Figure 1: timing-pattern

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

time (s)

100

80

60

40

20

0

0   50   100   150   200   250   300   350   400

n

repeat-seto

$1.87 \cdot 10^{-6} \cdot x^3 - 5.36 \cdot 10^{-5}$

repeat-seto

$1.87 \cdot 10^{-6} \cdot x^3 - 5.34 \cdot 10^{-5} \cdot$

abstract+set

$9.31 \cdot 10^{-7} \cdot x^3 - 6.47 \cdot 10^{-7} \cdot$

abstract+set

$9.31 \cdot 10^{-7} \cdot x^3 - 5.31 \cdot 10^{-7} \cdot$

setoid-r

$9.24 \cdot 10^{-7} \cdot x^3 - 1.91 \cdot 10^{-5} \cdot$

setoid-r

$9.23 \cdot 10^{-7} \cdot x^3 - 1.89 \cdot 10^{-5} \cdot$

noop-try-set

$9.26 \cdot 10^{-7} \cdot x^3 - 2.11 \cdot 10^{-5} \cdot$

noop-try-set

$9.25 \cdot 10^{-7} \cdot x^3 - 2.09 \cdot 10^{-5} \cdot$

noop-repeat-s

$9.54 \cdot 10^{-7} \cdot x^3 - 3.95 \cdot 10^{-5} \cdot$

noop-repeat-s

$9.52 \cdot 10^{-7} \cdot x^3 - 3.87 \cdot 10^{-5} \cdot$

close-abstract+

$2.23 \cdot 10^{-5} \cdot x^2 - 2.8$

close-abstract+

$2.23 \cdot 10^{-5} \cdot x^2 - 2.8$

repeat-seto

setoid-r

noop-repeat-s

abstract+se

noop-try-set

close-abstract+

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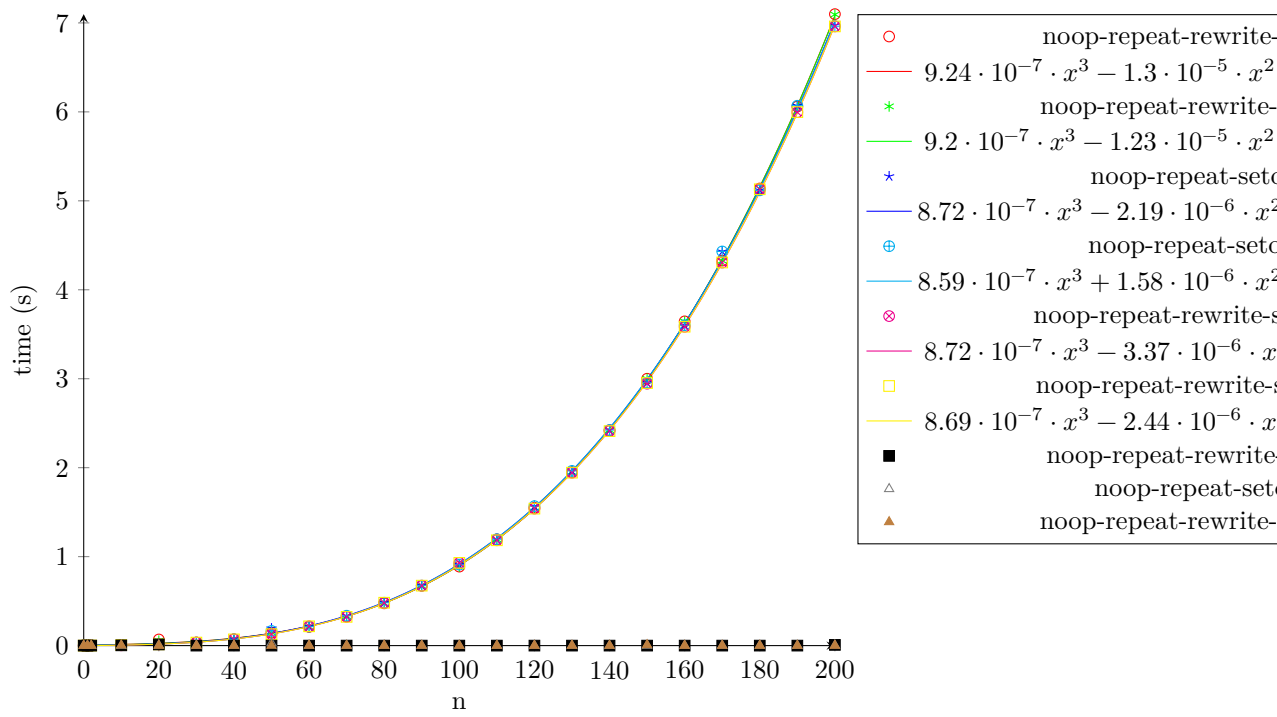
3

