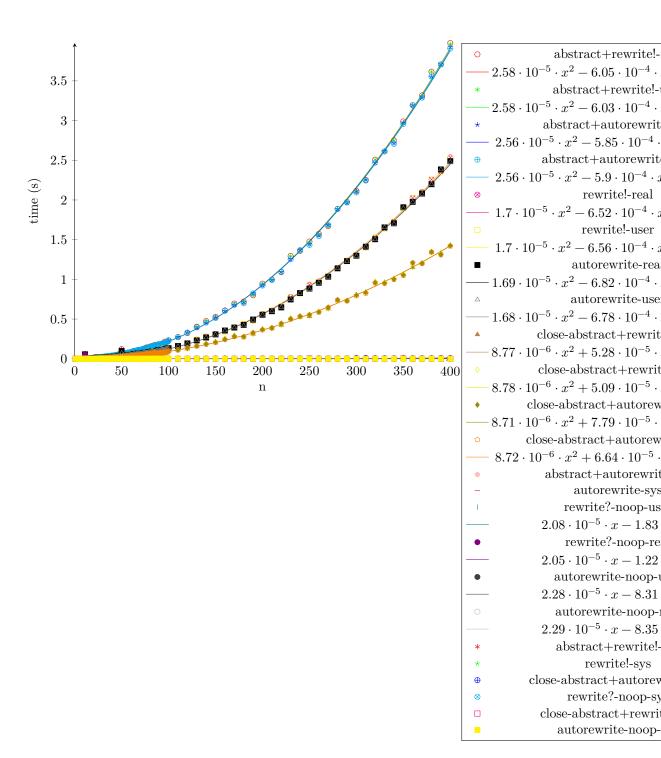


Figure 6: timing-rewrite-repeated-app-autorewrite

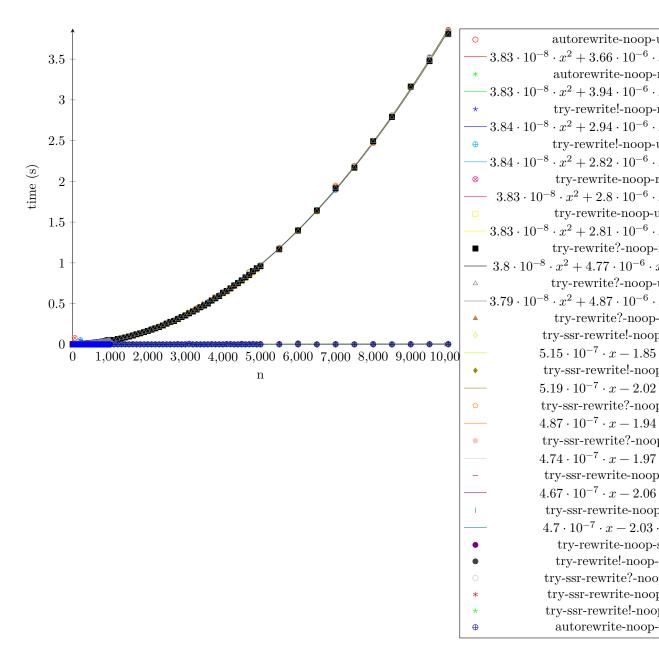


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

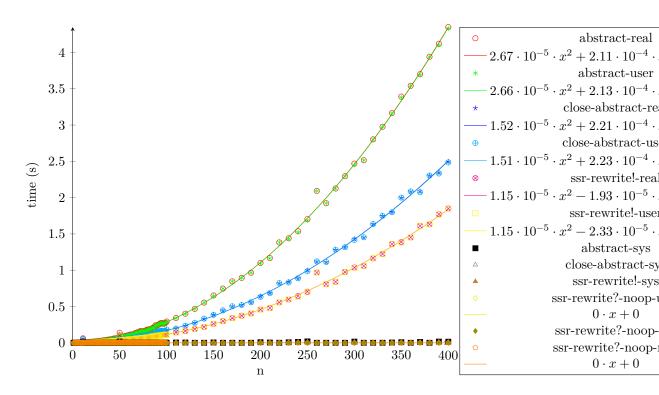


Figure 8: timing-rewrite-repeated-app-ssrrewrite

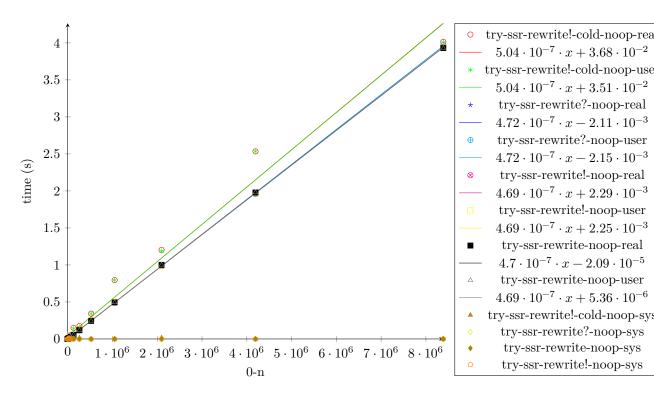


