Figure 1: timing-pattern

1

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

The plot legend contains the following entries:

- abstract-real
- $1.69 \cdot 10^{-9} \cdot x^2 + 2.05 \cdot 10^{-4} \cdot$
- abstract-user
- $1.64 \cdot 10^{-9} \cdot x^2 + 2.02 \cdot 10^{-4} \cdot$
- close-abstract-real
- $1.41 \cdot 10^{-9} \cdot x^2 + 1.35 \cdot 10^{-4} \cdot$
- close-abstract-user
- $1.3 \cdot 10^{-9} \cdot x^2 + 1.34 \cdot 10^{-4} \cdot x$
- exact-real
- $7.37 \cdot 10^{-5} \cdot x - 5.9$
- exact-user
- $7.3 \cdot 10^{-5} \cdot x - 6.28$
- abstract-sys
- close-abstract-sys
- exact-sys

The figure shows a plot with x-axis labeled "n" ranging from 0 to 400, and y-axis labeled "time (s)" ranging from 0 to over 100. The legend (partially cut off) contains the following entries:

- repeat-seto...
- $1.83 \cdot 10^{-6} \cdot x^3 - 6.46 \cdot 10^{-5} \cdot$
- repeat-seto...
- $1.83 \cdot 10^{-6} \cdot x^3 - 6.38 \cdot 10^{-5} \cdot$
- abstract+set...
- $9.05 \cdot 10^{-7} \cdot x^3 - 7.92 \cdot 10^{-6} \cdot$
- abstract+set...
- $9.04 \cdot 10^{-7} \cdot x^3 - 7.79 \cdot 10^{-6} \cdot$
- setoid-r...
- $9.07 \cdot 10^{-7} \cdot x^3 - 2.93 \cdot 10^{-5} \cdot$
- setoid-r...
- $9.06 \cdot 10^{-7} \cdot x^3 - 2.91 \cdot 10^{-5} \cdot$
- noop-try-set...
- $9.21 \cdot 10^{-7} \cdot x^3 - 4.14 \cdot 10^{-5} \cdot$
- noop-try-set...
- $9.21 \cdot 10^{-7} \cdot x^3 - 4.14 \cdot 10^{-5}$
- noop-repeat-s...
- $8.37 \cdot 10^{-7} \cdot x^3 - 4.94 \cdot 10^{-6} \cdot$
- noop-repeat-s...
- $8.35 \cdot 10^{-7} \cdot x^3 - 4.52 \cdot 10^{-6} \cdot$
- close-abstract+
- $1.98 \cdot 10^{-5} \cdot x^2 + 4.6$
- close-abstract+
- $1.98 \cdot 10^{-5} \cdot x^2 + 4.6$
- setoid-r...
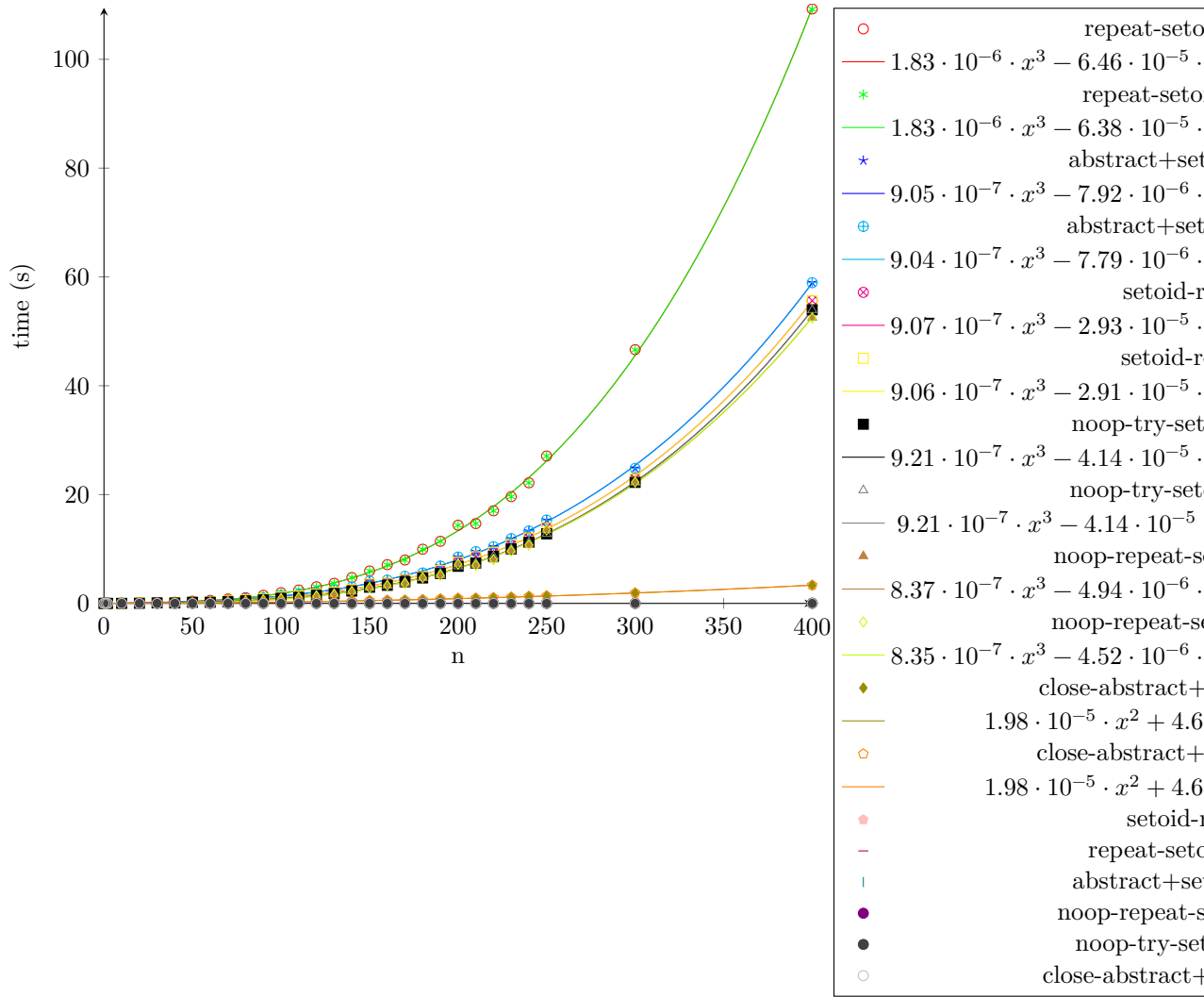- repeat-seto...
- abstract+set...
- noop-repeat-s...
- noop-try-set...
- close-abstract+

