

# Unstable Redex: May Change Without Warning

Version 6.0

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This library is *unstable*; compatibility will not be maintained. See *Unstable: May Change Without Warning* for more information.

```
(require unstable/gui/redex)      package: unstable-redex
```

This library provides functions to help typesetting for `redex` models. The following example program provides an overview of the features:

```
> (define-language ZF
  [e empty
   (Set e)
   (Union e_1 e_2)
   (Powerset e)
   ZZ
   variable-not-otherwise-mentioned]
 [formula (same? e_1 e_2)
          (in? e_1 e_2)
          true
          false
          (implies formula_1 formula_2)])
```

By default, Redex models are typeset as S-expressions with some basic styling that distinguishes literals from nonterminal names, handles subscripting, etc.

```
> (language->pict ZF)
```

```

e ::= empty
    | (Set e)
    | (Union e1 e2)
    | (Powerset e)
    | ZZ
    | variable-not-otherwise-mentioned
formula ::= (same? e1 e2)
    | (in? e1 e2)
    | true
    | false
    | (implies formula1 formula2)
> (term->pict ZF (in? x (Set 1 2 3 ...)))
(in? x (Set 1 2 3 ...))

```

This library provides helper functions for creating and using rewriters that transform the S-expression model terms into other notations.

```

> (add-atomic-rewriters!
  'empty "∅"
  'formula "ϕ"
  'ZZ (text "Z" '(bold . modern) (default-font-size))
  'variable-not-otherwise-mentioned
    (lambda () (text "x, y, z, ..." (literal-style) (default-
font-size))))
  'true (lambda () (text "true" '(caps . modern) (default-font-
size))))
  'false (lambda () (text "false" '(caps . modern) (default-font-
size))))

> (add-compound-rewriters!
  'same? (binary-rw " = ")
  'in? (binary-rw " ∈ ")
  'Set (bracket-rw 'curly)
  'Powerset (function-rw "P")
  'Union (binary-rw "∪")
  'implies (binary-rw " ⇒ " #:parenthesize-left '(implies)))

> (with-rewriters
  (lambda ()
    (language->pict ZF)))

```

```

e ::= ∅
    | {e}
    | e1 ∪ e2
    | P(e)
    | Z
    | x, y, z, ...
φ ::= e1 = e2
    | e1 ∈ e2
    | TRUE
    | FALSE
    | φ1 ⇒ φ2
> (with-rewriters
   (lambda ()
    (render-term ZF (in? x (Set 1 2 3 ...)))))
x ∈ {1, 2, 3, ...}

```

```

(with-rewriters proc) → any
proc : (-> any)

```

Calls *proc* with the rewriters of `current-atomic-rewriters`, `current-compound-rewriters`, and `current-unquote-rewriters`.

```

(current-atomic-rewriters)
  (let ([atomic-rewriter/c
        (or/c string? pict?
              (-> (or/c string? pict?)))]])
    → (plistof symbol? atomic-rewriter/c))
(current-atomic-rewriters rewriters) → void?
  (let ([atomic-rewriter/c
        (or/c string? pict?
              (-> (or/c string? pict?)))]])
    rewriters : (plistof symbol? atomic-rewriter/c))

```

Parameter of atomic rewriters (as in `with-atomic-rewriter`) used by `with-rewriters`.

```

(current-compound-rewriters)
  → (plistof symbol? compound-rewriter/c)
(current-compound-rewriters rewriters) → void?
  rewriters : (plistof symbol? compound-rewriter/c)

```

Parameter of compound rewriters (as in `with-compound-rewriter`) used by `with-rewriters`.

```

(current-unquote-rewriters)
→ (plistogram (-> lw? any/c) (-> lw? lw?))
(current-unquote-rewriters rewriters) → void?
rewriters : (plistogram (-> lw? any/c) (-> lw? lw?))

```

Parameter of unquote rewriters (as in `with-unquote-rewriter`) used by `with-rewriters`.

```

(add-atomic-rewriters! rewriters) → void?
      (let ([atomic-rewriter/c
            (or/c string? pict?
              (-> (or/c string? pict?)))]])
      (plistogram symbol? atomic-rewriter/c))
(add-compound-rewriters! rewriters) → void?
rewriters : (plistogram symbol? compound-rewriter/c)
(add-unquote-rewriters! rewriters) → void?
rewriters : (plistogram (-> lw? any/c) (-> lw? lw?))

```

Add rewriters to the `current-atomic-rewriters`, `current-compound-rewriters`, or `current-unquote-rewriters`, respectively.

```

(plistogram key/c value/c) → contract?
key/c : contract?
value/c : contract?

```

Contract for even-length lists of alternating `key/c` and `value/c` values.

Equivalent to

```

(letrec ([ctc
          (recursive-contract
            (or/c '()
              (cons/c key/c (cons/c value/c ctc))))])
  ctc)

```

```

compound-rewriter/c : contract?

```

Contract for compound rewriters, which take a list of `lw` structs and returns a list of `lws`, `picts`, or strings.

Equivalent to

```
(-> (listof lw?)
    (listof (or/c lw? pict? string?)))
```

```
(binary-rw operator
  [#:parenthesize-arg parenthesize-arg
   #:parenthesize-left parenthesize-left
   #:parenthesize-right parenthesize-right])
→ compound-rewriter/c
operator : (or/c string? pict? (-> (or/c string? pict?)))
parenthesize-arg : (or/c #t #f (listof symbol?) (-> lw? any/c))
                  = #f
parenthesize-left : (or/c #t #f (listof symbol?) (-> lw? any/c))
                   = parenthesize-arg
parenthesize-right : (or/c #t #f (listof symbol?) (-> lw? any/c))
                    = parenthesize-arg
```

Typesets (*sym term1 term2*) using *operator* as a binary operator between *term1* and *term2*.

