

Figure 1: timing-pattern

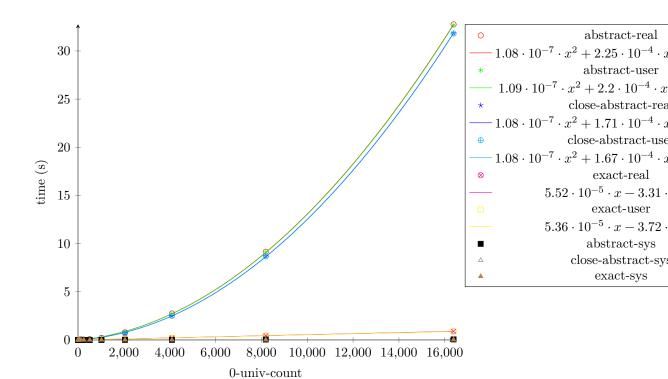


Figure 2: timing-n-polymorphic-universes param-1-n 0

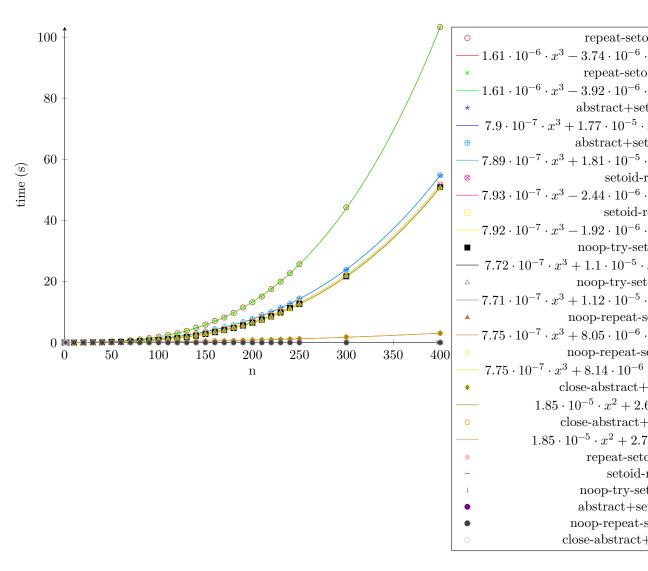
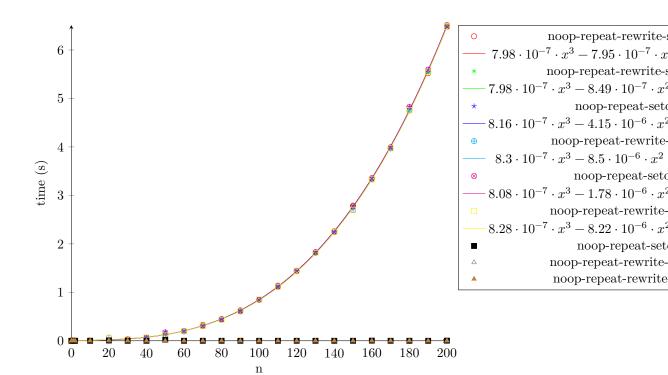