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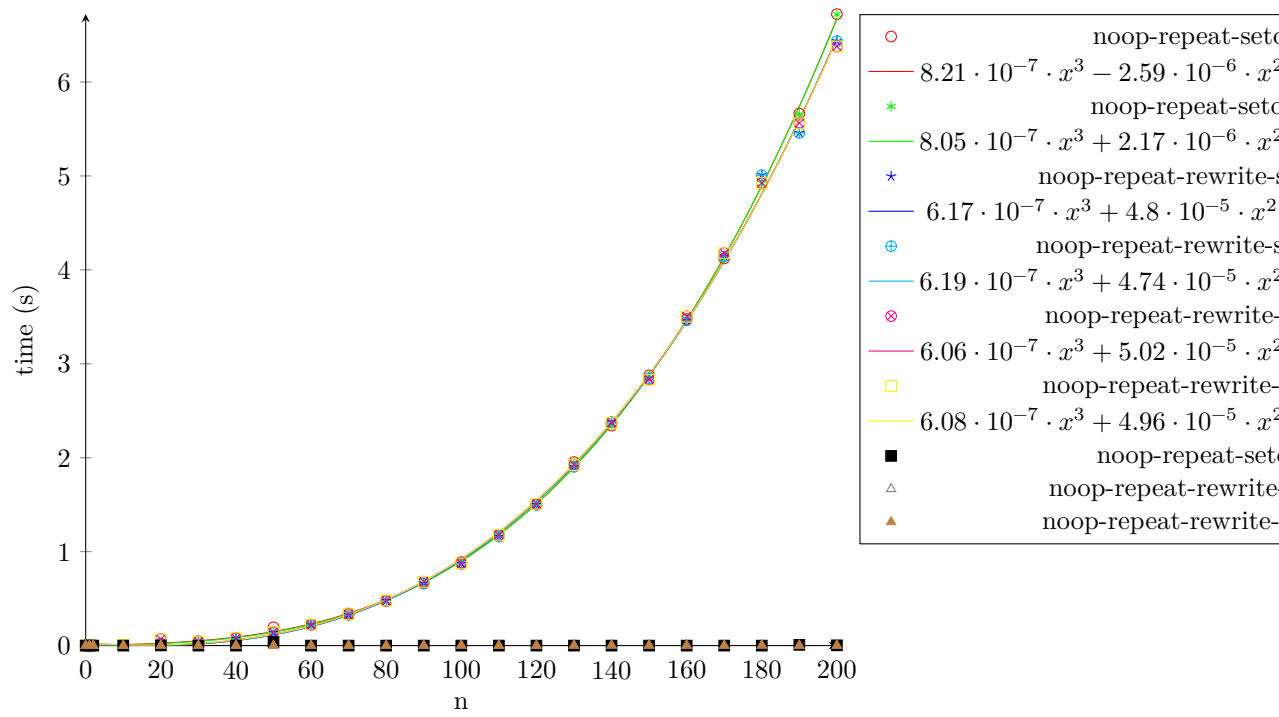
Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

4

abstract+repeat-rewri...
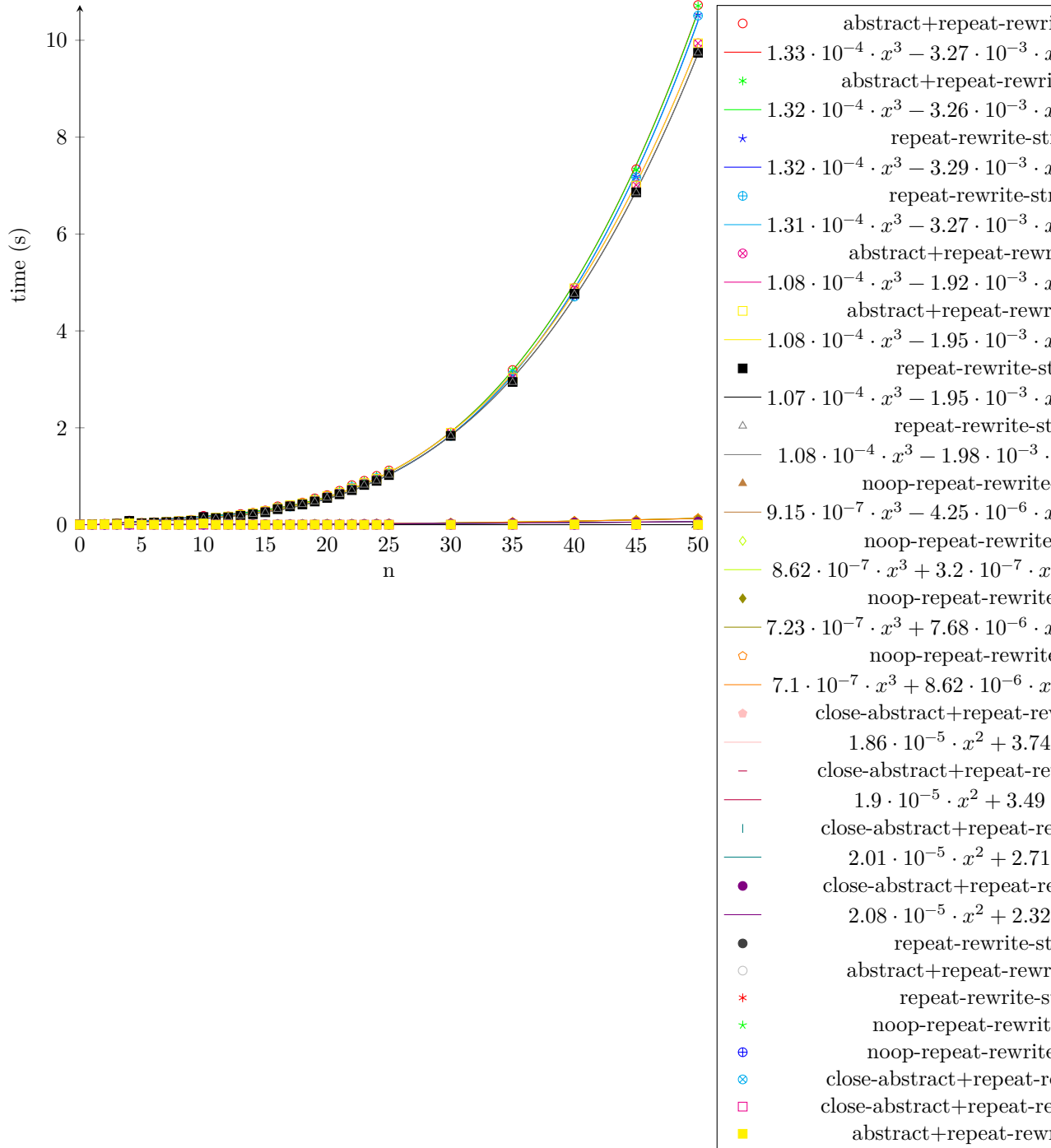
$1.33 \cdot 10^{-4} \cdot x^3 - 3.27 \cdot 10^{-3} \cdot x$

