Doing Math with Python

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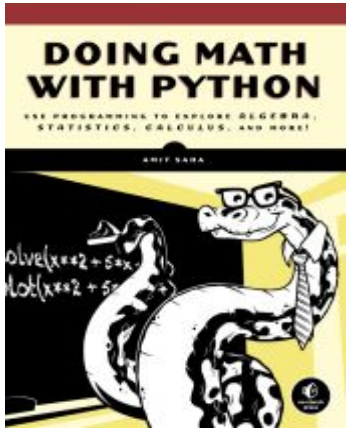
@echorand

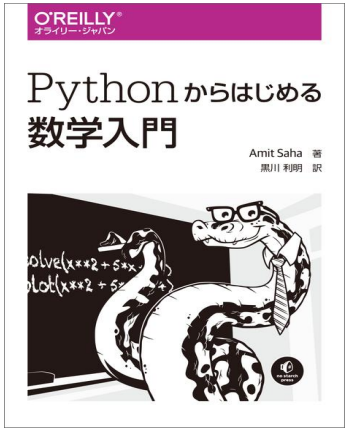
Hi!

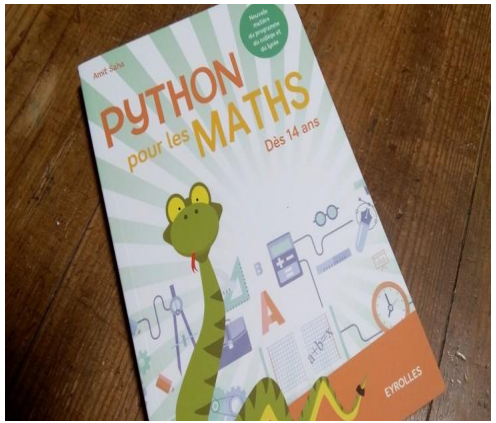
I am @echorand

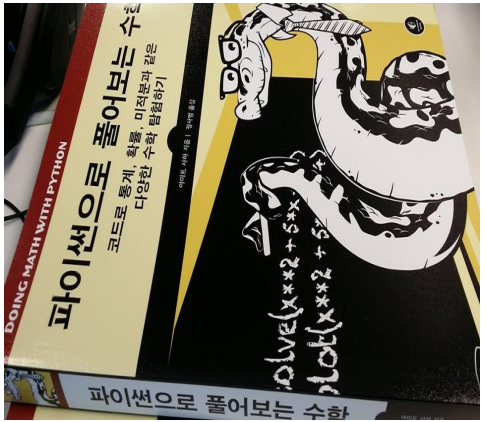
About me

Author of “Doing Math with Python”, No Starch Press, August, 2015









Contributor to SymPy, CPython, creator/maintainer of Fedora Scientific

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Demos

https://github.com/doingmathwithpython/pycon-au-2016

Why “Math with Python”?

Interactive and enriching teaching and learning experience

How?

Tools: Python 3, SymPy, matplotlib

How much Math?

Algebra

Basic statistics, sets and Probability

How much Math?

Random numbers

Basic Calculus

How much Python?

Defining and Calling functions

Loops and Basic Data structures

How much Python?

Creating objects, attributes

Calling methods on objects

Let’s get started!

Python as a ..

#1. Scientific Calculator

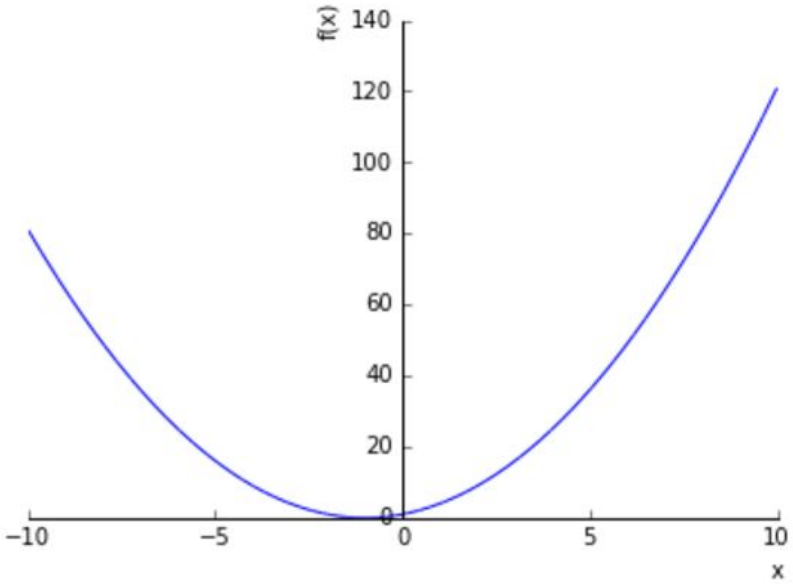
math, statistics, others

(Notebook: Scientific Calculator)

Question time!

