Figure 1: timing-pattern

1

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

The legend of the figure contains:

- abstract-real
- $2.36 \cdot 10^{-9} \cdot x^2 + 2.16 \cdot 10^{-4} \cdot$
- abstract-user
- $2.34 \cdot 10^{-9} \cdot x^2 + 2.13 \cdot 10^{-4} \cdot$
- close-abstract-real
- $2.21 \cdot 10^{-9} \cdot x^2 + 1.41 \cdot 10^{-4} \cdot$
- close-abstract-user
- $2.22 \cdot 10^{-9} \cdot x^2 + 1.38 \cdot 10^{-4} \cdot$
- exact-real
- $7.72 \cdot 10^{-5} \cdot x - 4.91$
- exact-user
- $7.6 \cdot 10^{-5} \cdot x - 5.11 \cdot$
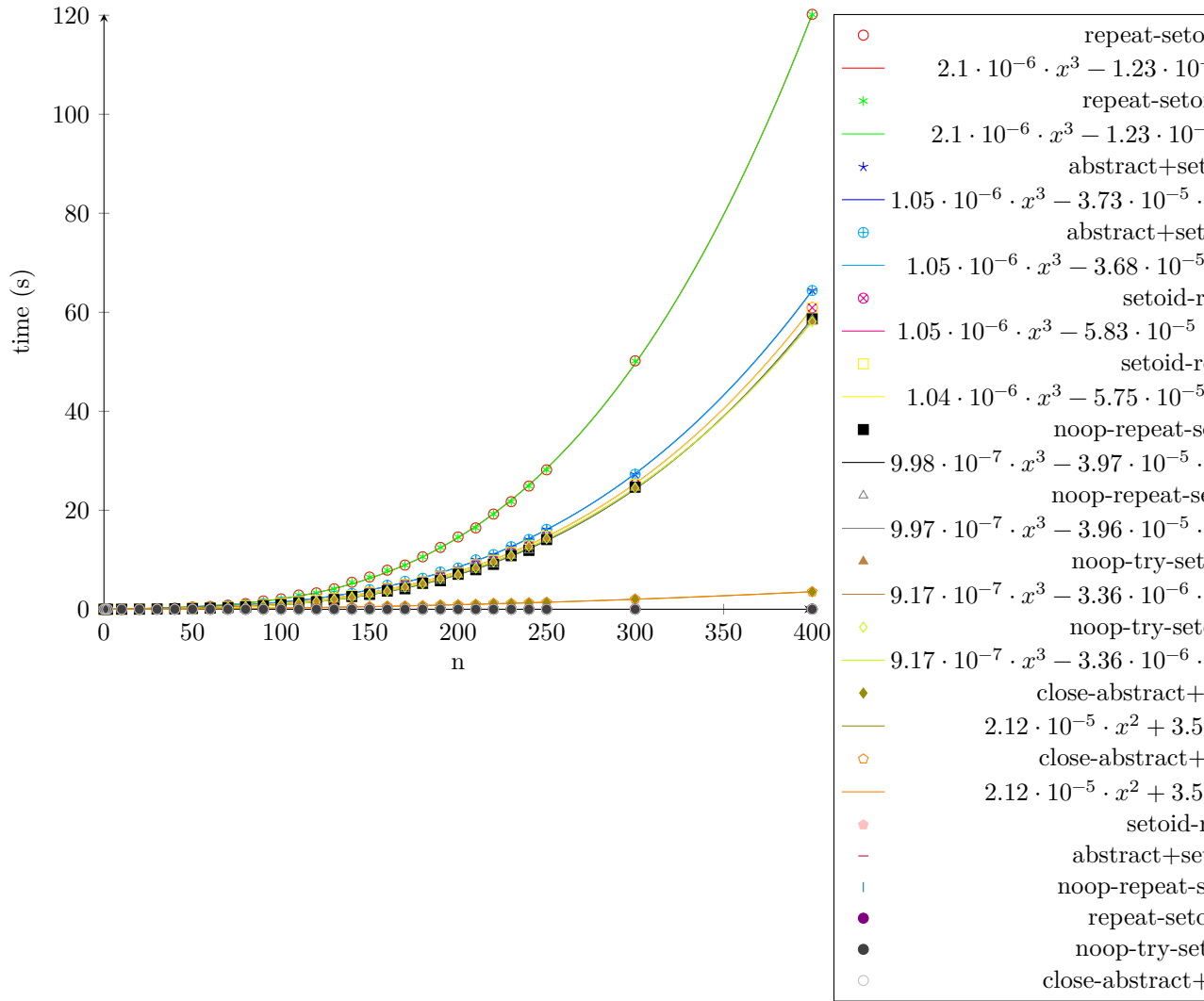- abstract-sys
- close-abstract-sys
- exact-sys

