Fifty shades of `sign`

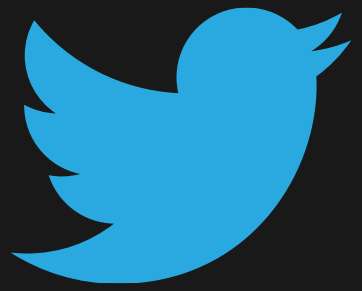
by Rodrigo Girão Serrão

PyCascades 2022

About me

Rodrigo Girão Serrão

- Formal education: maths
- Writing Python for 9 years
- Training/teaching:
  - APL (Dyalog Ltd.)
  - Python, maths, etc (mathspp.com)



@mathsppblog

Fifty shades of `sign`

`sign`

$$\operatorname{sign} x = \begin{cases} -1, & \text{if } x < 0 \\ 0, & \text{if } x = 0 \\ 1, & \text{if } x > 0 \end{cases}$$

`sign`

```
def sign(x):
    if x > 0:
        return 1
    elif x < 0:
        return -1
    else:
        return 0
```

`sign`

```
>>> sign(73)
1
>>> sign(0)
0
>>> sign(-42.42)
-1
```

`sign`

```
def sign(x):
    if x > 0:
        return 1
    elif x < 0:
        return -1
    else:
        return 0
```

`sign`

```
def sign(x):
    return (
        1 if x > 0 else -1 if x < 0 else 0
    )
```

`sign`

```
def sign(x):
    return (
        0 if x == 0 else 1 if x > 0 else -1
    )
```

`sign`

```
>>> bool(73)
True
>>> bool(0)
False
>>> bool(-42.42)
True
```

`sign`

```
def sign(x):
    return (
        0 if x == 0 else 1 if x > 0 else -1
    )
```

`sign`

```
def sign(x):
    return (
        0 if not x else 1 if x > 0 else -1
    )
```

`sign`

```
def sign(x):
    if x == 0:
        return 0
    else:
        return 1 if x > 0 else -1
```

`sign`

```
def sign(x):
    if x == 0:
        return 0

    return 1 if x > 0 else -1
```

`sign`

```
>>> abs(73)
73
>>> abs(0)
0
>>> abs(-42.42)
42.42
```

`sign`

```
>>> abs(73)
73
>>> abs(0)
0
>>> abs(-42.42)
42.42
```

`sign`

```
>>> abs(73) / 73
1
>>> abs(0)
0
>>> abs(-42.42) / -42.42
-1.0
```

`sign`

```
def sign(x):
    if x == 0:
        return 0

    return 1 if x > 0 else -1
```

`sign`

```
def sign(x):
    if x == 0:
        return 0

    return int(abs(x) // x)
```

`sign`

```
>>> int(True)
1
>>> int(False)
0
```

`sign`

```
def sign(x):
    if x == 0:
        return 0

    return int(abs(x) // x)
```

`sign`

```
def sign(x):
    if x < 0:
        return -1

    return int(bool(x))
```

`sign`

```
def sign(x):
    if x < 0:
        return -1

    return int(x > 0)
```

`sign`

```
def sign(x):
    if x < 0:
        return -1

    return int(bool(x))
```

`sign`

```
def sign(x):
    return (
        0 if x == 0
        else {False: -1, True: 1}[x > 0]
    )
```

`sign`

```
def sign(x):
    return (
        0 if x == 0
        else [-1, 1][x > 0]
    )
```

`sign`

```
def sign(x):
    return 0 if x == 0 else [-1, 1][x > 0]
```

`sign`

```
def sign(x):
    return [-1, 0, 1][(x >= 0) + (x > 0)]
```

`sign`

```
def sign(x):
    return (x > 0) - (x < 0)
```

`sign`

```
[x > 0, x < 0]
```

`sign`

```
[True, False]   # x > 0
[False, True]   # x < 0
[False, False]  # x == 0
```

`sign`

```
def sign(x):
    match x > 0, x < 0:
        case True, False: return 1
        case False, True: return -1
        case False, False: return 0
```

`sign`

```
def sign(x):
    match x:
        case x if x > 0: return 1
        case x if x < 0: return -1
        case _: return 0
```

`sign`

```
def sign(x):
    if x > 0: return 1
    if x < 0: return -1
    return 0
```