Figure 3: timing-repeat-setoid-rewrite-under-binders



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

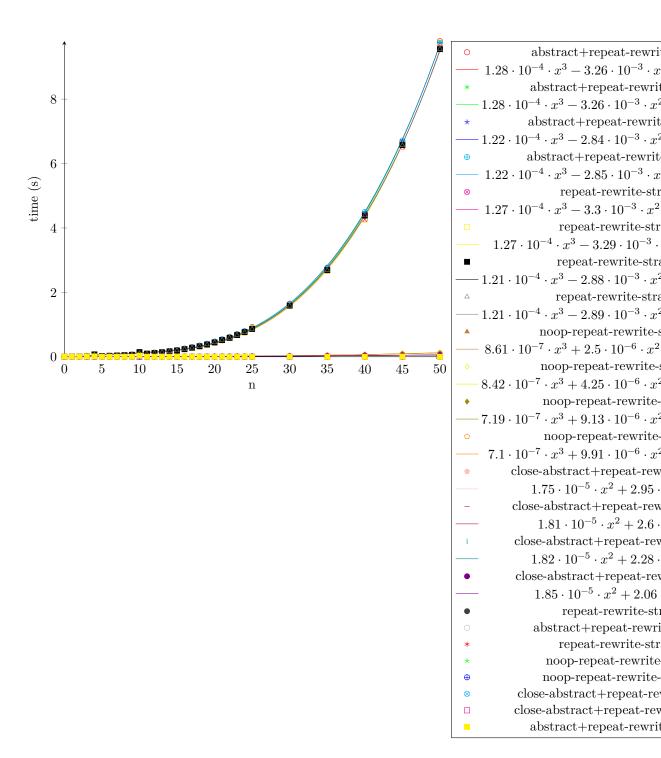


Figure 5: timing-rewrite-strat-under-binders

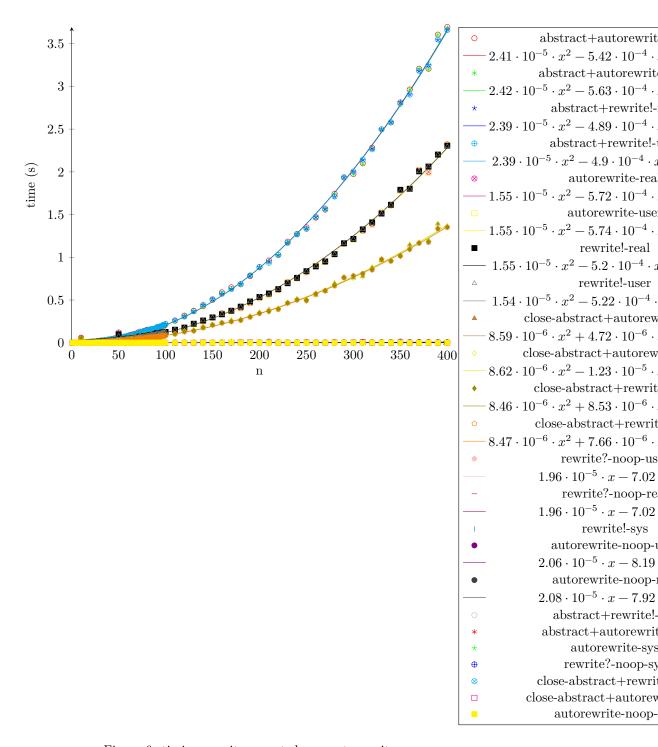


Figure 6: timing-rewrite-repeated-app-autorewrite

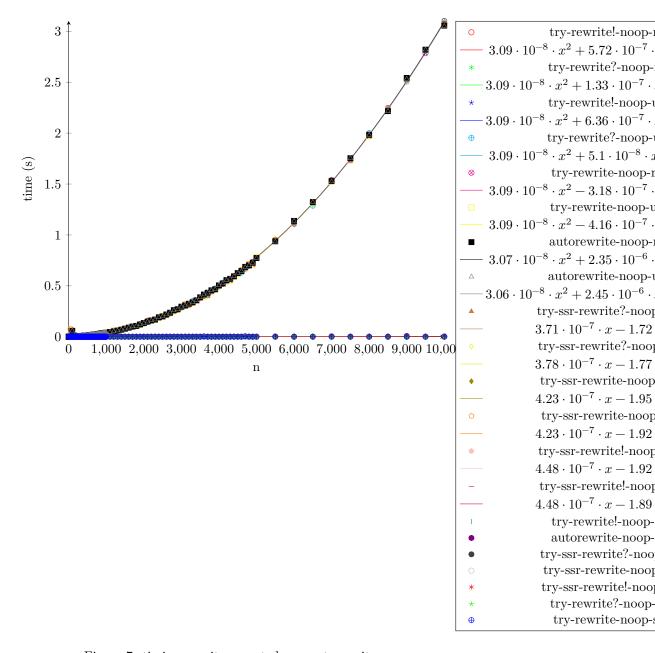