Figure 4: timing-repeat-setoid-rewrite-under-binders-noop
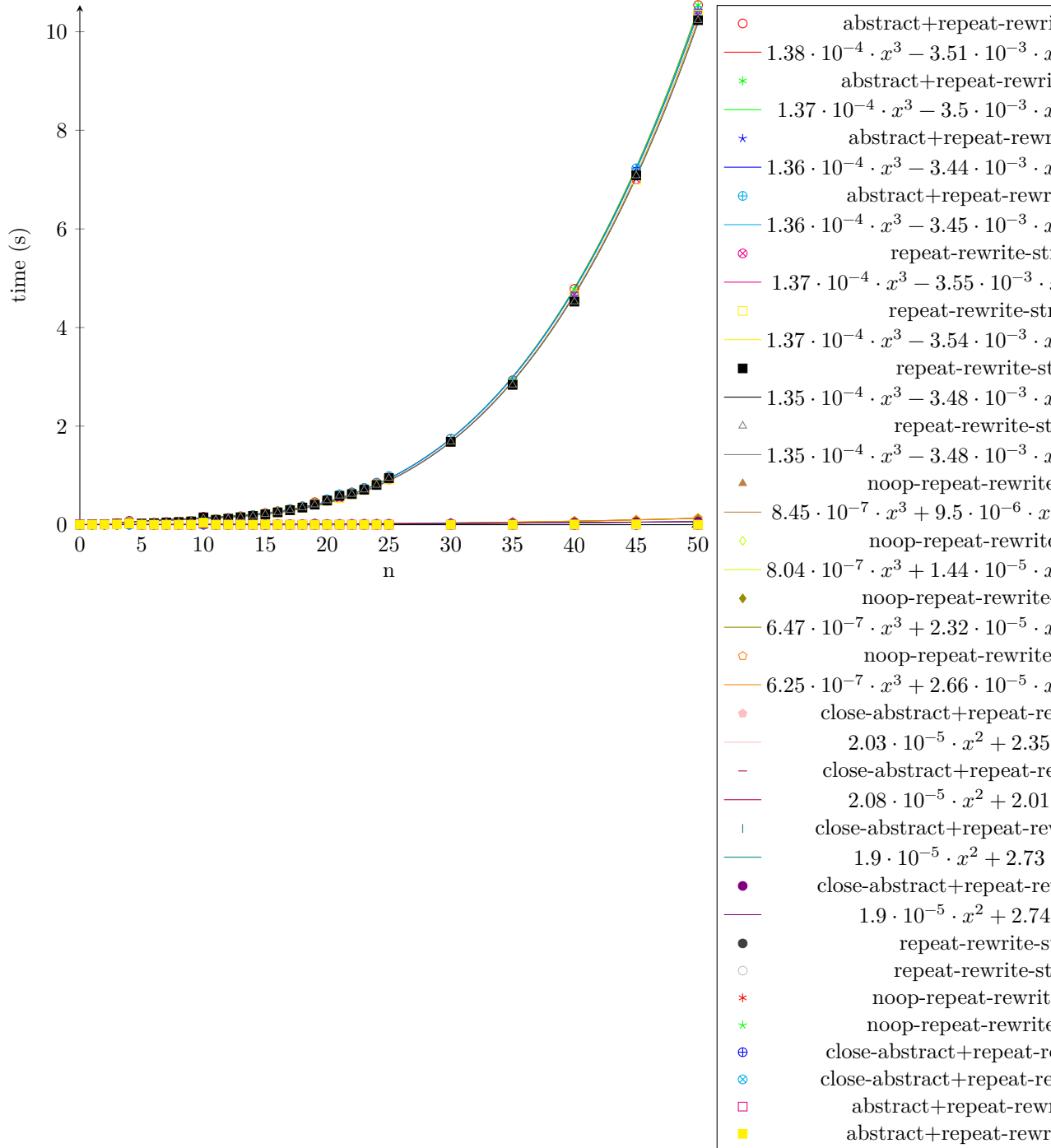
Figure 5: timing-rewrite-strat-under-binders