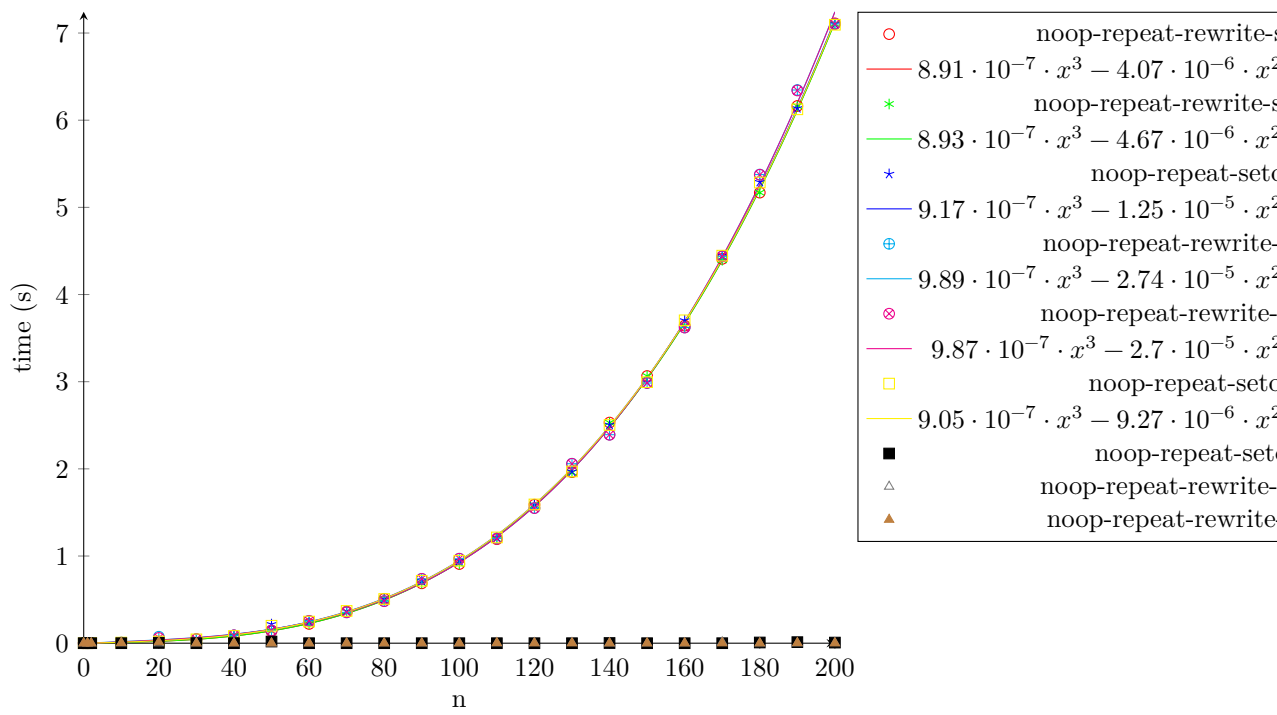Figure 3: timing-repeat-setoid-rewrite-under-binders
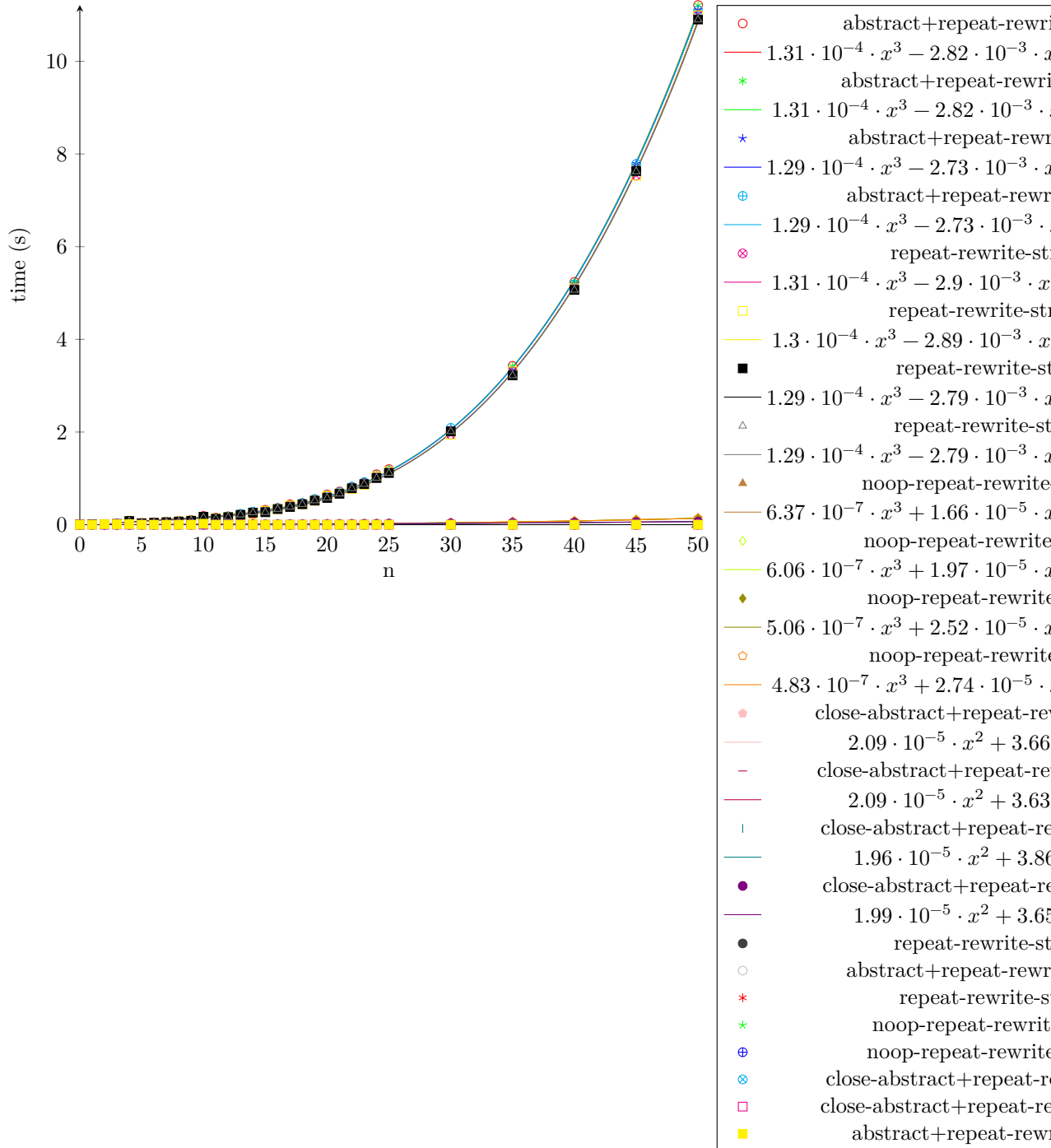
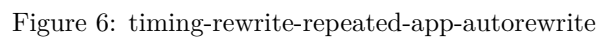Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