Figure 7: timing-rewrite-repeated-app-autorewrite-noop

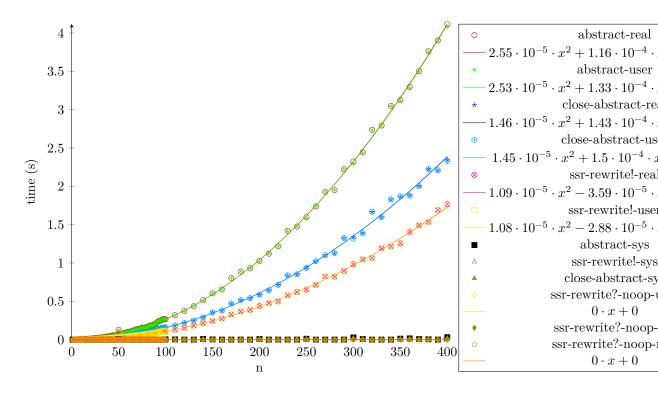


Figure 8: timing-rewrite-repeated-app-ssrrewrite

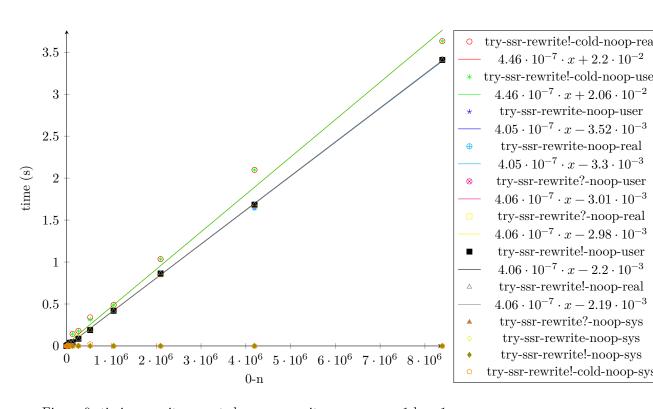


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

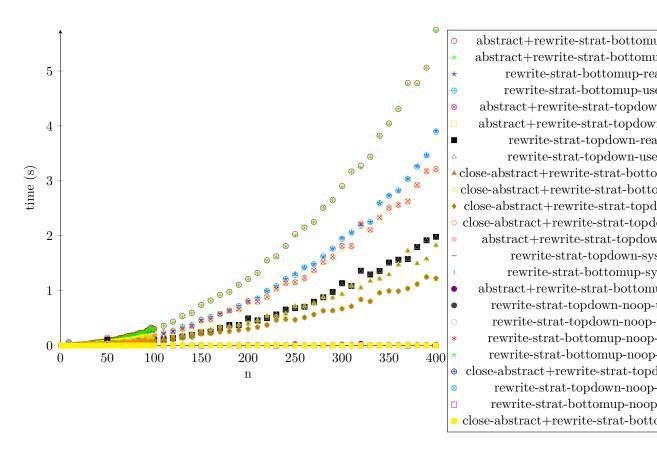
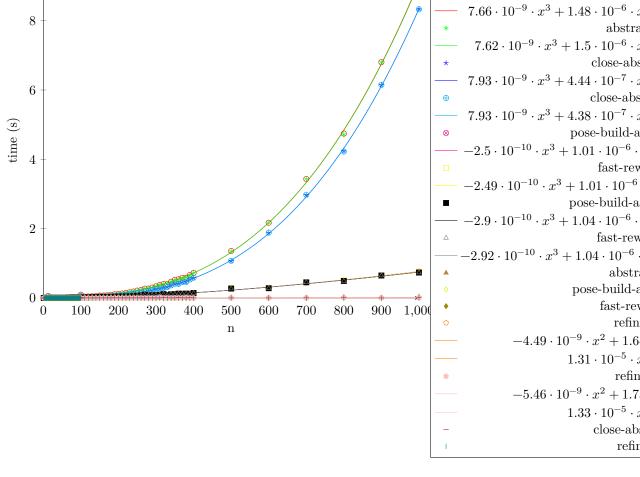
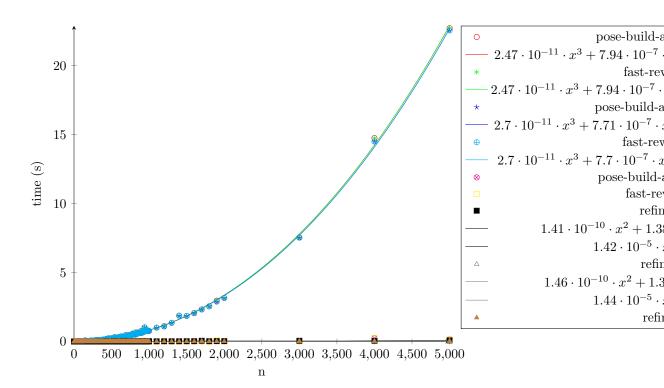