abstract+repeat-rewri...

$1.32 \cdot 10^{-4} \cdot x^3 - 3.26 \cdot 10^{-3} \cdot x$

repeat-rewrite-str...

$1.32 \cdot 10^{-4} \cdot x^3 - 3.29 \cdot 10^{-3} \cdot x$

repeat-rewrite-str...

$1.31 \cdot 10^{-4} \cdot x^3 - 3.27 \cdot 10^{-3} \cdot x$

abstract+repeat-rewr...

$1.08 \cdot 10^{-4} \cdot x^3 - 1.92 \cdot 10^{-3} \cdot x$

abstract+repeat-rewr...

$1.08 \cdot 10^{-4} \cdot x^3 - 1.95 \cdot 10^{-3} \cdot x$

repeat-rewrite-st...

$1.07 \cdot 10^{-4} \cdot x^3 - 1.95 \cdot 10^{-3} \cdot x$

repeat-rewrite-st...

$1.08 \cdot 10^{-4} \cdot x^3 - 1.98 \cdot 10^{-3} \cdot$

noop-repeat-rewrite...

$9.15 \cdot 10^{-7} \cdot x^3 - 4.25 \cdot 10^{-6} \cdot x$

noop-repeat-rewrite...

$8.62 \cdot 10^{-7} \cdot x^3 + 3.2 \cdot 10^{-7} \cdot x$

noop-repeat-rewrite...

$7.23 \cdot 10^{-7} \cdot x^3 + 7.68 \cdot 10^{-6} \cdot x$

noop-repeat-rewrite...

$7.1 \cdot 10^{-7} \cdot x^3 + 8.62 \cdot 10^{-6} \cdot x$

close-abstract+repeat-re...

$1.86 \cdot 10^{-5} \cdot x^2 + 3.74$

close-abstract+repeat-re...

$1.9 \cdot 10^{-5} \cdot x^2 + 3.49$

close-abstract+repeat-re...

$2.01 \cdot 10^{-5} \cdot x^2 + 2.71$

close-abstract+repeat-re...

$2.08 \cdot 10^{-5} \cdot x^2 + 2.32$

repeat-rewrite-st...

abstract+repeat-rewr...

repeat-rewrite-s...

noop-repeat-rewrit...

noop-repeat-rewrite...

close-abstract+repeat-r...

close-abstract+repeat-re...

abstract+repeat-rewr...

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

5

time (s)

4

3

2

1

0

0   50   100   150   200   250   300   350   400

n

abstract+rewrite!-re...

$2.96 \cdot 10^{-5} \cdot x^2 - 1.01 \cdot 10^{-3} \cdot x$

abstract+rewrite!-us...

$2.96 \cdot 10^{-5} \cdot x^2 - 1.02 \cdot 10^{-3} \cdot x$

abstract+autorewrite-...

$2.86 \cdot 10^{-5} \cdot x^2 - 7.38 \cdot 10^{-4} \cdot x$

abstract+autorewrite-...

$2.85 \cdot 10^{-5} \cdot x^2 - 7.38 \cdot 10^{-4} \cdot x$

rewrite!-real

$1.94 \cdot 10^{-5} \cdot x^2 - 1.04 \cdot 10^{-3} \cdot x$

rewrite!-user

$1.94 \cdot 10^{-5} \cdot x^2 - 1.05 \cdot 10^{-3} \cdot x$

autorewrite-real

$1.91 \cdot 10^{-5} \cdot x^2 - 9.78 \cdot 10^{-4} \cdot x$

autorewrite-user

$1.9 \cdot 10^{-5} \cdot x^2 - 9.74 \cdot 10^{-4} \cdot x$

close-abstract+rewrite!...

$1.01 \cdot 10^{-5} \cdot x^2 + 2.29 \cdot 10^{-6} \cdot x$

close-abstract+rewrite!...

$1.01 \cdot 10^{-5} \cdot x^2 + 5.31 \cdot 10^{-6} \cdot x$

close-abstract+autorewri...

$9.5 \cdot 10^{-6} \cdot x^2 + 2.23 \cdot 10^{-4} \cdot x$

close-abstract+autorewri...

$9.49 \cdot 10^{-6} \cdot x^2 + 2.23 \cdot 10^{-4} \cdot x$

autorewrite-sys

abstract+autorewrite-...

rewrite?-noop-user

$2.13 \cdot 10^{-5} \cdot x - 7.29 \cdot 1...$

rewrite?-noop-real

$2.28 \cdot 10^{-5} \cdot x - 7.77 \cdot 1...$

autorewrite-noop-use...

$2.22 \cdot 10^{-5} \cdot x - 8.18 \cdot 1...$

autorewrite-noop-rea...