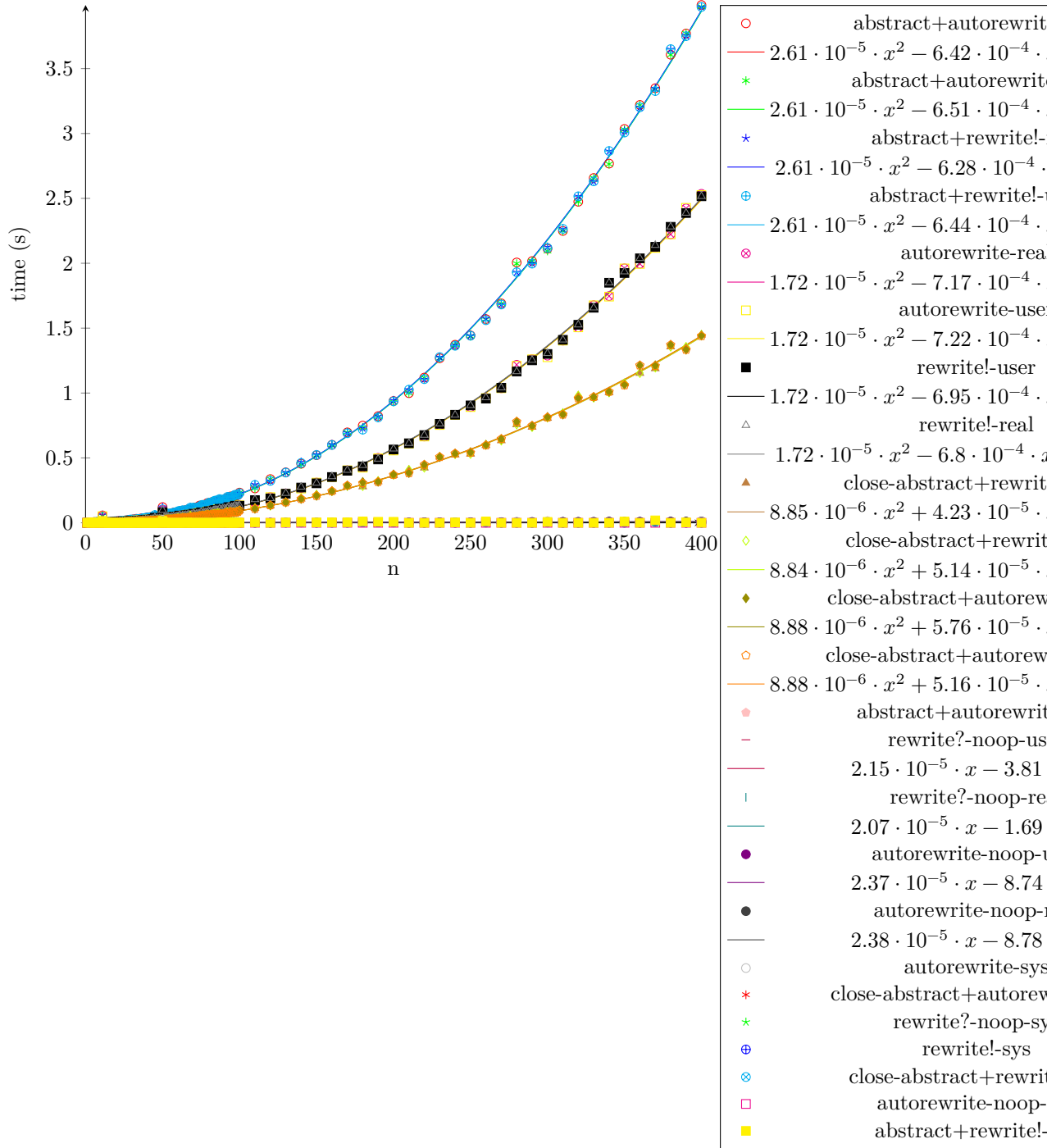
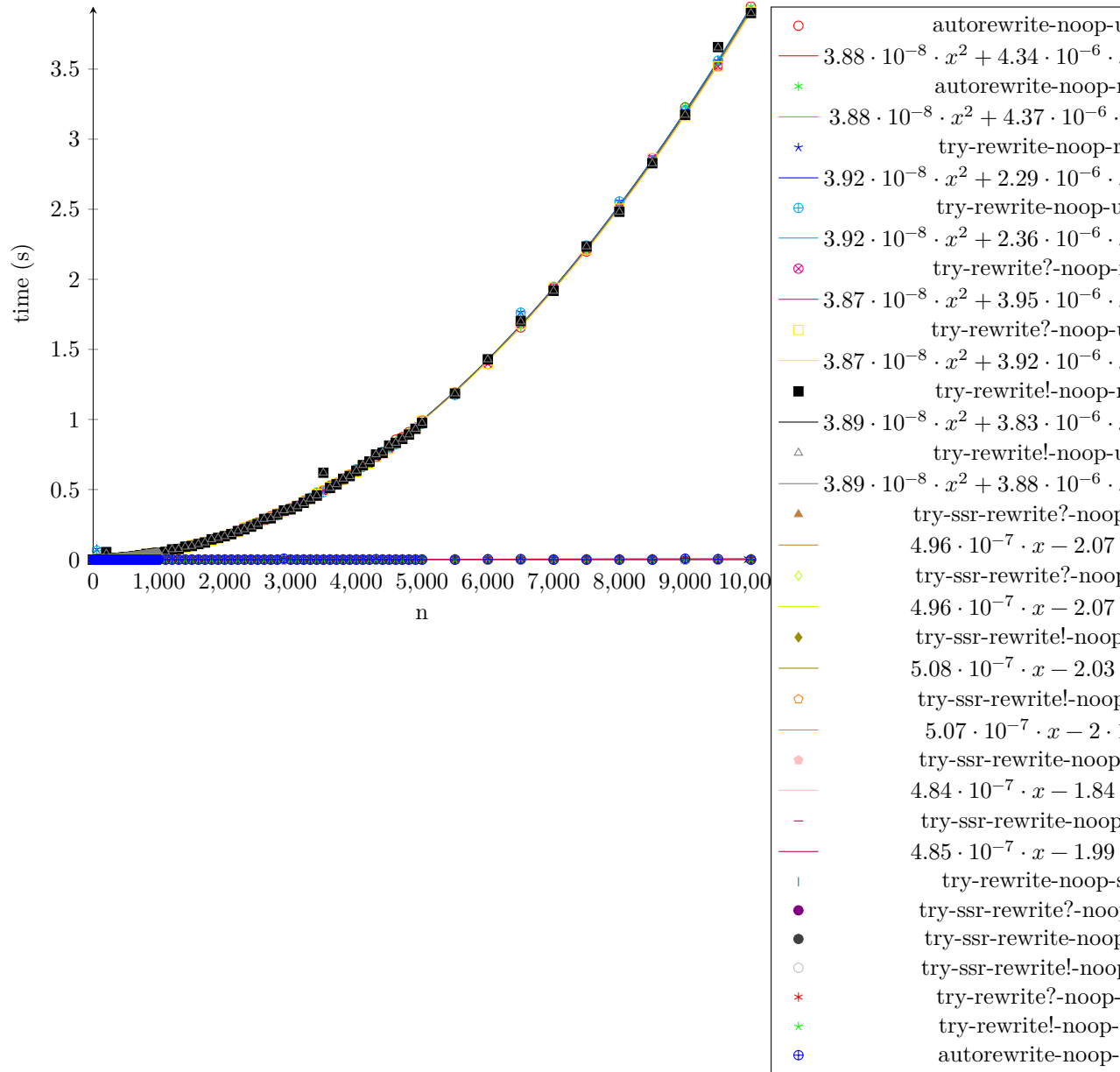Figure 6: timing-rewrite-repeated-app-autorewrite