Figure 10: timing-rewrite-repeated-app-rewrite-strat

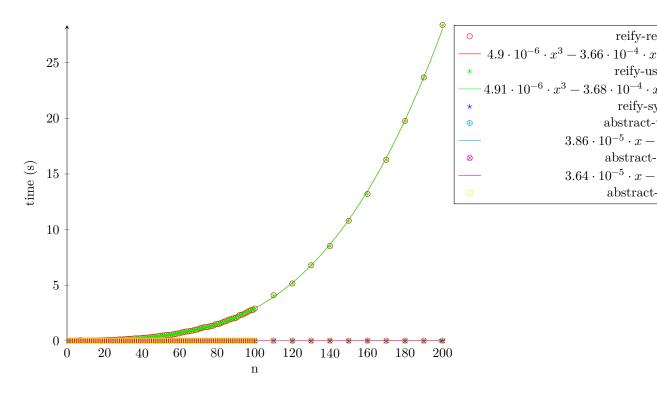


abstra

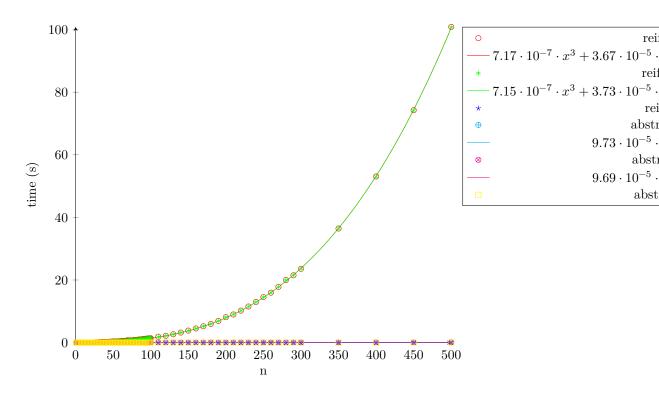
Figure 11: timing-rewrite-repeated-app-fast-rewrite



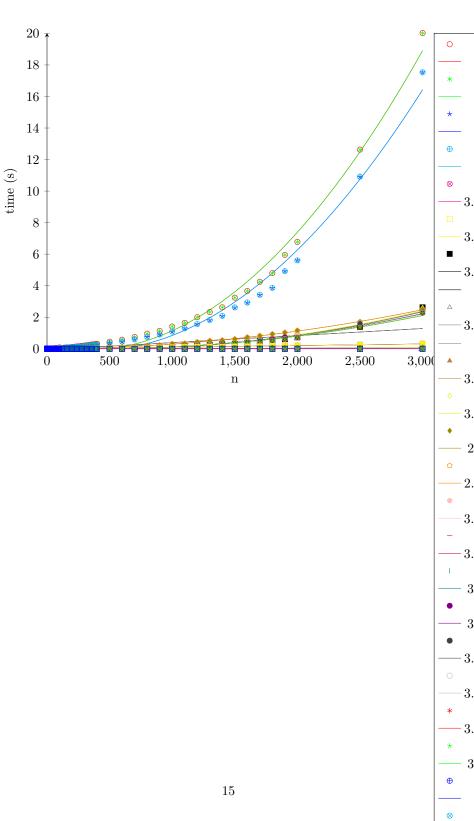
Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