$2.3 \cdot 10^{-5} \cdot x - 8.38 \cdot 1...$

rewrite!-sys

abstract+rewrite!-sy...

rewrite?-noop-sys

close-abstract+rewrite!...

close-abstract+autowri...

autorewrite-noop-sy...

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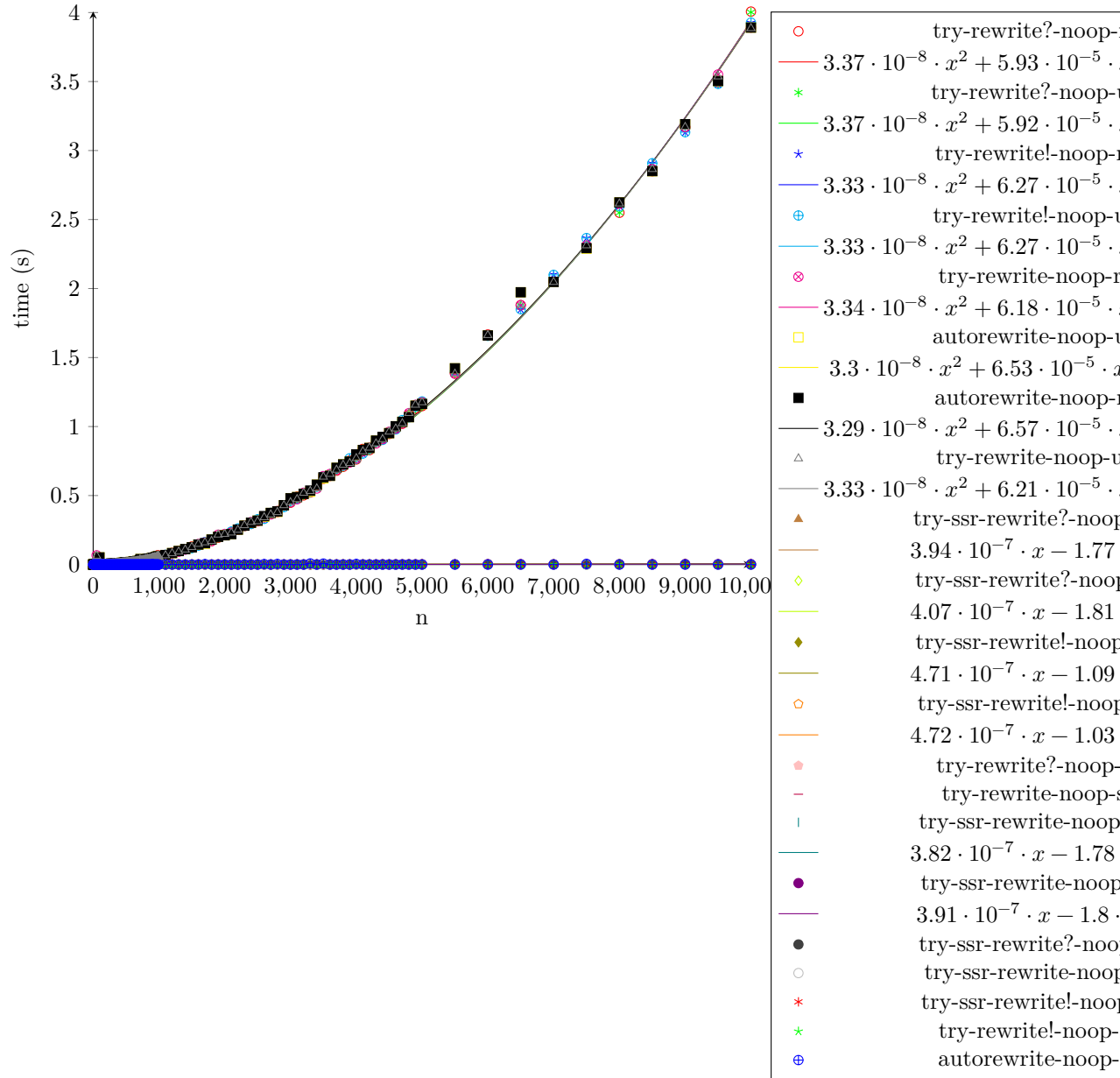
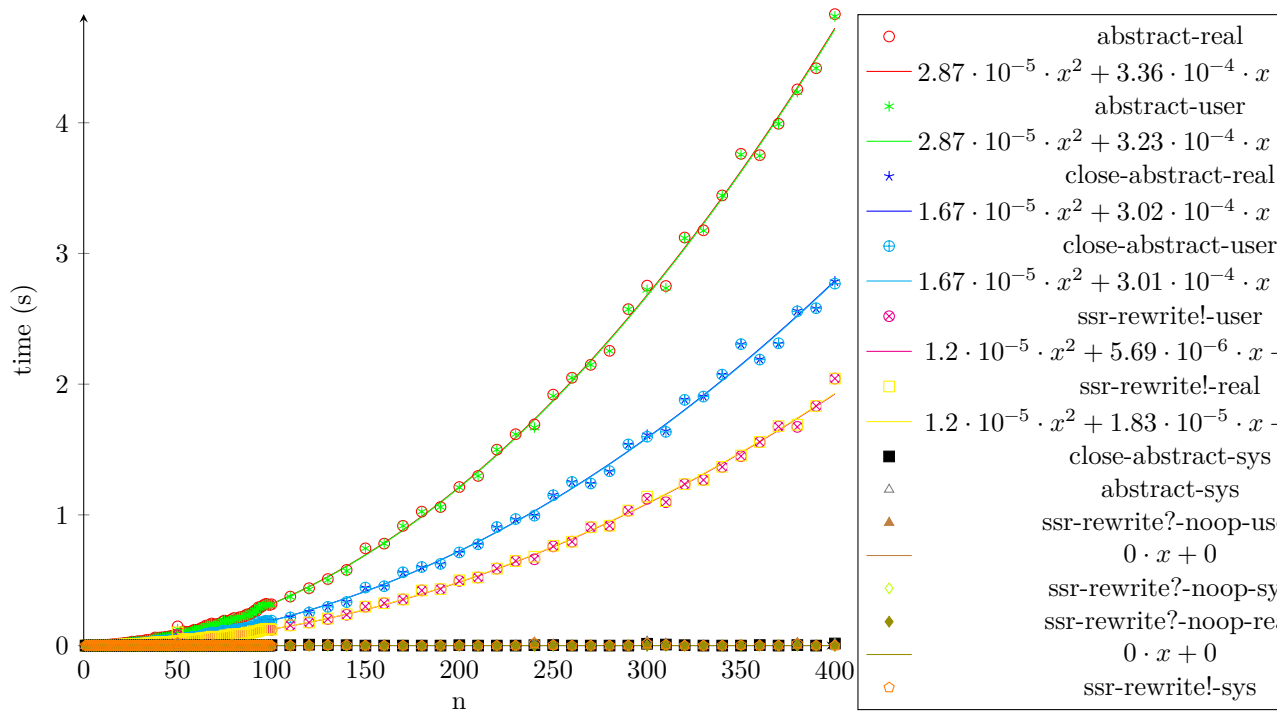Figure 7: timing-rewrite-repeated-app-autorewrite-noop