time (s)

3.5

3

2.5

2

1.5

1

0.5

0

n

0   1,000   2,000   3,000   4,000   5,000   6,000   7,000   8,000   9,000   10,00

⚬ autorewrite-noop-u
— $3.88 \cdot 10^{-8} \cdot x^2 + 4.34 \cdot 10^{-6} \cdot$
* autorewrite-noop-
— $3.88 \cdot 10^{-8} \cdot x^2 + 4.37 \cdot 10^{-6} \cdot$
* try-rewrite-noop-
— $3.92 \cdot 10^{-8} \cdot x^2 + 2.29 \cdot 10^{-6} \cdot$
⊕ try-rewrite-noop-u
— $3.92 \cdot 10^{-8} \cdot x^2 + 2.36 \cdot 10^{-6} \cdot$
⊗ try-rewrite?-noop-
— $3.87 \cdot 10^{-8} \cdot x^2 + 3.95 \cdot 10^{-6} \cdot$
□ try-rewrite?-noop-u
— $3.87 \cdot 10^{-8} \cdot x^2 + 3.92 \cdot 10^{-6} \cdot$
■ try-rewrite!-noop-
— $3.89 \cdot 10^{-8} \cdot x^2 + 3.83 \cdot 10^{-6} \cdot$
△ try-rewrite!-noop-u
— $3.89 \cdot 10^{-8} \cdot x^2 + 3.88 \cdot 10^{-6} \cdot$
▲ try-ssr-rewrite?-noop
— $4.96 \cdot 10^{-7} \cdot x - 2.07$
◇ try-ssr-rewrite?-noop
— $4.96 \cdot 10^{-7} \cdot x - 2.07$
◆ try-ssr-rewrite!-noop
— $5.08 \cdot 10^{-7} \cdot x - 2.03$
⬠ try-ssr-rewrite!-noop
— $5.07 \cdot 10^{-7} \cdot x - 2 \cdot$
⬠ try-ssr-rewrite-noop
— $4.84 \cdot 10^{-7} \cdot x - 1.84$
− try-ssr-rewrite-noop
— $4.85 \cdot 10^{-7} \cdot x - 1.99$
| try-rewrite-noop-s
● try-ssr-rewrite?-noo
● try-ssr-rewrite-noop
○ try-ssr-rewrite!-noop
* try-rewrite?-noop-
* try-rewrite!-noop-
⊕ autorewrite-noop-