`sign`

```python
def sign(x):
    if x > 0: return 1
    if x < 0: return -1
    return 0
```

```
  0 LOAD_FAST                0 (x)
  2 LOAD_CONST               1 (0)
  4 COMPARE_OP               4 (>)
  6 POP_JUMP_IF_FALSE        6 (to 12)
  8 LOAD_CONST               2 (1)
 10 RETURN_VALUE

>>   12 LOAD_FAST             0 (x)
     14 LOAD_CONST            1 (0)
     16 COMPARE_OP            0 (<)
     18 POP_JUMP_IF_FALSE    12 (to 24)
     20 LOAD_CONST            3 (-1)
     22 RETURN_VALUE

>>   24 LOAD_CONST            1 (0)
     26 RETURN_VALUE
```

`sign`

```
def sign(x):
    if x > 0:
        return 1
    elif x < 0:
        return -1
    else:
        return 0
```

```
              0 LOAD_FAST                0 (x)
              2 LOAD_CONST               1 (0)
              4 COMPARE_OP               4 (>)
              6 POP_JUMP_IF_FALSE        6 (to 12)

              8 LOAD_CONST               2 (1)
             10 RETURN_VALUE

        >>   12 LOAD_FAST                0 (x)
             14 LOAD_CONST               1 (0)
             16 COMPARE_OP               0 (<)
             18 POP_JUMP_IF_FALSE       12 (to 24)

             20 LOAD_CONST               3 (-1)
             22 RETURN_VALUE

        >>   24 LOAD_CONST               1 (0)
             26 RETURN_VALUE
```

~~Fifty~~

Fifteen shades of `sign`

`sign`

```
(py310) PS C:\Users\rodri\documents\talks\202202_pycascades> python signs.py
```

Timing results.

Function	+f	-f	0	+L	-L
sign_conditional_conditional_3	-%	-%	-%	-%	-%
sign_conditional_conditional	-11.0%	+12.7%	+42.8%	-11.0%	+7.8%
sign_canned_if_elif_else	-9.8%	+12.7%	+42.3%	-10.7%	+8.0%
sign_standard_if_elif_else	-9.6%	+12.7%	+42.9%	-10.4%	+8.3%
sign_if0_conditional_expression	+14.1%	+13.2%	+12.6%	+10.5%	+9.6%
sign_conditional_conditional_2	+14.3%	+13.3%	+12.6%	+10.8%	+9.5%
sign_if_else_conditinal_expression	+14.1%	+13.3%	+12.7%	+11.1%	+9.6%
sign_match	-1.5%	+20.7%	+53.0%	-1.5%	+16.0%
sign_boolean_emoji	+24.2%	+20.4%	+48.2%	+17.5%	+14.3%
sign_conditional_int_bool	+70.9%	-11.5%	+120.6%	+73.2%	-13.2%
sign_conditional_list	+55.6%	+52.6%	+12.4%	+53.8%	+49.3%
sign_conditional_dict	+90.9%	+87.0%	+11.2%	+90.8%	+85.8%
sign_list	+78.5%	+75.5%	+120.2%	+74.0%	+69.5%
sign_if0_divide_abs	+109.4%	+105.2%	+12.4%	+157.2%	+163.5%
sign_structural_match	+88.9%	+130.3%	+264.0%	+85.8%	+128.6%

`sign`

```
(py310) PS C:\Users\rodri\documents\talks\202202_pycascades> python signs.py
```

Timing results.

Function	+f	-f	0	+L	-L
sign_conditional_conditional_3	-%	-%	-%	-%	-%
sign_conditional_conditional	-11.0%	+12.7%	+42.8%	-11.0%	+7.8%
sign_canned_if_elif_else	-9.8%	+12.7%	+42.3%	-10.7%	+8.0%
sign_standard_if_elif_else	-9.6%	+12.7%	+42.9%	-10.4%	+8.3%
sign_if0_conditional_expression	+14.1%	+13.2%	+12.6%	+10.5%	+9.6%
sign_conditional_conditional_2	+14.3%	+13.3%	+12.6%	+10.8%	+9.5%
sign_if_else_conditinal_expression	+14.1%	+13.3%	+12.7%	+11.1%	+9.6%
sign_match	-1.5%	+20.7%	+53.0%	-1.5%	+16.0%
sign_boolean_emoji	+24.2%	+20.4%	+48.2%	+17.5%	+14.3%
sign_conditional_int_bool	+70.9%	-11.5%	+120.6%	+73.2%	-13.2%
sign_conditional_list	+55.6%	+52.6%	+12.4%	+53.8%	+49.3%
sign_conditional_dict	+90.9%	+87.0%	+11.2%	+90.8%	+85.8%
sign_list	+78.5%	+75.5%	+120.2%	+74.0%	+69.5%
sign_if0_divide_abs	+109.4%	+105.2%	+12.4%	+157.2%	+163.5%
sign_structural_match	+88.9%	+130.3%	+264.0%	+85.8%	+128.6%