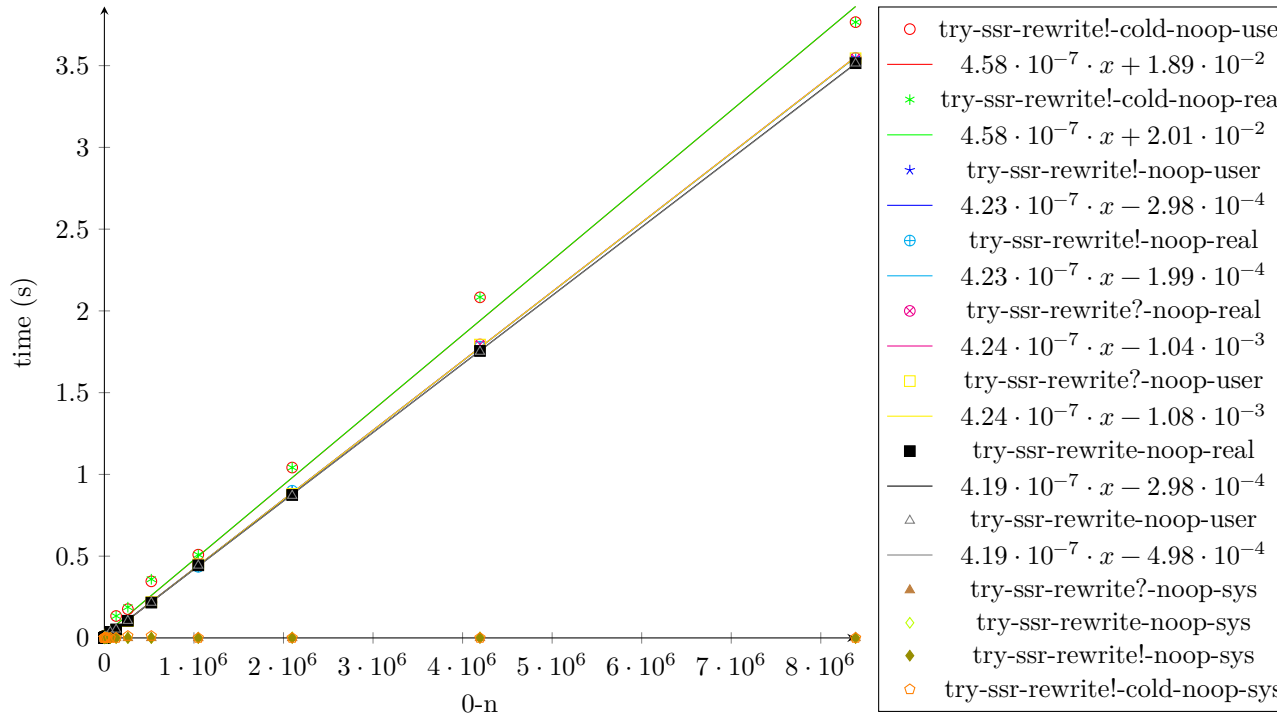Figure 8: timing-rewrite-repeated-app-ssrrewrite

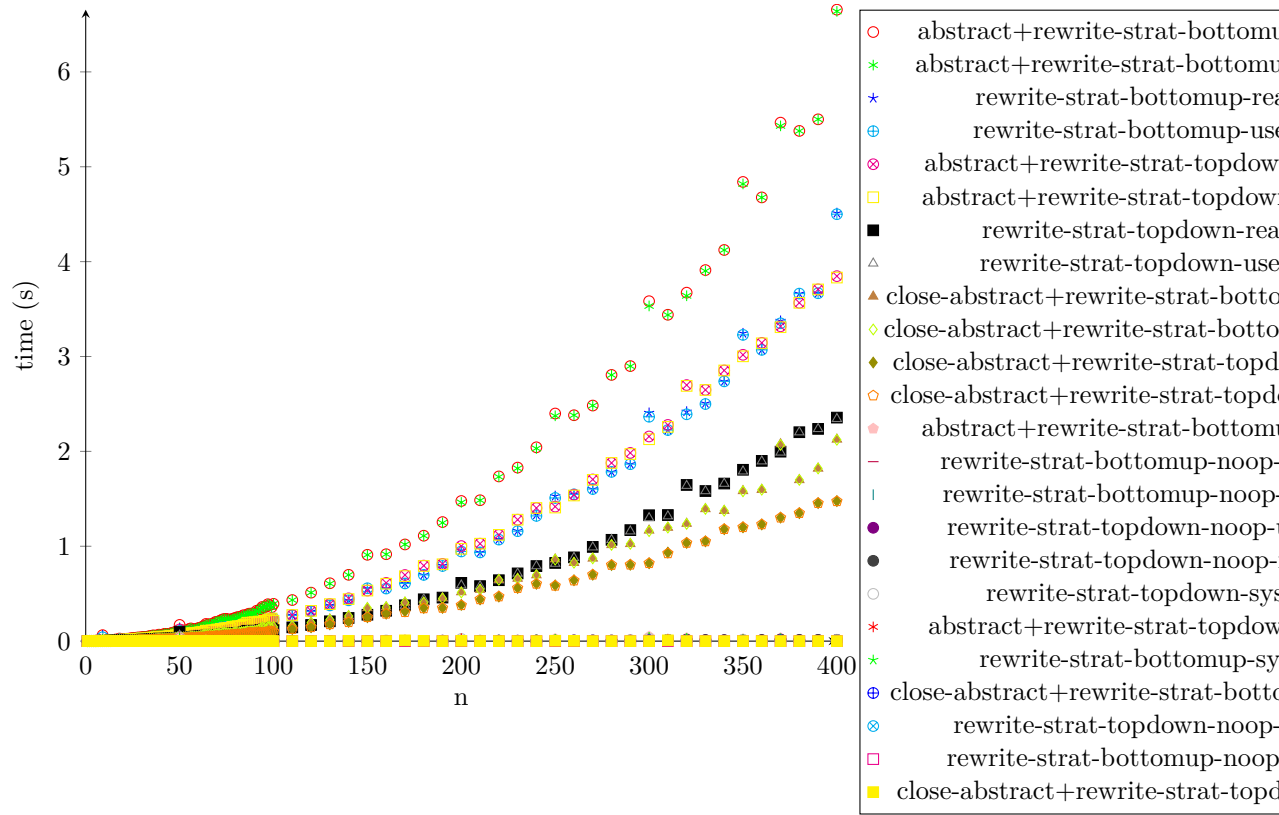Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn   1