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

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

6
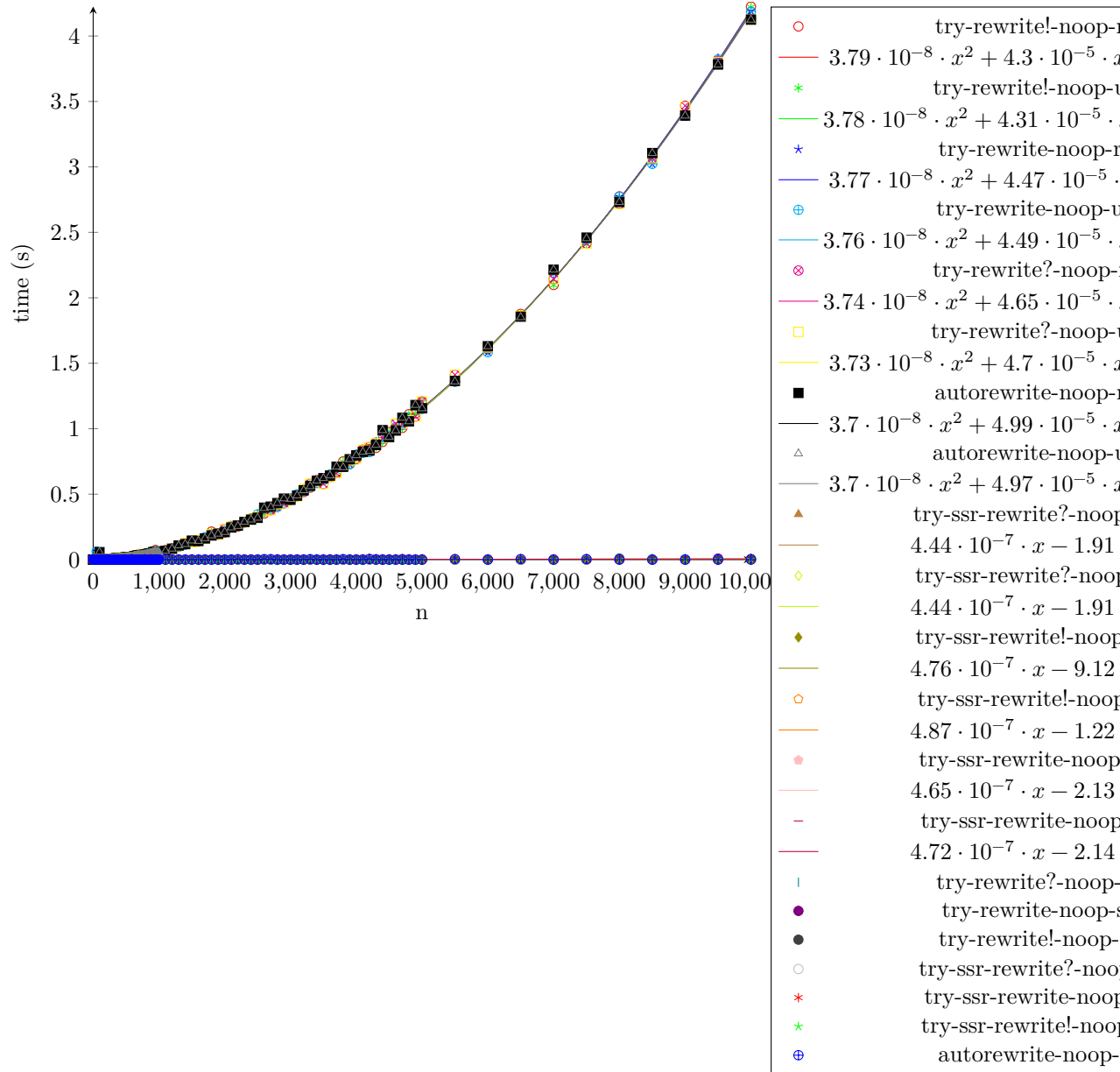
Figure 7: timing-rewrite-repeated-app-autorewrite-noop
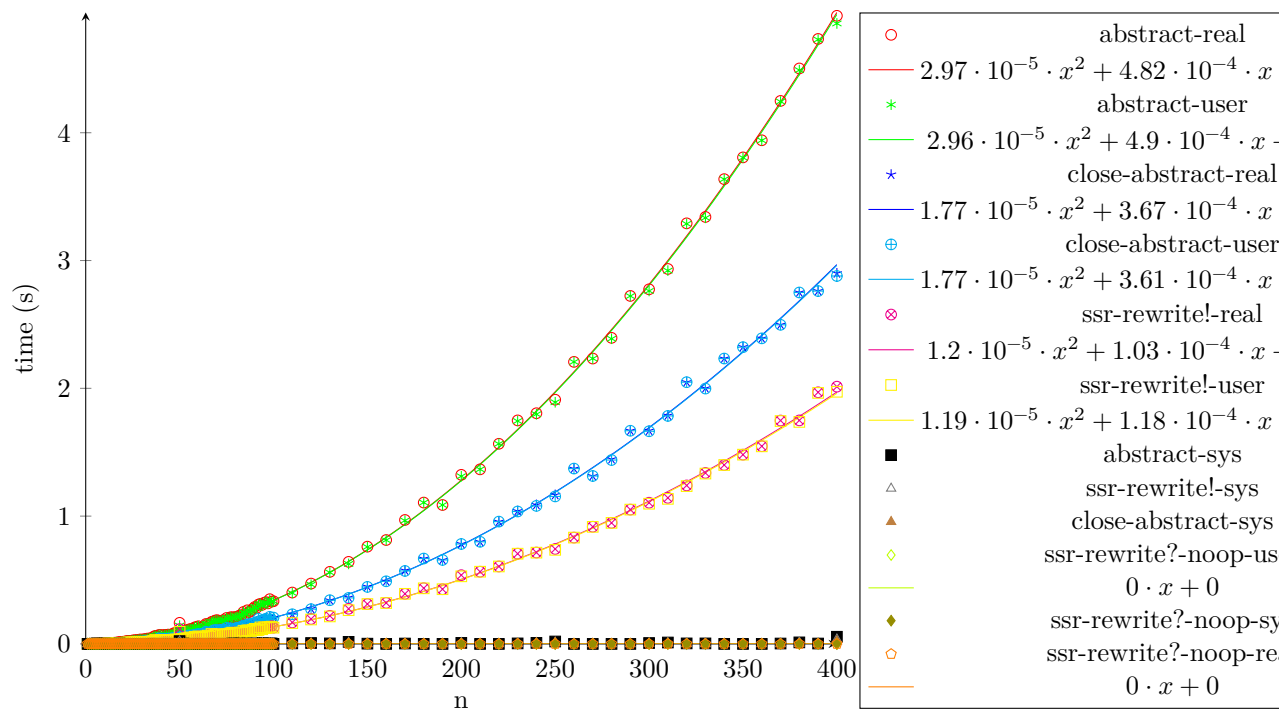
Figure 8: timing-rewrite-repeated-app-ssrrewrite