`sign`

```
def sign(x):
    if x > 0: return 1
    if x < 0: return -1
    return 0
```

`sign`

```
def sign(x):
    if x > 0: return 1
    if x < 0: return -1
    return 0
```

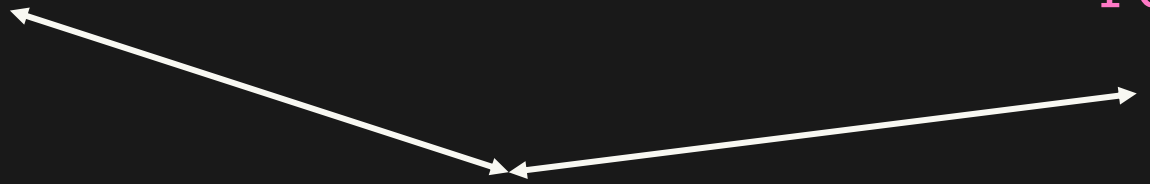
```
def sign(x):
    if x > 0:
        return 1
    elif x < 0:
        return -1
    else:
        return 0
```

`sign`

```python
def sign(x):
    if x > 0: return 1
    if x < 0: return -1
    return 0
```

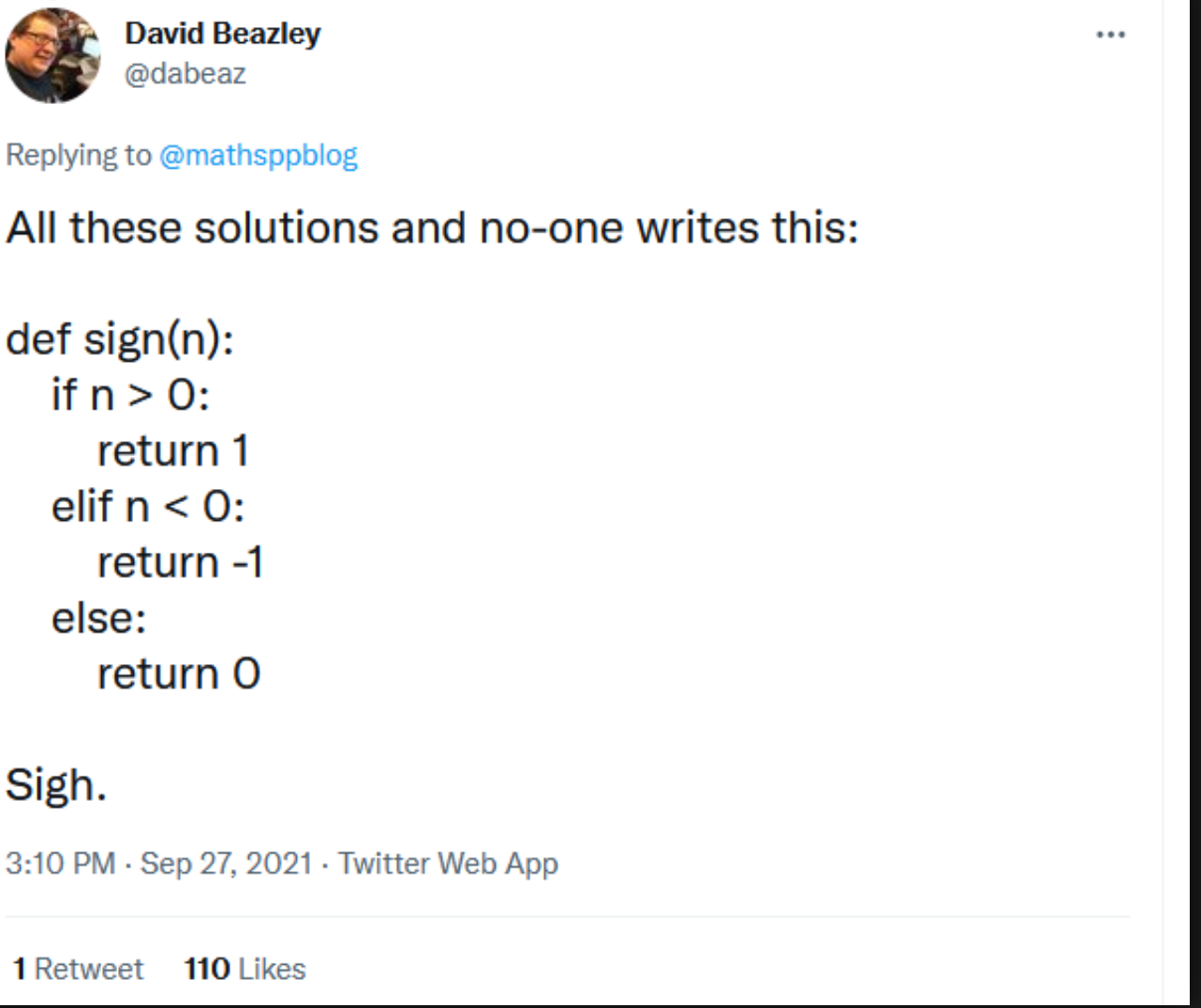


```python
def sign(x):
    if x > 0:
        return 1
    elif x < 0:
        return -1
    else:
        return 0
```



```python
def sign(x):
    return 1 if x > 0 else -1 if x < 0 else 0
```