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

The legend entries (partially visible, truncated at right edge):

- 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-noop-...
- rewrite-strat-bottomup-noop-...
- rewrite-strat-topdown-noop-...
- rewrite-strat-topdown-noop-...
- rewrite-strat-topdown-sys...
- abstract+rewrite-strat-topdow...
- rewrite-strat-bottomup-sy...
- close-abstract+rewrite-strat-botto...
- rewrite-strat-topdown-noop-...
- rewrite-strat-bottomup-noop...
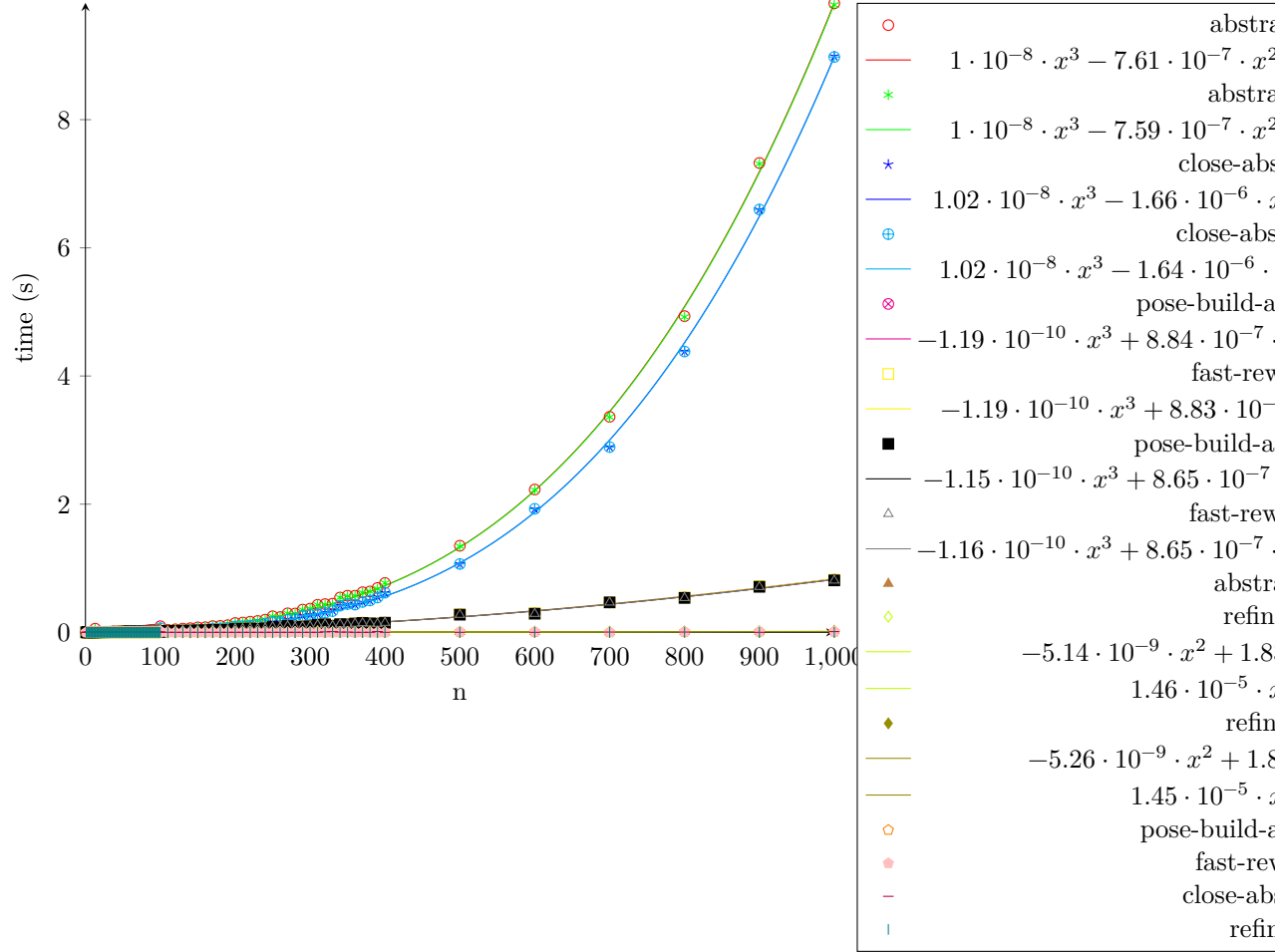- close-abstract+rewrite-strat-topd...