Figure 7: timing-rewrite-repeated-app-autorewrite-noop
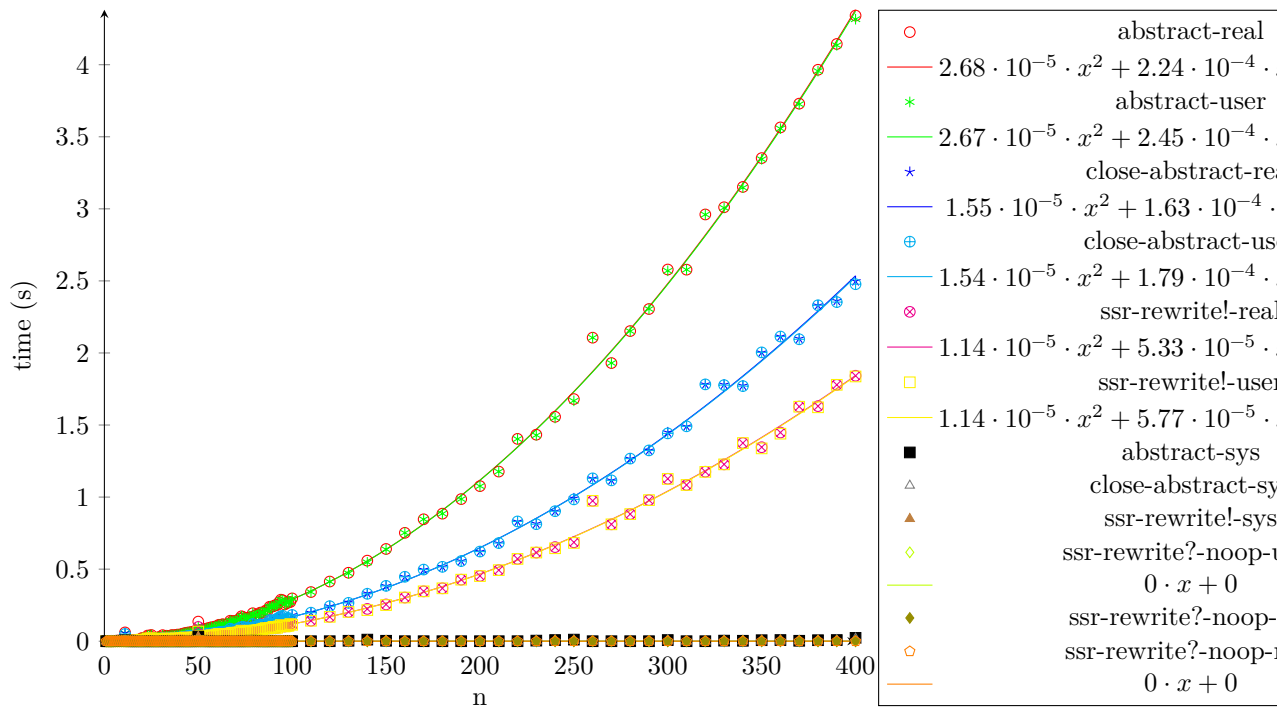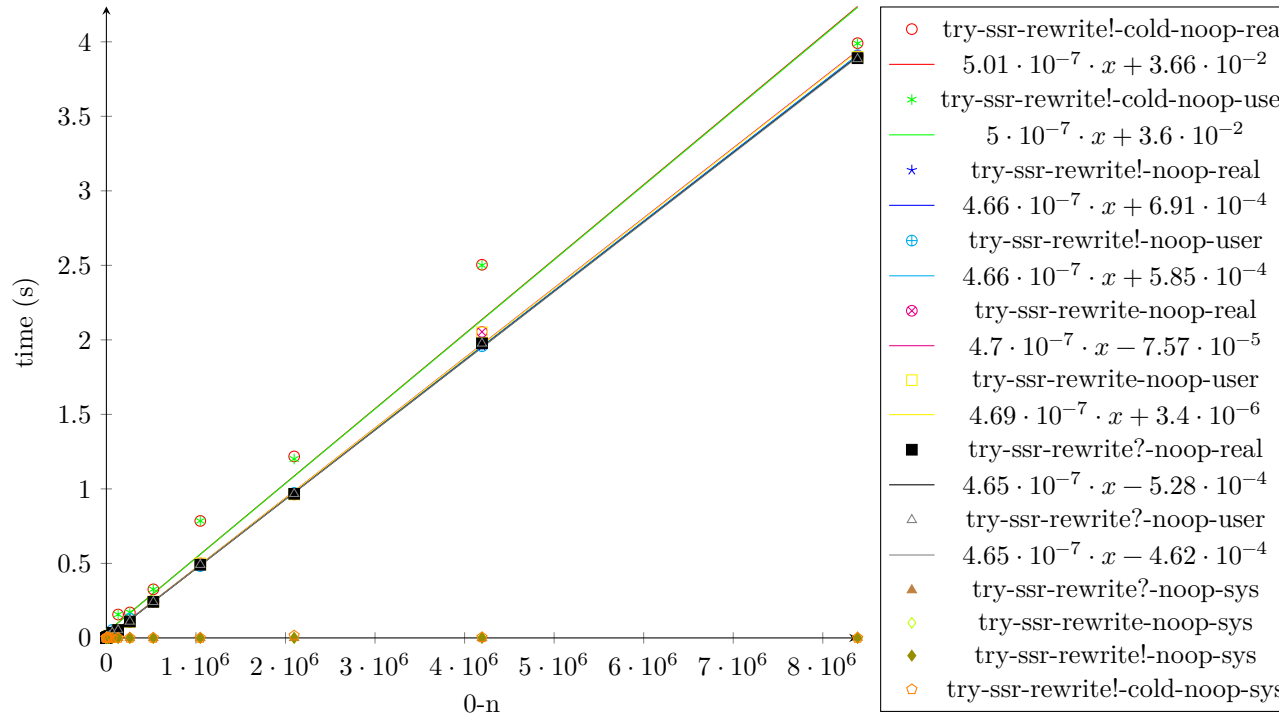
Figure 8: timing-rewrite-repeated-app-ssrrewrite