How many lines in a program to do this?

```
Enter an expression in x to graph: x**2 + 2*x + 1
```



Input

Output

#2. Really Awesome Calculator

How to do all the math with Python?

SymPy, matplotlib

SymPy Basics

Programs which understand x and y

(Notebooks: SymPy Basics - 1, 2, 3)

Create a graph

$$y = 2x^2 + 2x + 1$$

(Notebook: Awesome Calculator - 1)

Solve equations

$$2x^2 + 2x + 1 = 0$$

(Notebook: Awesome Calculator - 2)

Solve inequalities

$$\sin(x) + 1 <= 0$$

(Notebook: Awesome Calculator - 3)

Question time!

Limit of a function

$$\lim_{x \to 0} \frac{sin(x)}{x}$$

(Notebook: Awesome Calculator - 4)

Derivative of a function

$$\frac{d}{dx}\left(\frac{sin(x)}{x}\right)$$

(Notebook: Awesome Calculator - 5)

Integral of a function

$$\int xsin(x)$$

(Notebook: Awesome Calculator - 6)

Definite Integral of a function

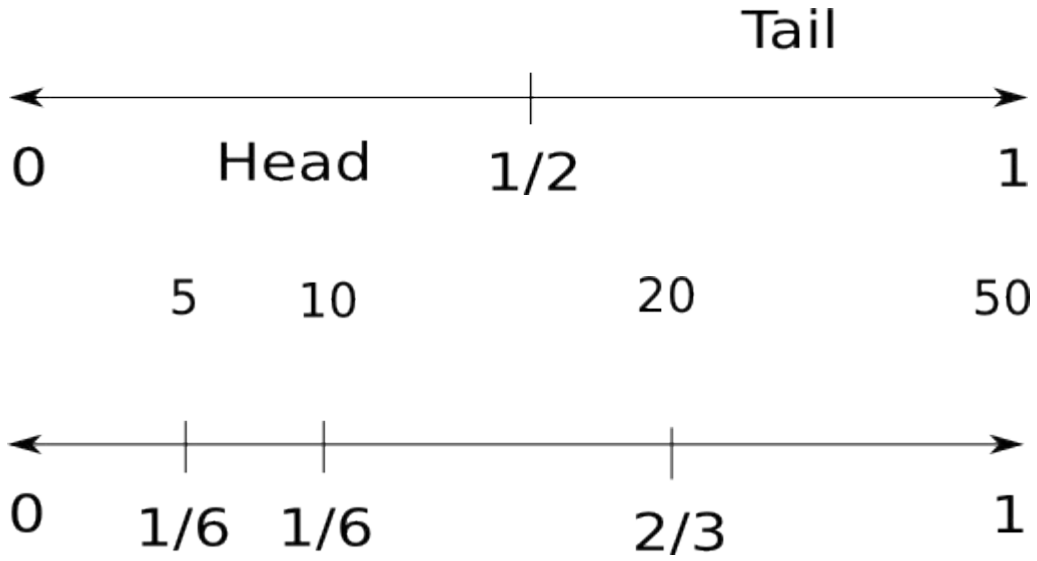
$$\int_0^2 xsin(x)$$

(Notebook: Awesome Calculator - 7)

#3. More than smart calculators

Interactive notebooks, Animations

Uniform and Non-uniform random numbers



(Notebook: Uniform and Non-uniform Random numbers)

Interactive Notebooks

(Notebook: Interactive Notebook Demo)

Interactive Barnsley Fern

Non-uniform random numbers

(Notebook: Interactive Barnsley Fern)

Interactive Mandelbrot Set

(Notebook: Interactive Mandelbrot Set)

Animations

(Notebook: Projectile Motion, py-files: projectile_animation.py)

Great base for the future

Data Science, Machine Learning

(Notebooks: Gradient Descent, Simple Linear Regression)

That’s all.

@mathwithpython

Check out:

https://doingmathwithpython.github.io