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

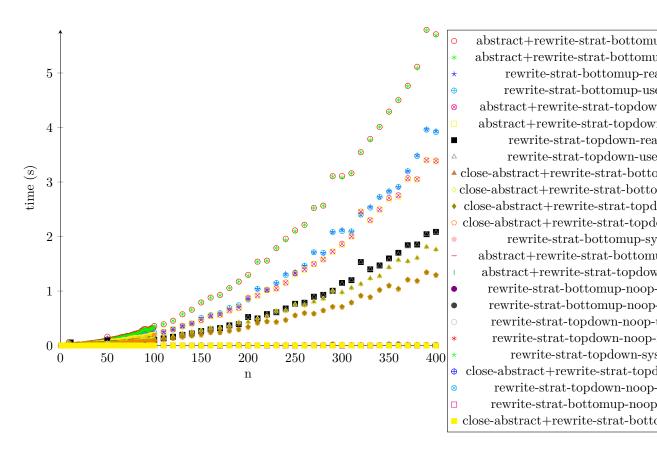


Figure 10: timing-rewrite-repeated-app-rewrite-strat

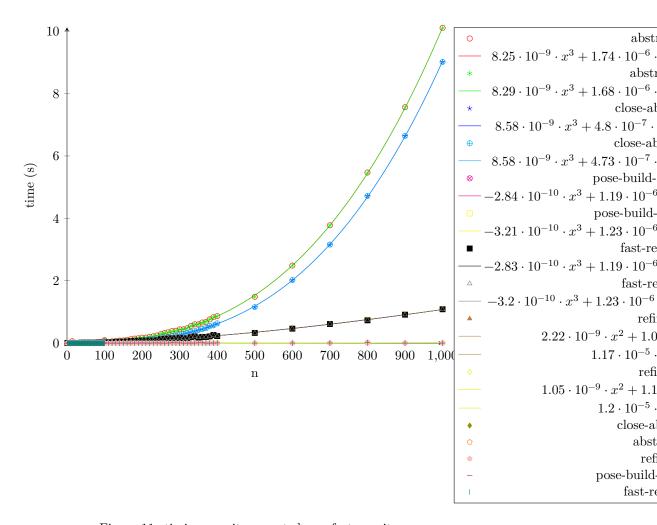
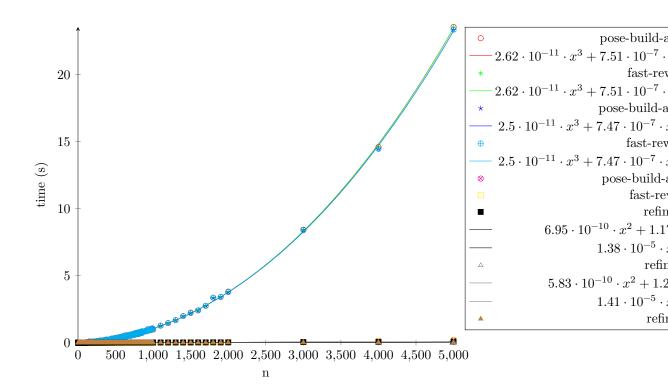
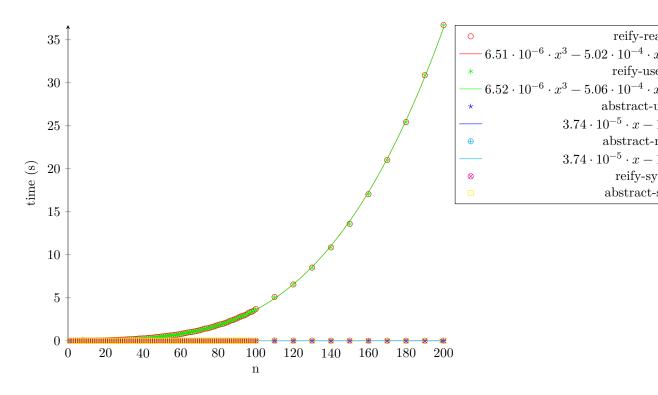


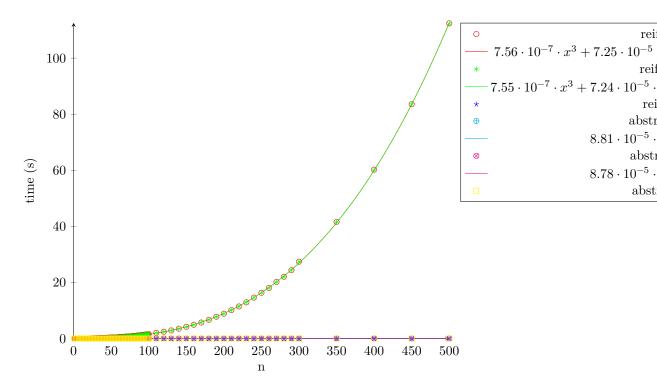
Figure 11: timing-rewrite-repeated-app-fast-rewrite