Legend (partial, right side of figure):

- ○ abstract-real
- $2.68 \cdot 10^{-5} \cdot x^2 + 2.24 \cdot 10^{-4} \cdot$ ...
- ∗ abstract-user
- $2.67 \cdot 10^{-5} \cdot x^2 + 2.45 \cdot 10^{-4} \cdot$ ...
- ∗ close-abstract-re...
- $1.55 \cdot 10^{-5} \cdot x^2 + 1.63 \cdot 10^{-4} \cdot$ ...
- ⊕ close-abstract-us...
- $1.54 \cdot 10^{-5} \cdot x^2 + 1.79 \cdot 10^{-4} \cdot$ ...
- ⊗ ssr-rewrite!-real
- $1.14 \cdot 10^{-5} \cdot x^2 + 5.33 \cdot 10^{-5} \cdot$ ...
- □ ssr-rewrite!-user
- $1.14 \cdot 10^{-5} \cdot x^2 + 5.77 \cdot 10^{-5} \cdot$ ...
- ■ abstract-sys
- △ close-abstract-sy...
- ▲ ssr-rewrite!-sys...
- ◇ ssr-rewrite?-noop-u...
- $0 \cdot x + 0$
- ◆ ssr-rewrite?-noop-...
- ⬠ ssr-rewrite?-noop-...
- $0 \cdot x + 0$

8

Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn 1
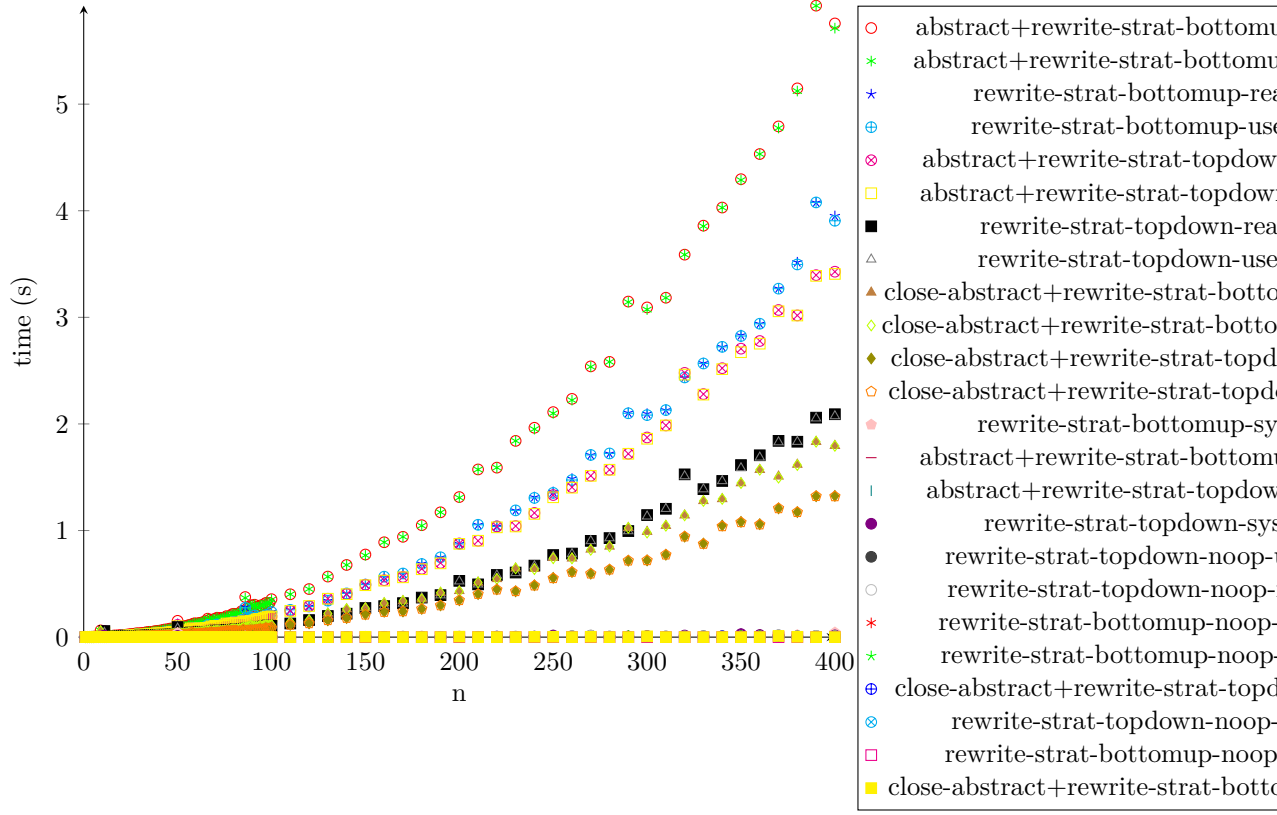
Figure 10: timing-rewrite-repeated-app-rewrite-strat