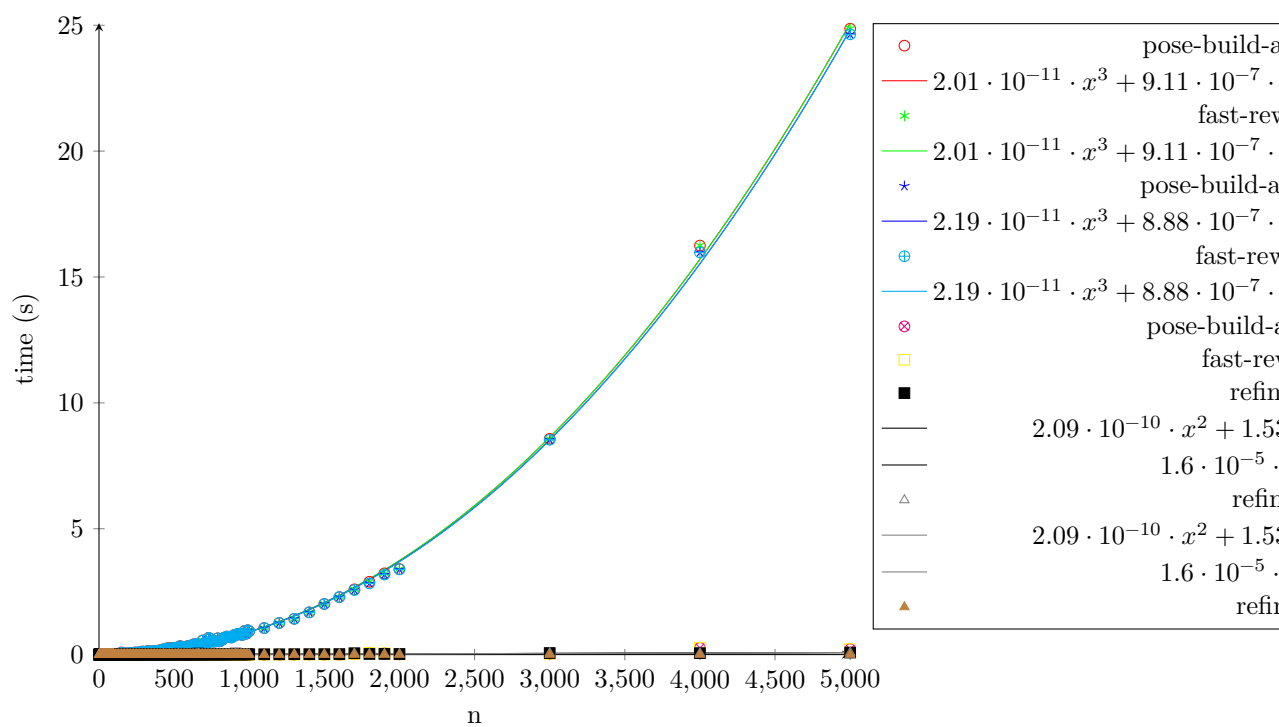Figure 11: timing-rewrite-repeated-app-fast-rewrite

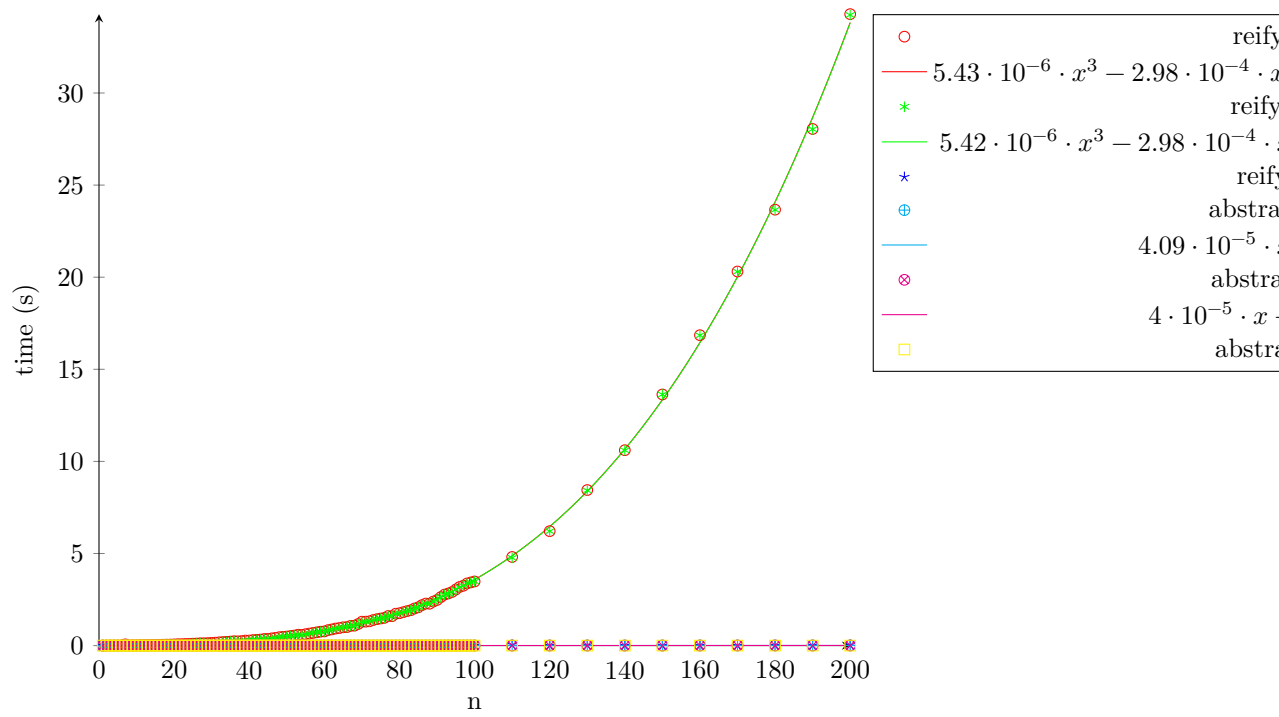Figure 12: timing-rewrite-repeated-app-fast-rewrite-no-abstract
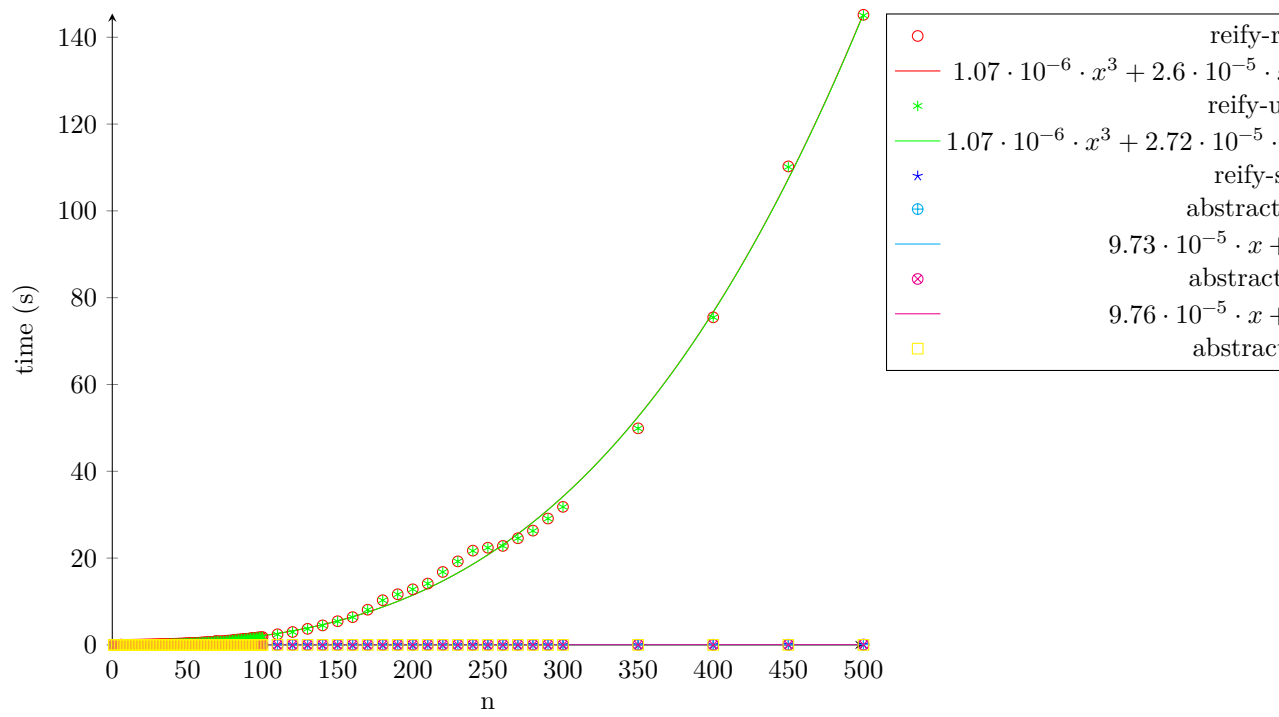
Figure 13: timing-typeclass-reification-let-in-HOAS