`sign`



David Beazley
@dabeaz

Replying to @mathsppblog

All these solutions and no-one writes this:

```
def sign(n):
    if n > 0:
        return 1
    elif n < 0:
        return -1
    else:
        return 0
```

Sigh.

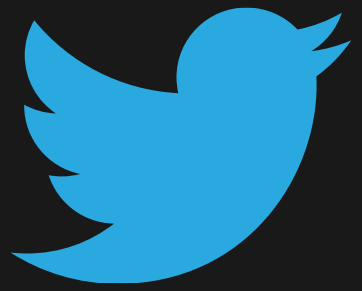
3:10 PM · Sep 27, 2021 · Twitter Web App

1 Retweet **110** Likes

References

- Pydon'ts:
  - Does elegance matter, https://mathspp.com/blog/pydonts/does-elegance-matter
  - Code style matters, https://mathspp.com/blog/pydonts/code-style-matters
  - Zen of Python, https://mathspp.com/blog/pydonts/pydont-disrespect-the-zen-of-python
  - Truthy, Falsy, and bool, https://mathspp.com/blog/pydonts/truthy-falsy-and-bool
  - Conditional expressions, https://mathspp.com/blog/pydonts/conditiona-expressions
- TIL #028 – disassemble Python, https://mathspp.com/blog/til/028
- 50 shades of `sign`, https://mathspp.com/blog/50-shades-of-sign
- Original twitter thread: https://twitter.com/mathsppblog/status/1442042804398665732

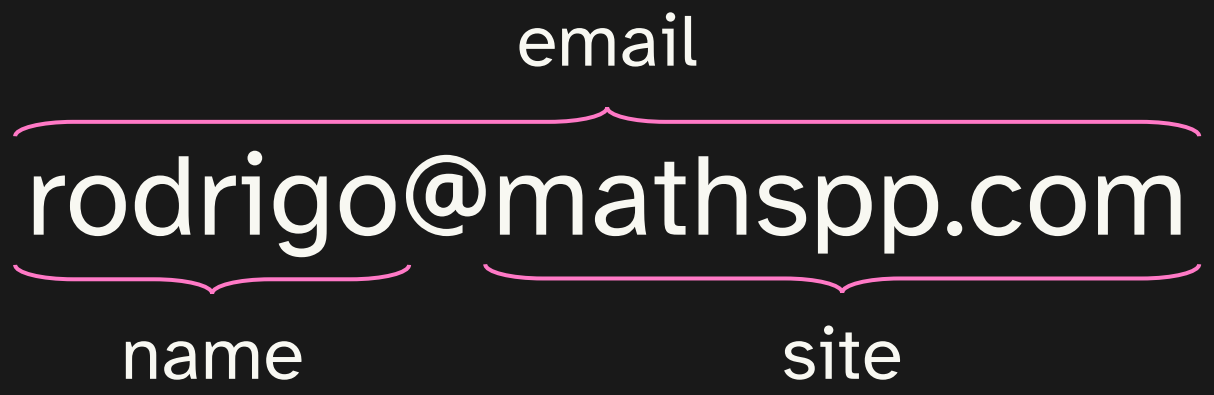
gum.co/pydonts



@mathsppblog

mathspp.com/subscribe

/mathspp/talks


email
rodrigo@mathspp.com
name
site