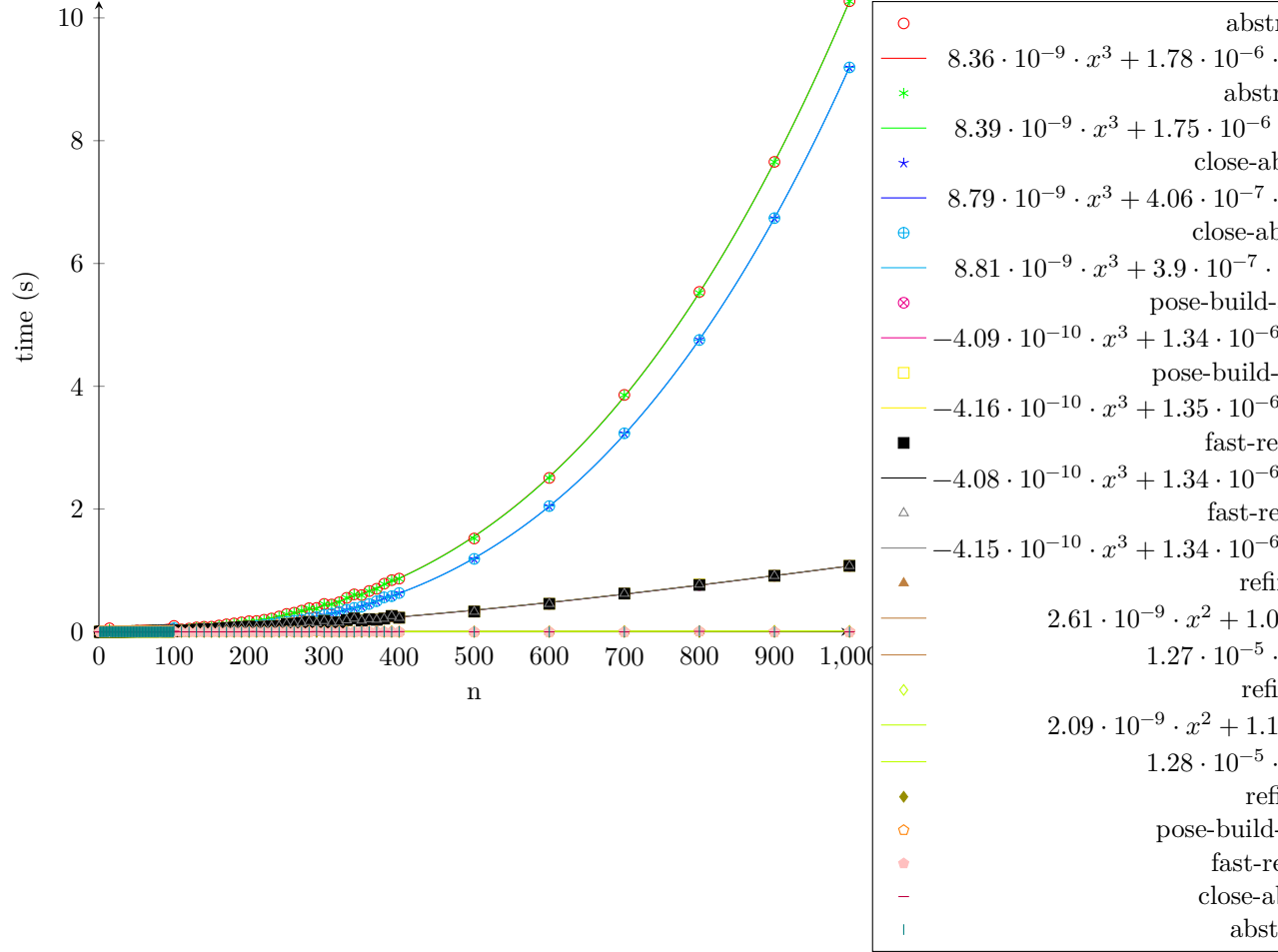Figure 11: timing-rewrite-repeated-app-fast-rewrite