Legend:
- abstract-real ○
- $2.97 \cdot 10^{-5} \cdot x^2 + 4.82 \cdot 10^{-4} \cdot x$
- abstract-user ✱
- $2.96 \cdot 10^{-5} \cdot x^2 + 4.9 \cdot 10^{-4} \cdot x$
- close-abstract-real ✱
- $1.77 \cdot 10^{-5} \cdot x^2 + 3.67 \cdot 10^{-4} \cdot x$
- close-abstract-user ⊕
- $1.77 \cdot 10^{-5} \cdot x^2 + 3.61 \cdot 10^{-4} \cdot x$
- ssr-rewrite!-real ⊗
- $1.2 \cdot 10^{-5} \cdot x^2 + 1.03 \cdot 10^{-4} \cdot x$
- ssr-rewrite!-user □
- $1.19 \cdot 10^{-5} \cdot x^2 + 1.18 \cdot 10^{-4} \cdot x$
- abstract-sys ■
- ssr-rewrite!-sys △
- close-abstract-sys ▲
- ssr-rewrite?-noop-user ◇
- $0 \cdot x + 0$
- ssr-rewrite?-noop-sys ◆
- ssr-rewrite?-noop-real ⬠
- $0 \cdot x + 0$

8
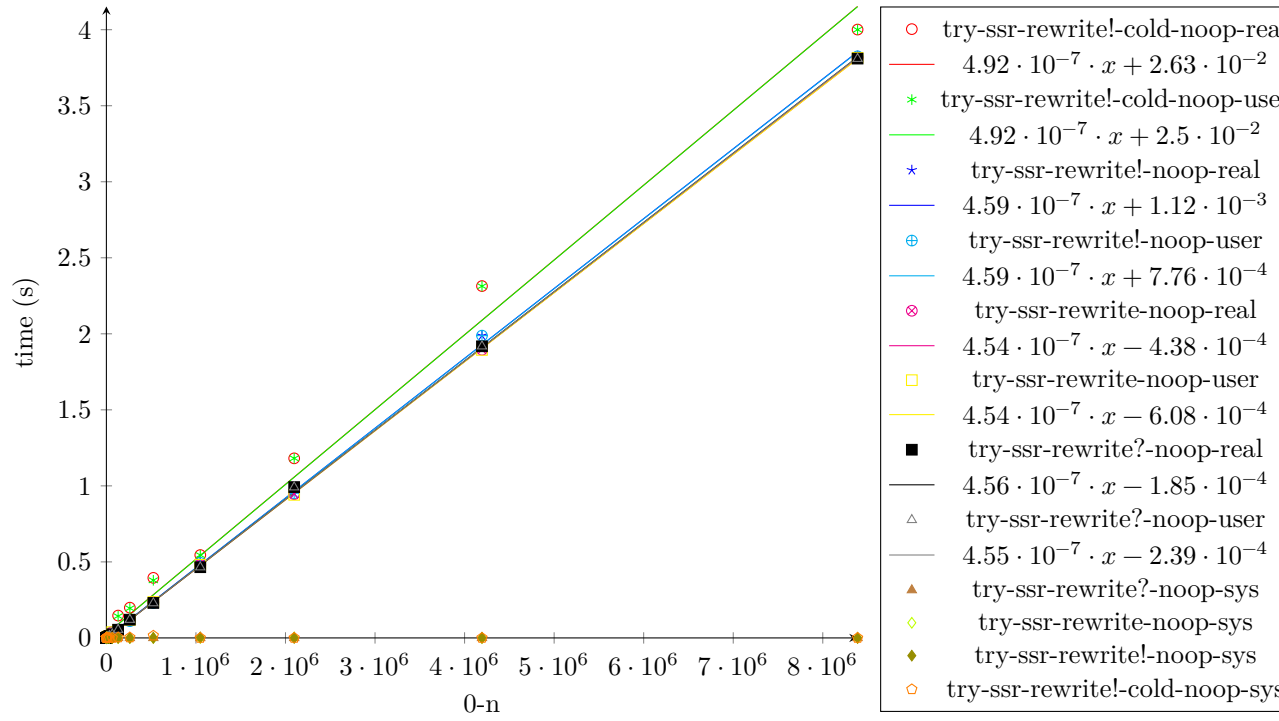
Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn 1
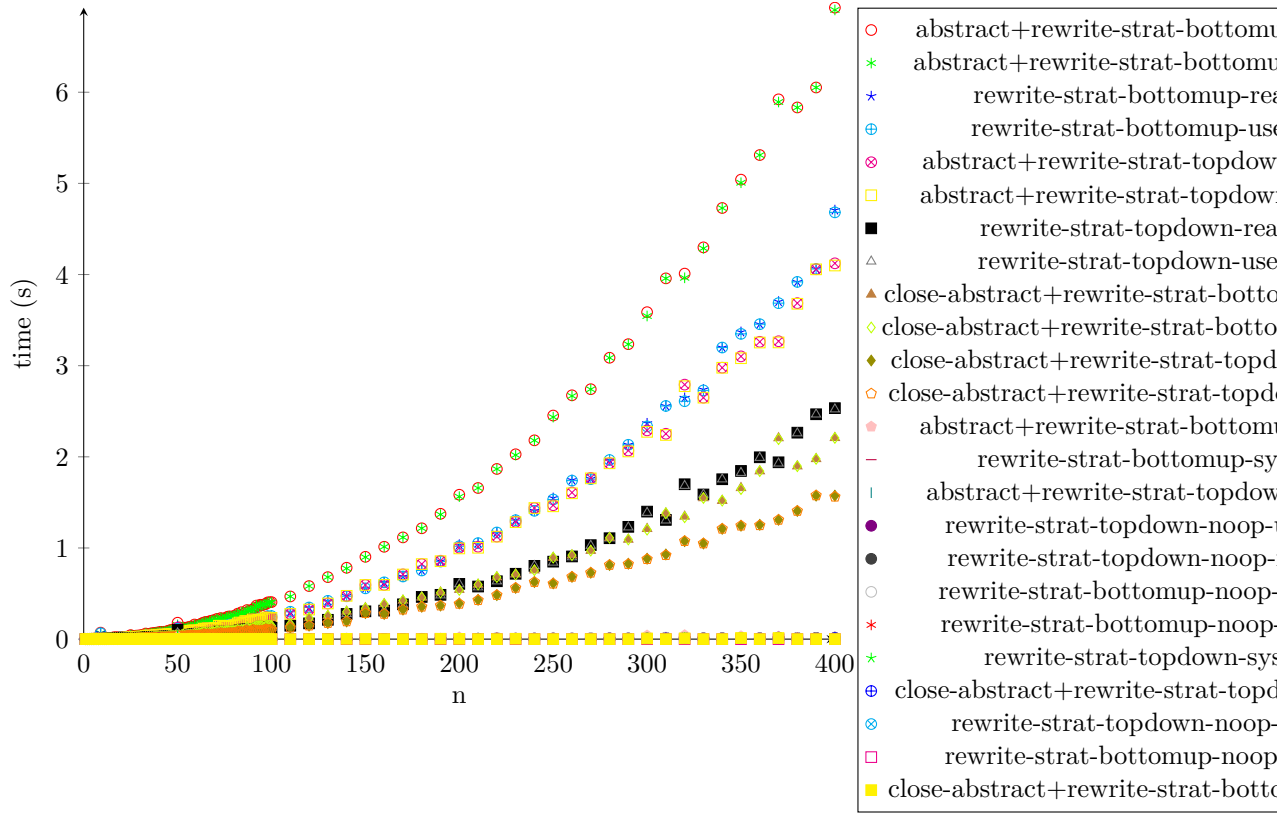
Figure 10: timing-rewrite-repeated-app-rewrite-strat

The plot shows:
- Y-axis: time (s), with values 0, 1, 2, 3, 4, 5, 6
- X-axis: n, with values 0, 50, 100, 150, 200, 250, 300, 350, 400