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



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



 $abstract\hbox{-}user$ $2.63 \cdot 10^{-6} \cdot x^2 - 1.65 \cdot 10^{-6}$ fast-rewrite-real $2.37 \cdot 10^{-6} \cdot x^2 - 1.68 \cdot 10^{-6}$ fast-rewrite-user $2.37 \cdot 10^{-6} \cdot x^2 - 1.68 \cdot 10^{-6}$ type-admit-cast-re $3.62 \cdot 10^{-7} \cdot x^2 - 3.07 \cdot 10^{-4} \cdot x^2$ type-admit-cast-us $3.62 \cdot 10^{-7} \cdot x^2 - 3.06 \cdot 10^{-4} \cdot x^2$ $3.56 \cdot 10^{-7} \cdot x^2 - 2.93 \cdot 10^{-4} \cdot x^2$ $4.47 \cdot 10^{-4} \cdot x - 5.47 \cdot$ $3.57 \cdot 10^{-7} \cdot x^2 - 2.93 \cdot 10^{-4} \cdot x^2$ $4.47 \cdot 10^{-4} \cdot x - 5.47 \cdot$ type-admit-user $3.68 \cdot 10^{-7} \cdot x^2 - 3.13 \cdot 10^{-4} \cdot x^2$ type-admit-real $3.68 \cdot 10^{-7} \cdot x^2 - 3.12 \cdot 10^{-4} \cdot x^2$ close-abstract-use $2.65 \cdot 10^{-7} \cdot x^2 + 3.22 \cdot 10^{-5} \cdot \\$ close-abstract-rea $2.64 \cdot 10^{-7} \cdot x^2 + 3.29 \cdot 10^{-5} \cdot x^2$ check-pf-cast-rea $3.27 \cdot 10^{-7} \cdot x^2 - 2.42 \cdot 10^{-4} \cdot x^2$ check-pf-cast-use $3.27 \cdot 10^{-7} \cdot x^2 - 2.42 \cdot 10^{-4} \cdot x^2$ check-admit-user $3.2 \cdot 10^{-7} \cdot x^2 - 2.26 \cdot 10^{-4} \cdot x$ check-admit-real $3.2 \cdot 10^{-7} \cdot x^2 - 2.26 \cdot 10^{-4} \cdot x$ check-admit-cast-u $3.21 \cdot 10^{-7} \cdot x^2 - 2.32 \cdot 10^{-4} \cdot x^2$ check-admit-cast-r $3.21 \cdot 10^{-7} \cdot x^2 - 2.32 \cdot 10^{-4} \cdot x^2$ type-pf-cast-user $3.06 \cdot 10^{-7} \cdot x^2 - 2.22 \cdot 10^{-4} \cdot x^2$ type-pf-cast-real $3.06 \cdot 10^{-7} \cdot x^2 - 2.21 \cdot 10^{-4}$ build-eval-thunk-us $1.01 \cdot 10^{-4} \cdot x - 7.83$ build-eval-thunk-re

abstract-real

refine-user

refine-real

 $1.01 \cdot 10^{-4} \cdot x - 6.83$ build-thunk-user $1.01 \cdot 10^{-4} \cdot x - 8.38 \cdot$ build-thunk-real $1.01 \cdot 10^{-4} \cdot x - 7.23$

 $2.63 \cdot 10^{-6} \cdot x^2 - 1.65 \cdot 10^{-6}$