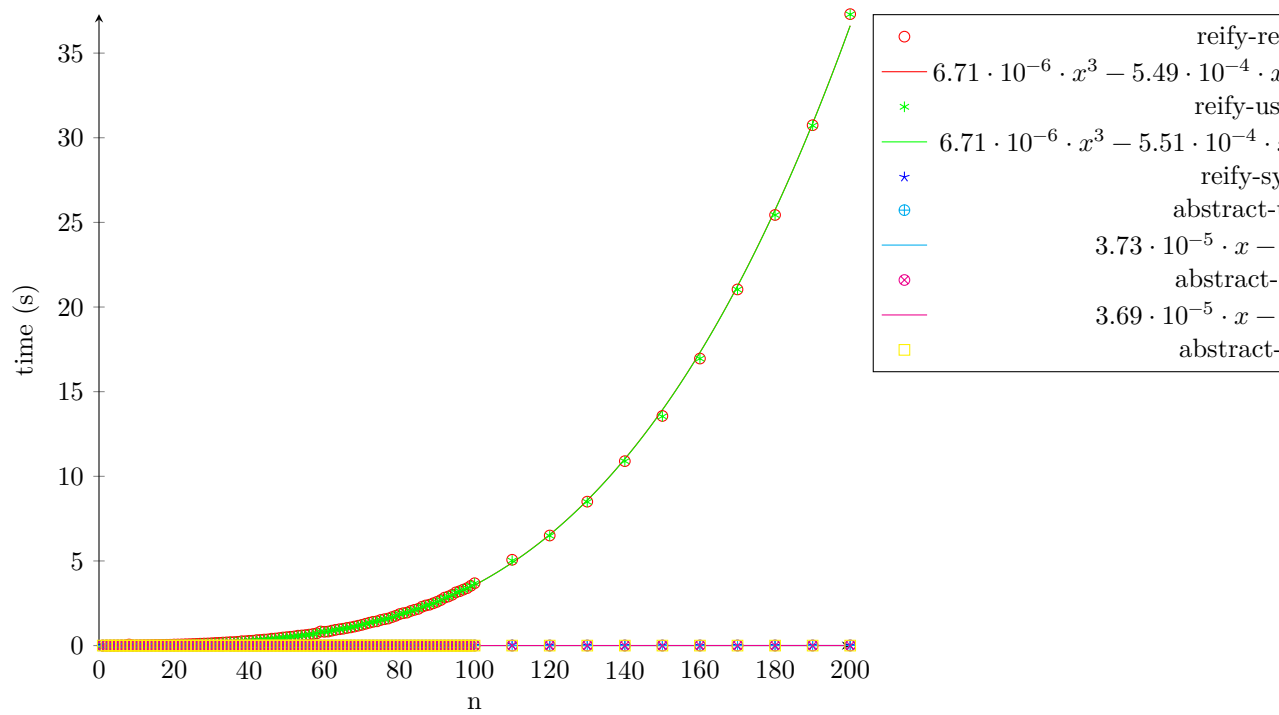Figure 12: timing-rewrite-repeated-app-fast-rewrite-no-abstract
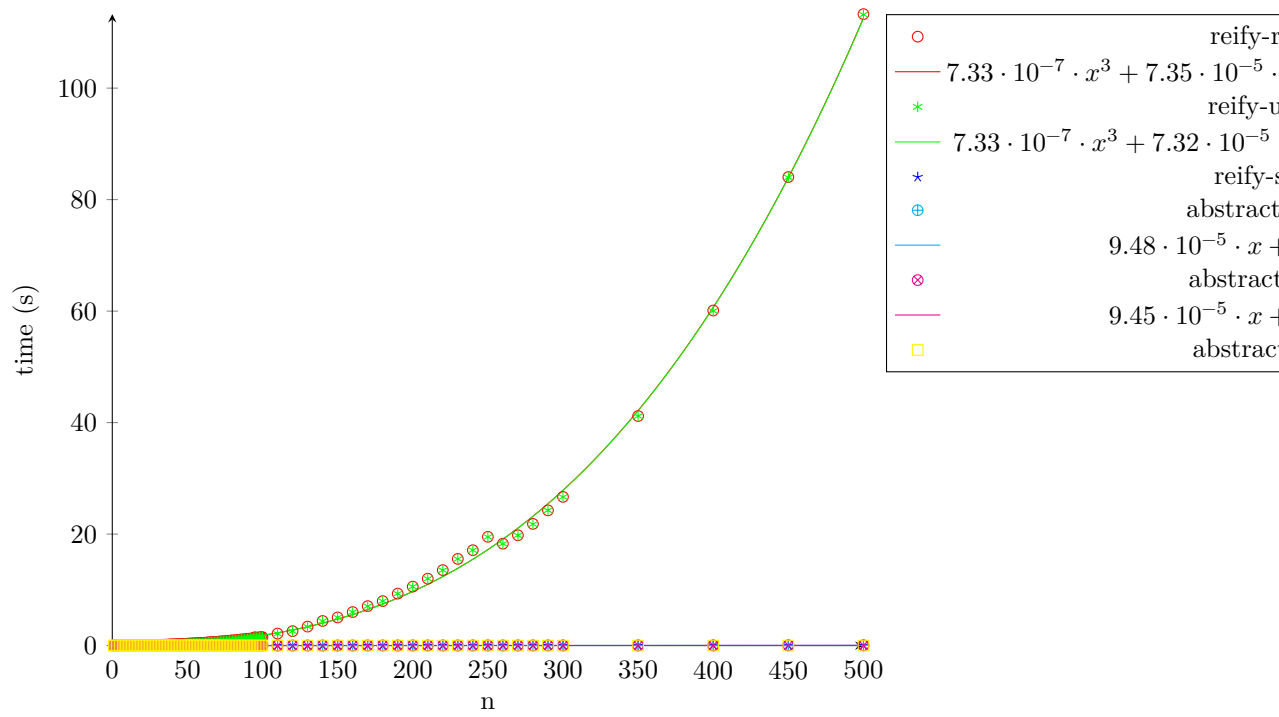
Figure 13: timing-typeclass-reification-let-in-HOAS

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