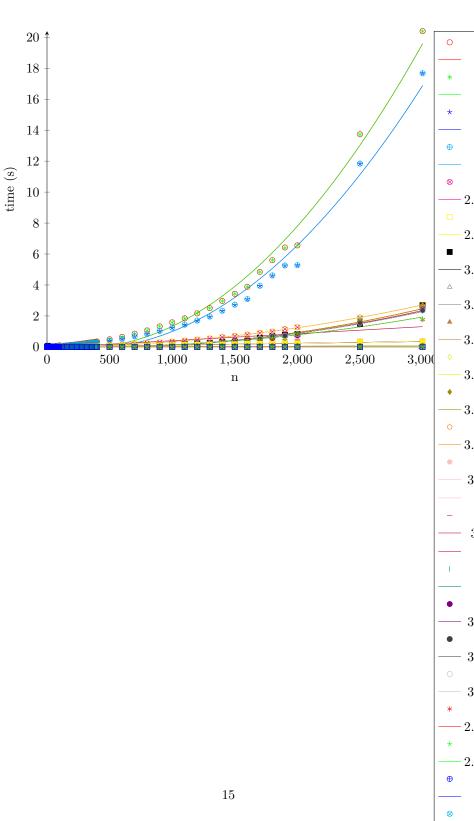
 ${\bf Figure~12:~timing\text{-}rewrite\text{-}repeated\text{-}app\text{-}fast\text{-}rewrite\text{-}no\text{-}abstract}}$



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



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



 $2.65 \cdot 10^{-6} \cdot x^2 - 1.48 \cdot 10^{-6}$ $2.65 \cdot 10^{-6} \cdot x^2 - 1.48 \cdot 10^{-6}$ $2.37 \cdot 10^{-6} \cdot x^2 - 1.53 \cdot 10^{-6}$ $2.37 \cdot 10^{-6} \cdot x^2 - 1.52 \cdot 10^{-6}$ $2.85 \cdot 10^{-7} \cdot x^2 + 4.83 \cdot 10^{-5} \cdot x^2$ $2.85 \cdot 10^{-7} \cdot x^2 + 4.65 \cdot 10^{-5} \cdot x^2$ $3.62 \cdot 10^{-7} \cdot x^2 - 2.69 \cdot 10^{-4} \cdot x^2$ $3.62 \cdot 10^{-7} \cdot x^2 - 2.68 \cdot 10^{-4} \cdot x^2$ $3.74 \cdot 10^{-7} \cdot x^2 - 3.07 \cdot 10^{-4} \cdot x^2$ $3.73 \cdot 10^{-7} \cdot x^2 - 3.06 \cdot 10^{-4} \cdot x^2$ $3.65 \cdot 10^{-7} \cdot x^2 - 2.81 \cdot 10^{-4} \cdot x^2$ $3.65 \cdot 10^{-7} \cdot x^2 - 2.81 \cdot 10^{-4} \cdot x^2$ $3.51 \cdot 10^{-7} \cdot x^2 - 2.74 \cdot 10^{-4}$ $3.5 \cdot 10^{-7} \cdot x^2 - 2.74 \cdot 10^{-4} \cdot x^2$ $3.3 \cdot 10^{-7} \cdot x^2 - 2.34 \cdot 10^{-4}$ $3.3 \cdot 10^{-7} \cdot x^2 - 2.34 \cdot 10^{-4} \cdot x$ $3.26 \cdot 10^{-7} \cdot x^2 - 2.24 \cdot 10^{-4}$ $3.26 \cdot 10^{-7} \cdot x^2 - 2.24 \cdot 10^{-4}$ $2.58 \cdot 10^{-7} \cdot x^2 - 1.32 \cdot 10^{-4} \cdot x^2$ $2.58 \cdot 10^{-7} \cdot x^2 - 1.32 \cdot 10^{-4} \cdot x^2$

abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

close-abstract-rea

close-abstract-use

check-pf-cast-rea

check-pf-cast-use

type-admit-cast-re

type-admit-cast-us

type-admit-user

type-admit-real

refine-real

 $4.54 \cdot 10^{-4} \cdot x - 5.46 \cdot$ refine-user

 $4.54 \cdot 10^{-4} \cdot x - 5.46 \cdot$ type-pf-cast-user

type-pf-cast-real

check-admit-cast-u

check-admit-cast-r

check-admit-user

check-admit-real

build-eval-thunk-re

 $1.16 \cdot 10^{-4} \cdot x - 6.58$ build-thunk-real $1.15 \cdot 10^{-4} \cdot x - 7.39$ build-eval-thunk-u $1.15 \cdot 10^{-4} \cdot x - 7.32 \cdot$ build-thunk-user $1.15 \cdot 10^{-4} \cdot x - 8.06 \cdot$ ala a ala Turaan