Doing Math with Python

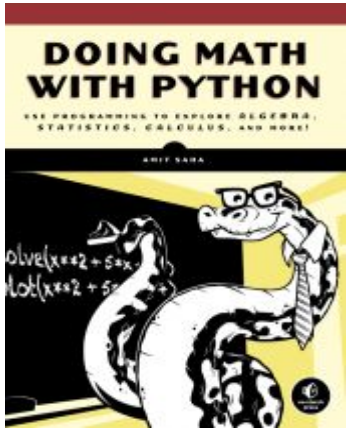
Amit Saha
@echorand

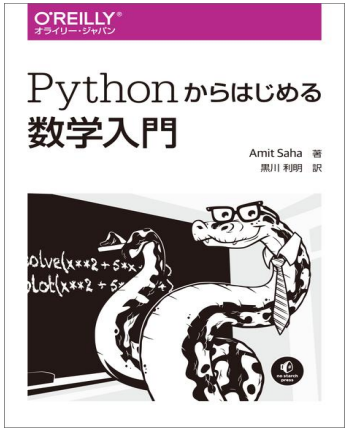
Hi!

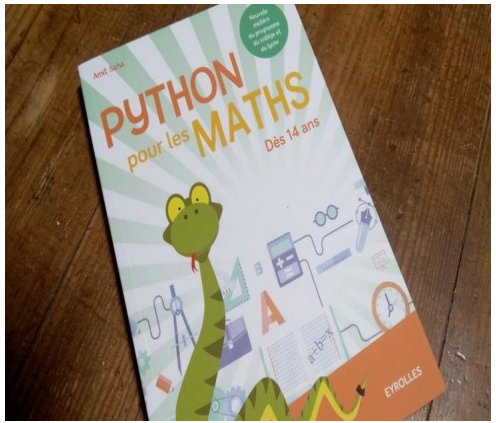
I am @echorand

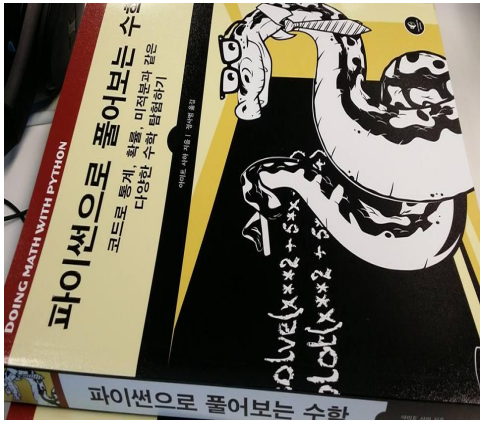
About me

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









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

Contact: @echorand, amitsaha.in@gmail.com, http://echorand.me

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

Python as a ..

#1. Scientific Calculator

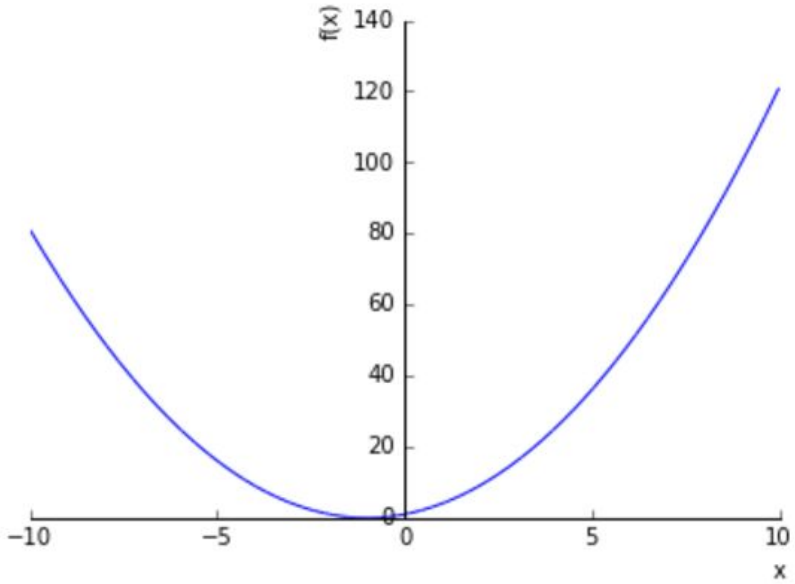
math, statistics, others

(Notebook: Scientific Calculator)

Question time!

How would you write 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)

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

Interactive Barnsley Fern

(Notebook: Interactive Barnsley Fern)

Interactive Mandelbrot Set

(Notebook: Interactive Mandelbrot Set)

Animations

(Notebook: Projectile Motion)

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