Legend:
- abstract+rewrite-strat-bottomu...
- abstract+rewrite-strat-bottomu...
- rewrite-strat-bottomup-rea...
- rewrite-strat-bottomup-use...
- abstract+rewrite-strat-topdow...
- abstract+rewrite-strat-topdow...
- rewrite-strat-topdown-rea...
- rewrite-strat-topdown-use...
- close-abstract+rewrite-strat-botto...
- close-abstract+rewrite-strat-botto...
- close-abstract+rewrite-strat-topd...
- close-abstract+rewrite-strat-topd...
- abstract+rewrite-strat-bottomu...
- rewrite-strat-bottomup-sy...
- abstract+rewrite-strat-topdow...
- rewrite-strat-topdown-noop-...
- rewrite-strat-topdown-noop-...
- rewrite-strat-bottomup-noop-...
- rewrite-strat-bottomup-noop-...
- rewrite-strat-topdown-sys...
- close-abstract+rewrite-strat-topd...
- rewrite-strat-topdown-noop-...
- rewrite-strat-bottomup-noop...
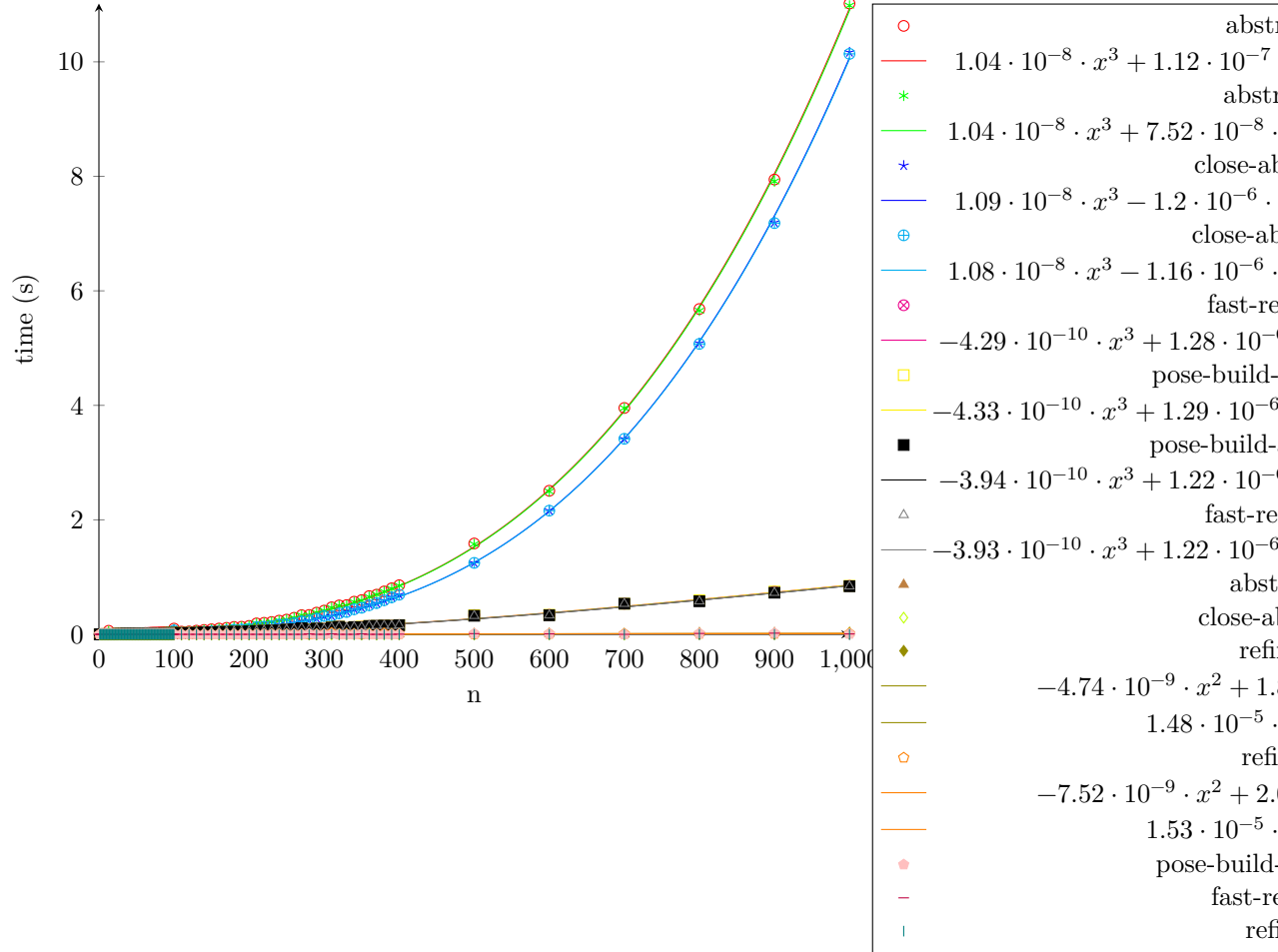- close-abstract+rewrite-strat-botto...

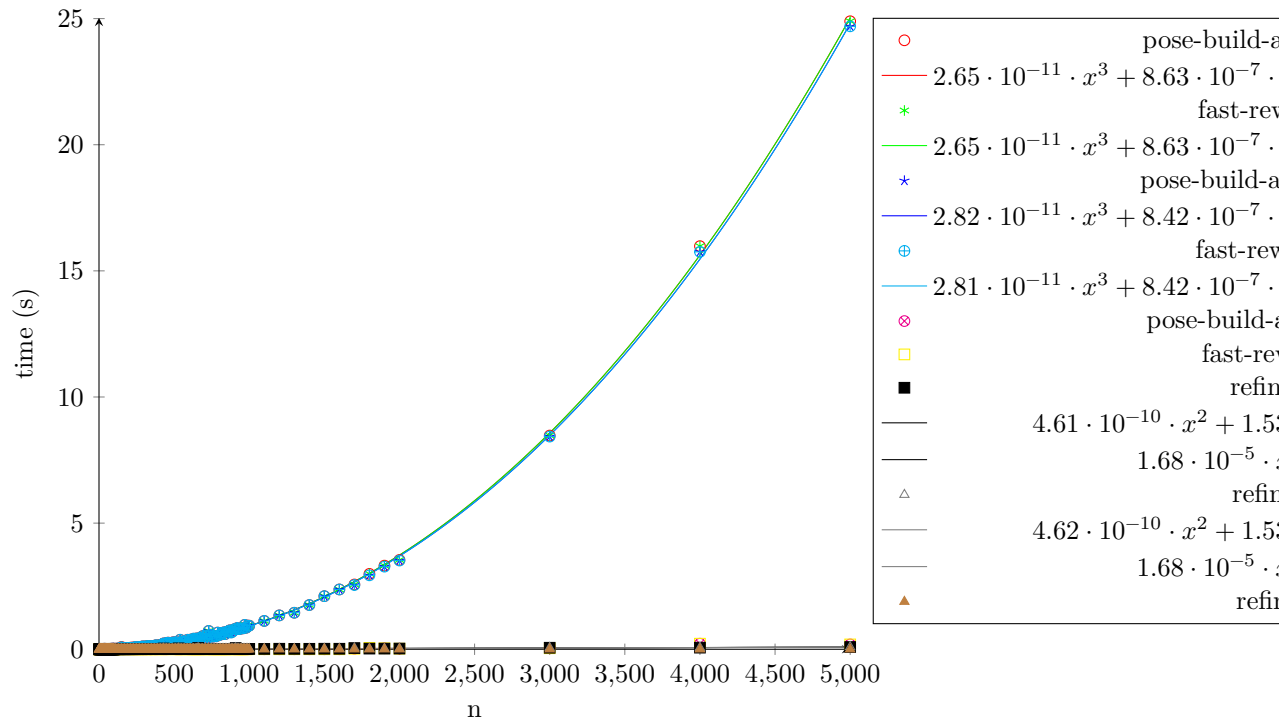Figure 11: timing-rewrite-repeated-app-fast-rewrite

