

# Unstable Flonums: May Change Without Warning

Version 6.1.1

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November 4, 2014

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

```
(require unstable/flonum)      package: unstable-flonum-lib  
  
(flonum->bit-field x) → (integer-in 0 (- (expt 2 64) 1))  
  x : flonum?
```

Returns the bits comprising *x* as an integer. A convenient shortcut for composing `integer-bytes->integer` with `real->floating-point-bytes`.

Examples:

```
> (number->string (flonum->bit-field -inf.0) 16)  
"fff0000000000000"  
> (number->string (flonum->bit-field +inf.0) 16)  
"7ff0000000000000"  
> (number->string (flonum->bit-field -0.0) 16)  
"8000000000000000"  
> (number->string (flonum->bit-field 0.0) 16)  
"0"  
> (number->string (flonum->bit-field -1.0) 16)  
"bff0000000000000"  
> (number->string (flonum->bit-field 1.0) 16)  
"3ff0000000000000"  
> (number->string (flonum->bit-field +nan.0) 16)  
"7ff8000000000000"  
  
(bit-field->flonum i) → flonum?  
  i : (integer-in 0 (- (expt 2 64) 1))
```

The inverse of `flonum->bit-field`.

```
(flonum->ordinal x)
→ (integer-in (- (- (expt 2 63) 1)) (- (expt 2 63) 1))
x : flonum?
```

Returns the signed ordinal index of  $x$  in a total order over flonums.

When inputs are not `+nan.0`, this function is monotone and symmetric; i.e. if  $(fl \leq x \ y)$  then  $(\leq (\text{flonum->ordinal } x) (\text{flonum->ordinal } y))$ , and  $(= (\text{flonum->ordinal } (- x)) (- (\text{flonum->ordinal } x)))$ .

Examples:

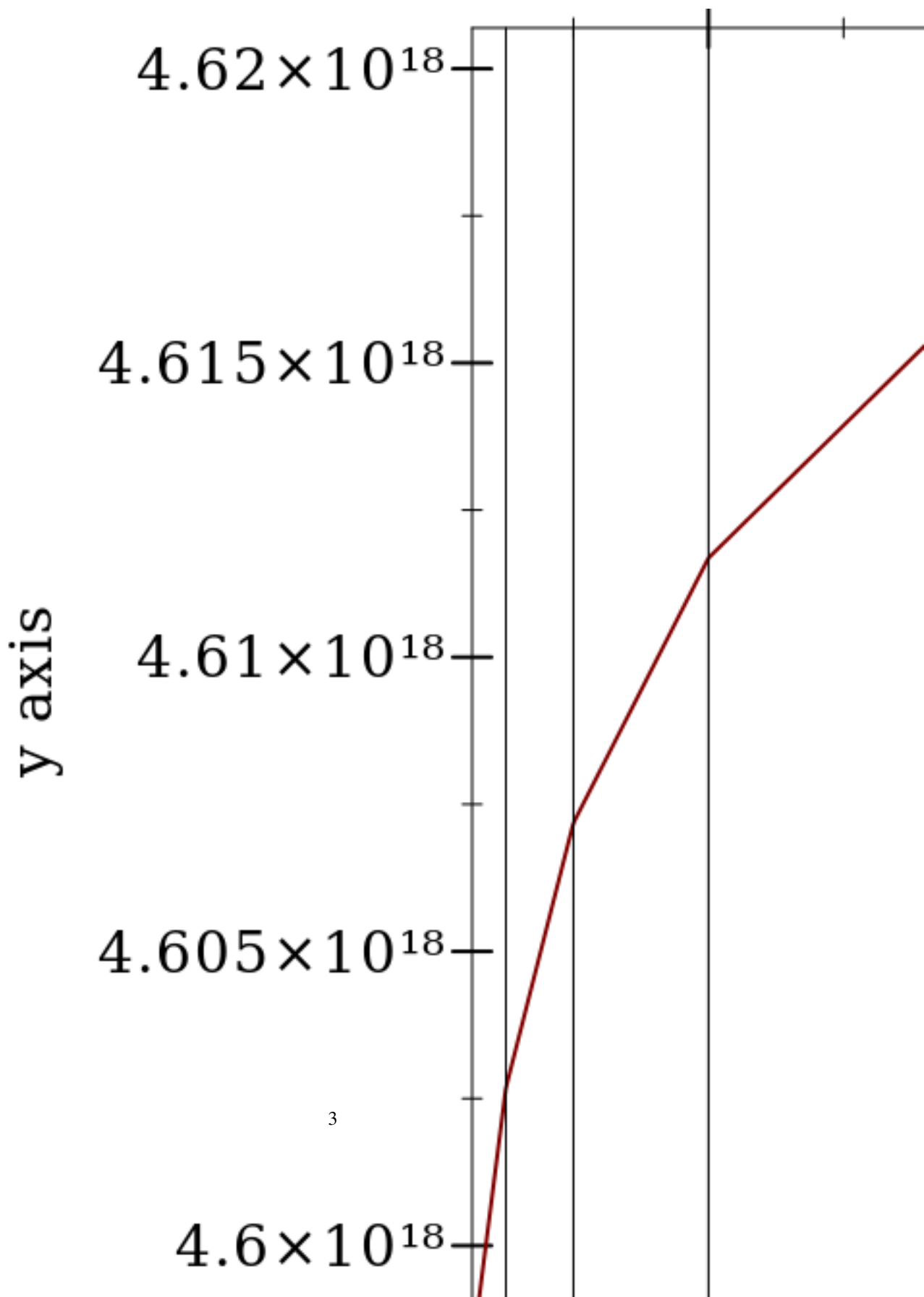
```
> (flonum->ordinal -inf.0)
-9218868437227405312
> (flonum->ordinal +inf.0)
9218868437227405312
> (flonum->ordinal -0.0)
0
> (flonum->ordinal 0.0)
0
> (flonum->ordinal -1.0)
-4607182418800017408
> (flonum->ordinal 1.0)
4607182418800017408
> (flonum->ordinal +nan.0)
9221120237041090560
```