Examples:

```
> (add-compound-rewriters!
    'plus (binary-rw " + "))

> (with-rewriters
    (lambda ()
      (term->pict ZF (plus 1 2))))
1 + 2
```

Redex terms may become ambiguous when typeset. To avoid ambiguity, use `#:parenthesize-arg` to direct when arguments should be parenthesized. If `parenthesize-arg` is `#t`, then arguments are always parenthesized; if it is `#f`, never; if it is a list of symbols, then an argument is parenthesized only if the argument is a term starting with a symbol in the list; if it is a procedure, then the argument is parenthesized if the procedure applied to the argument's `lw` struct returns a true value.

```
> (add-compound-rewriters!
    'times (binary-rw " × "))

> (with-rewriters
    (lambda ()
      (term->pict ZF (times (plus 1 2) 3))))
1 + 2 × 3

> (add-compound-rewriters!
    'times (binary-rw " × " #:parenthesize-arg '(plus)))
```

```
> (with-rewriters
    (lambda ()
      (term->pict ZF (times (plus 1 2) 3))))
(1 + 2) × 3
```

The parenthesization rules for left and right arguments can be supplied separately through `#:parenthesize-left` and `#:parenthesize-right`, for example to create left-associated or right-associated operators:

```
> (add-compound-rewriters!
    'arrow (binary-rw " → " #:parenthesize-left '(arrow)))

> (with-rewriters
    (lambda ()
      (term->pict ZF (arrow (arrow A B) (arrow C D)))))
(A → B) → C → D
```

```
(prefix-rw prefix
  [#:parenthesize-arg parenthesize-arg])
→ compound-rewriter/c
prefix : (or/c string? pict? (-> (or/c string? pict?)))
parenthesize-arg : (or/c #f #t (listof symbol?) (-> lw? any/c))
                  = #f
```

Typesets (*sym term*) by placing *prefix* before *term*.

Examples:

```
> (add-compound-rewriters!
    'not (prefix-rw "¬"))

> (with-rewriters
    (lambda ()
      (term->pict ZF (not (in? x empty)))))
¬ x ∈ ∅
```

```
(postfix-rw postfix
  [#:parenthesize-arg parenthesize-arg])
→ compound-rewriter/c
postfix : (or/c string? pict? (-> (or/c string? pict?)))
parenthesize-arg : (or/c #f #t (listof symbol?) (-> lw? any/c))
                  = #f
```

Typesets (*sym term*) by placing *postfix* after *term*.

Examples:

```
> (add-compound-rewriters!  
  'nonempty (postfix-rw " is nonempty"))
```

```
> (with-rewriters  
  (lambda ()  
    (term->pict ZF (nonempty (Set x)))))  
{x} is nonempty
```

```
(function-rw function) → compound-rewriter/c  
function : (or/c string? pict? (-> (or/c string? pict?)))
```

Typesets (*sym term ...*) by placing *function* before the parenthesized, comma-separated list of *terms*.

Examples:

```
> (add-compound-rewriters!  
  'f (function-rw "f")  
  'max (function-rw (text "max" '(bold . modern) (default-font-size))))
```

```
> (with-rewriters  
  (lambda ()  
    (term->pict ZF (max 1 2 (f 3)))))  
max(1, 2, f(3))
```

```
(only-first-rw) → compound-rewriter/c
```

Typesets (*sym term1 term2 ...*) as *term1*. Useful for hiding parameters that are necessary for defining the semantics but can be glossed over in its explanation, such as state parameters used for generating unique names.

Examples:

```
> (add-compound-rewriters!  
  'First (only-first-rw))
```

```
> (with-rewriters  
  (lambda ()  
    (term->pict ZF [First (in? x y) counter])))  
x ∈ y
```

```
(splice-rw) → compound-rewriter/c
```

Typesets (*sym term ...*) by rendering the *terms* side-by-side.

```
(constant-rw constant) → compound-rewriter/c
  constant : (or/c string? pict? (-> (or/c string? pict?)))
```

Typesets (*sym term ...*) as *constant*.

```
(bracket-rw brackets [#:comma? comma?]) → compound-rewriter/c
  (or/c 'round 'square 'curly 'angle
  brackets : (list (or/c string? pict?)
                  (or/c string? pict?))
  comma? : any/c = #t
```

Typesets (*sym term ...*) by surrounding the comma-separated (or space-separated, if *comma?* is false) sequence of *terms* with brackets. If *brackets* is a list, the first element is the left bracket and the second is the right bracket; 'round is equivalent to '("(" " "); 'square is equivalent to '("[ " "]); 'curly is equivalent to '("{ " "}"); and 'angle is equivalent to '("< " ">").

Examples:

```
> (add-compound-rewriters!
   'Tuple (bracket-rw 'angle))

> (with-rewriters
   (lambda ()
     (term->pict ZF (Tuple 1 2 3))))
⟨1, 2, 3⟩
```

```
(set-cons-rw) → compound-rewriter/c
```

Rewriter that typesets (*sym elem-term set-term*) as the union of the singleton set containing *elem-term* with the set *set-term*.

Examples:

```
> (add-compound-rewriters!
   'set-cons (set-cons-rw))

> (with-rewriters
   (lambda ()
     (term->pict ZF (set-cons x S))))
{x} ∪ S
```