11

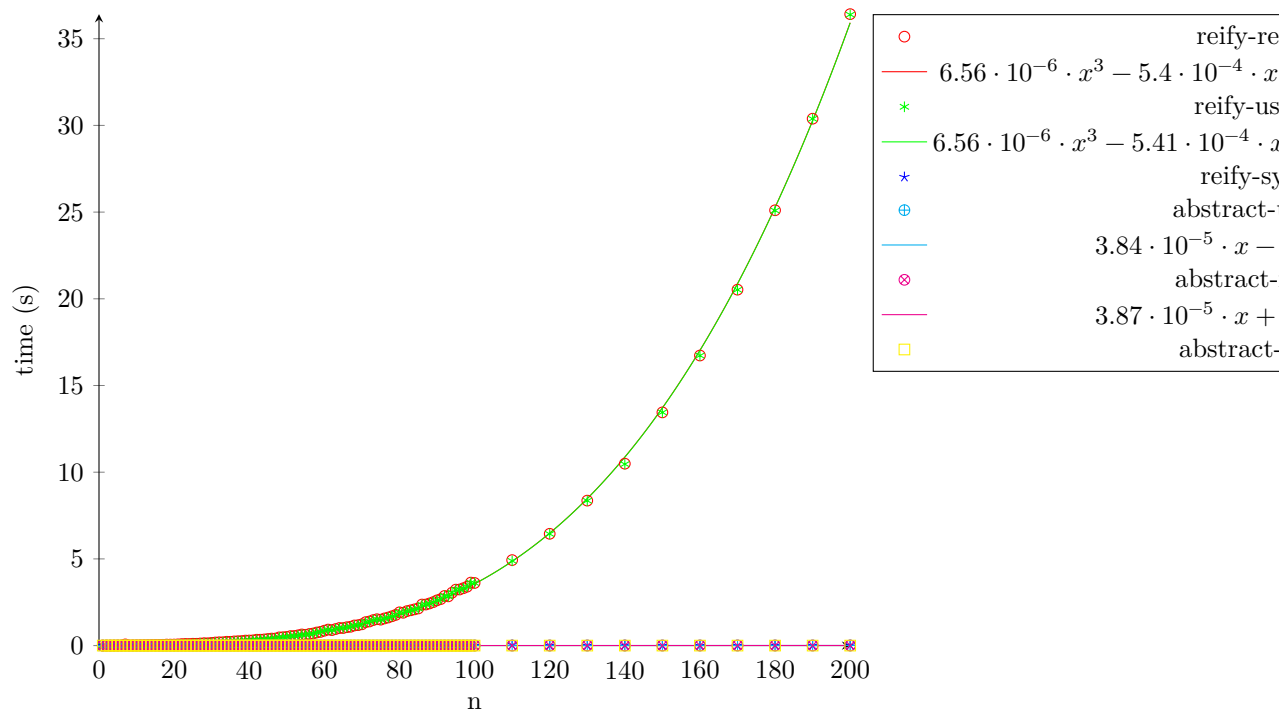Figure 12: timing-rewrite-repeated-app-fast-rewrite-no-abstract
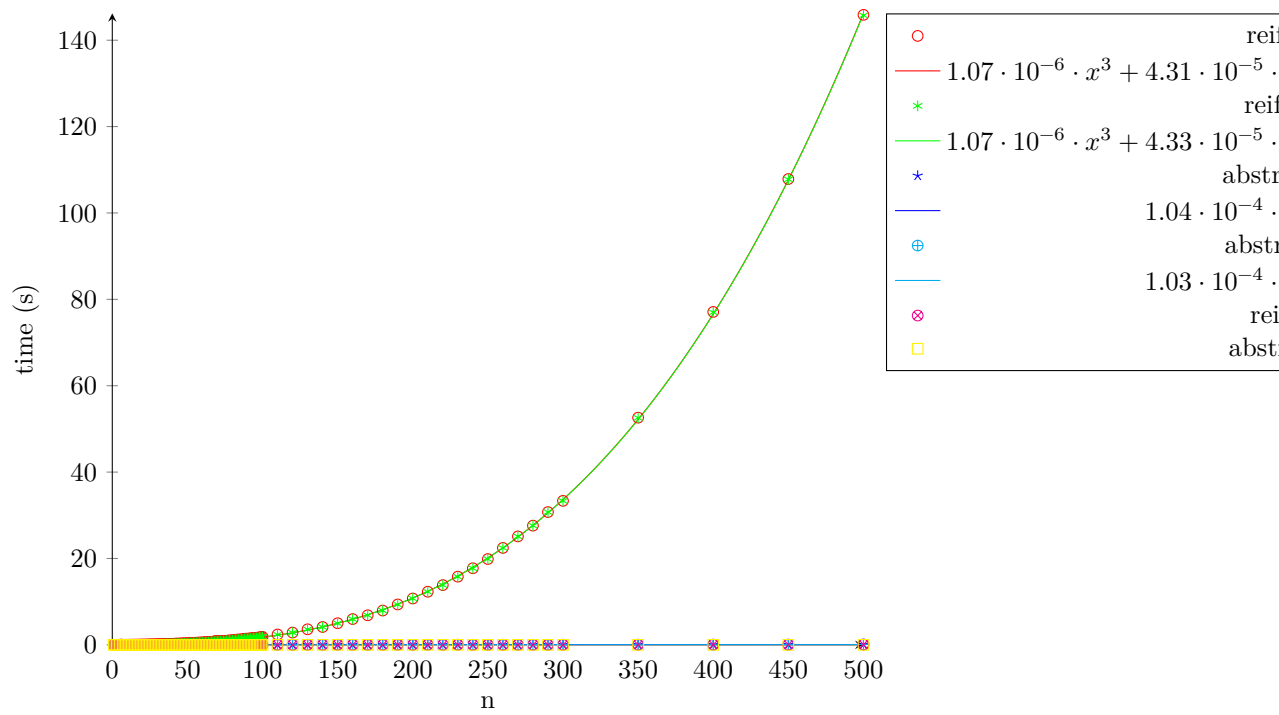
Figure 13: timing-typeclass-reification-let-in-HOAS