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

time (s)

n

Legend:

abstract-real
$2.44 \cdot 10^{-6} \cdot x^2 - 1.9 \cdot 10^{-4} \cdot x$

abstract-user
$2.44 \cdot 10^{-6} \cdot x^2 - 1.96 \cdot 10^{-4} \cdot x$

fast-rewrite-real
$2.02 \cdot 10^{-6} \cdot x^2 - 1.8 \cdot 10^{-4} \cdot x$

fast-rewrite-user
$2.02 \cdot 10^{-6} \cdot x^2 - 1.84 \cdot 10^{-4} \cdot x$

close-abstract-real
$4.16 \cdot 10^{-7} \cdot x^2 - 1.19 \cdot 10^{-5} \cdot x$

close-abstract-user
$4.16 \cdot 10^{-7} \cdot x^2 - 1.38 \cdot 10^{-5} \cdot x$

check-admit-user
$2.99 \cdot 10^{-7} \cdot x^2 - 5.91 \cdot 10^{-5} \cdot x$

check-admit-real
$2.98 \cdot 10^{-7} \cdot x^2 - 5.8 \cdot 10^{-5} \cdot x$

check-admit-cast-user
$2.87 \cdot 10^{-7} \cdot x^2 - 3.75 \cdot 10^{-5} \cdot x$

check-admit-cast-real
$2.87 \cdot 10^{-7} \cdot x^2 - 3.75 \cdot 10^{-5} \cdot x$

refine-real
$2.87 \cdot 10^{-7} \cdot x^2 - 3.54 \cdot 10^{-5} \cdot x$
$5.6 \cdot 10^{-4} \cdot x - 6.17 \cdot x$

refine-user
$2.86 \cdot 10^{-7} \cdot x^2 - 3.53 \cdot 10^{-5} \cdot x$
$5.59 \cdot 10^{-4} \cdot x - 6.17 \cdot x$

type-admit-user
$2.97 \cdot 10^{-7} \cdot x^2 - 8.14 \cdot 10^{-5} \cdot x$

type-admit-real
$2.97 \cdot 10^{-7} \cdot x^2 - 8.11 \cdot 10^{-5} \cdot x$

type-pf-cast-real
$2.74 \cdot 10^{-7} \cdot x^2 - 1.98 \cdot 10^{-5} \cdot x$

type-pf-cast-user
$2.74 \cdot 10^{-7} \cdot x^2 - 2.04 \cdot 10^{-5} \cdot x$

check-pf-cast-user
$2.76 \cdot 10^{-7} \cdot x^2 - 4.71 \cdot 10^{-5} \cdot x$

check-pf-cast-real
$2.76 \cdot 10^{-7} \cdot x^2 - 4.71 \cdot 10^{-5} \cdot x$

type-admit-cast-real
$2.79 \cdot 10^{-7} \cdot x^2 - 4.44 \cdot 10^{-5} \cdot x$

type-admit-cast-user
$2.79 \cdot 10^{-7} \cdot x^2 - 4.45 \cdot 10^{-5} \cdot x$

build-eval-thunk-user
$1.22 \cdot 10^{-4} \cdot x - 1.78 \cdot x$

build-eval-thunk-real
$1.22 \cdot 10^{-4} \cdot x - 1.66 \cdot x$

build-thunk-user
$1.21 \cdot 10^{-4} \cdot x - 1.86 \cdot x$

build-thunk-real
$1.21 \cdot 10^{-4} \cdot x - 1.71 \cdot x$

check-L-user