These properties mean that `flonum->ordinal` does not distinguish `-0.0` and `0.0`.

The following plot demonstrates how the density of floating-point numbers decreases with magnitude:

Example:

```
> (parameterize ([y-axis-ticks? #f])
  (plot (list (function (compose flonum->ordinal exact-
>inexact) 1/4 8)
           (y-axis 1/2) (y-axis 1) (y-axis 2) (y-axis 4))))
```



```
(ordinal->flonum i) → flonum?  
i : (integer-in (- (- (expt 2 63) 1)) (- (expt 2 63) 1))
```

The inverse of `flonum->ordinal`.

```
(flonums-between x y) → exact-integer?  
x : flonum?  
y : flonum?
```

Returns the number of flonums between `x` and `y`, excluding one endpoint. Equivalent to `(- (flonum->ordinal y) (flonum->ordinal x))`.

Examples:

```
> (flonums-between 0.0 1.0)  
4607182418800017408  
> (flonums-between 1.0 2.0)  
4503599627370496  
> (flonums-between 2.0 3.0)  
2251799813685248  
> (flonums-between 1.0 +inf.0)  
4611686018427387904
```

```
(flstep x n) → flonum?  
x : flonum?  
n : exact-integer?
```

Returns the flonum `n` flonums away from `x`, according to `flonum->ordinal`. If `x` is `+nan.0`, returns `+nan.0`.

Examples:

```
> (flstep 0.0 1)  
4.9406564584125e-324  
> (flstep (flstep 0.0 1) -1)  
0.0  
> (flstep 0.0 -1)  
-4.9406564584125e-324  
> (flstep +inf.0 1)  
+inf.0  
> (flstep +inf.0 -1)  
1.7976931348623157e+308  
> (flstep -inf.0 -1)  
-inf.0  
> (flstep -inf.0 1)
```

```
-1.7976931348623157e+308  
> (flstep +nan.0 1000)  
+nan.0
```

```
(flnext x) → flonum?  
x : flonum?
```

Equivalent to `(flstep x 1)`.

```
(flprev x) → flonum?  
x : flonum?
```

Equivalent to `(flstep x -1)`.

```
-max.0 : flonum?  
-min.0 : flonum?  
+min.0 : flonum?  
+max.0 : flonum?
```

The rational flonums with maximum and minimum magnitude.

Examples:

```
> (list -max.0 +max.0 -min.0 +min.0)  
'(-1.7976931348623157e+308  
 1.7976931348623157e+308  
 -4.9406564584125e-324  
 4.9406564584125e-324)  
> (plot (function sqrt 0 (* 20 +min.0)))
```