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

time (s)

18

16

14

12

10

8

6

4

2

0

0   500   1,000   1,500   2,000   2,500   3,000

n

○   abstract-real
—— $2.16 \cdot 10^{-6} \cdot x^2 + 1.35 \cdot 10^{-4} \cdot x$
✳   abstract-user
—— $2.16 \cdot 10^{-6} \cdot x^2 + 1.28 \cdot 10^{-4} \cdot x$
⋆   fast-rewrite-real
—— $1.76 \cdot 10^{-6} \cdot x^2 + 8.56 \cdot 10^{-5} \cdot x$
⊕   fast-rewrite-user
—— $1.76 \cdot 10^{-6} \cdot x^2 + 8.02 \cdot 10^{-5} \cdot x$
⊗   close-abstract-real
—— $3.94 \cdot 10^{-7} \cdot x^2 + 4.75 \cdot 10^{-5} \cdot x$
□   close-abstract-user
—— $3.95 \cdot 10^{-7} \cdot x^2 + 4.56 \cdot 10^{-5} \cdot x$
■   type-pf-cast-user
—— $2.59 \cdot 10^{-7} \cdot x^2 - 1.77 \cdot 10^{-5} \cdot x$
△   type-pf-cast-real
—— $2.59 \cdot 10^{-7} \cdot x^2 - 1.69 \cdot 10^{-5} \cdot x$
▲   check-pf-cast-user
—— $2.61 \cdot 10^{-7} \cdot x^2 - 3.58 \cdot 10^{-5} \cdot x$
◇   check-pf-cast-real
—— $2.61 \cdot 10^{-7} \cdot x^2 - 3.48 \cdot 10^{-5} \cdot x$
◆   refine-user
—— $2.47 \cdot 10^{-7} \cdot x^2 + 4.32 \cdot 10^{-6} \cdot x$
—— $5.18 \cdot 10^{-4} \cdot x - 5.56 \cdot$
⬠   refine-real
—— $2.48 \cdot 10^{-7} \cdot x^2 + 4.21 \cdot 10^{-6} \cdot x$
—— $5.19 \cdot 10^{-4} \cdot x - 5.56 \cdot$
⬠   check-admit-cast-user
—— $2.5 \cdot 10^{-7} \cdot x^2 - 3.55 \cdot 10^{-6} \cdot x$
–   check-admit-cast-real
—— $2.51 \cdot 10^{-7} \cdot x^2 - 3.35 \cdot 10^{-6} \cdot x$
⏐   check-admit-real
—— $2.45 \cdot 10^{-7} \cdot x^2 - 2.27 \cdot 10^{-6} \cdot x$
●   check-admit-user
—— $2.45 \cdot 10^{-7} \cdot x^2 - 2.46 \cdot 10^{-6} \cdot x$
●   type-admit-user
—— $2.52 \cdot 10^{-7} \cdot x^2 - 3.37 \cdot 10^{-5} \cdot x$
○   type-admit-real
—— $2.52 \cdot 10^{-7} \cdot x^2 - 3.3 \cdot 10^{-5} \cdot x$
✳   type-admit-cast-user
—— $2.42 \cdot 10^{-7} \cdot x^2 - 6.82 \cdot 10^{-6} \cdot x$
✳   type-admit-cast-real
—— $2.42 \cdot 10^{-7} \cdot x^2 - 6.59 \cdot 10^{-6} \cdot x$
⊕   build-eval-thunk-user
—— $1.18 \cdot 10^{-4} \cdot x - 6.51 \cdot$
⊗   build-eval-thunk-real
—— $1.19 \cdot 10^{-4} \cdot x - 5.64 \cdot$
□   build-thunk-user
—— $1.17 \cdot 10^{-4} \cdot x - 6.89 \cdot$
■   build-thunk-real
—— $1.18 \cdot 10^{-4} \cdot x - 6.07 \cdot$
△   check-L-user

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