

# Doing Math with Python

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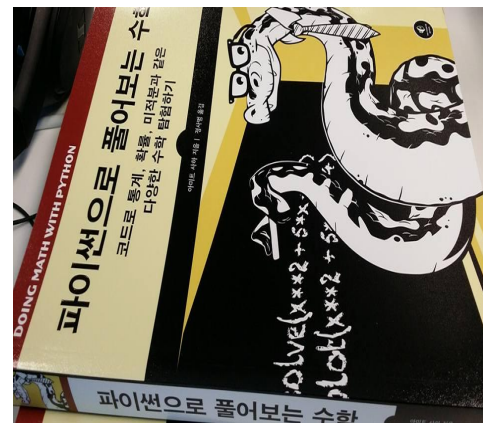
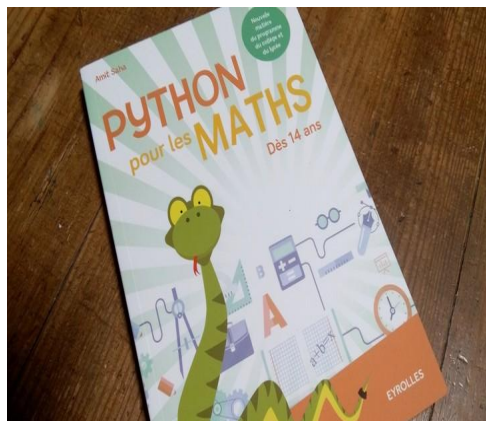
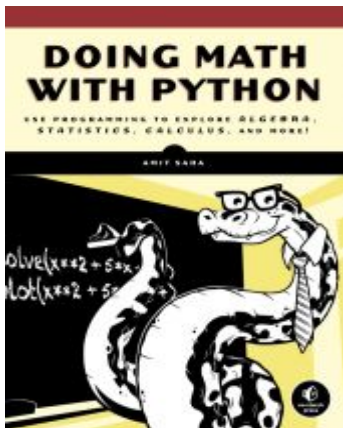
Amit Saha  
@echorand

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](https://fedoraproject.org/wiki/Fedora_Scientific)

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## Demos and slides

<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

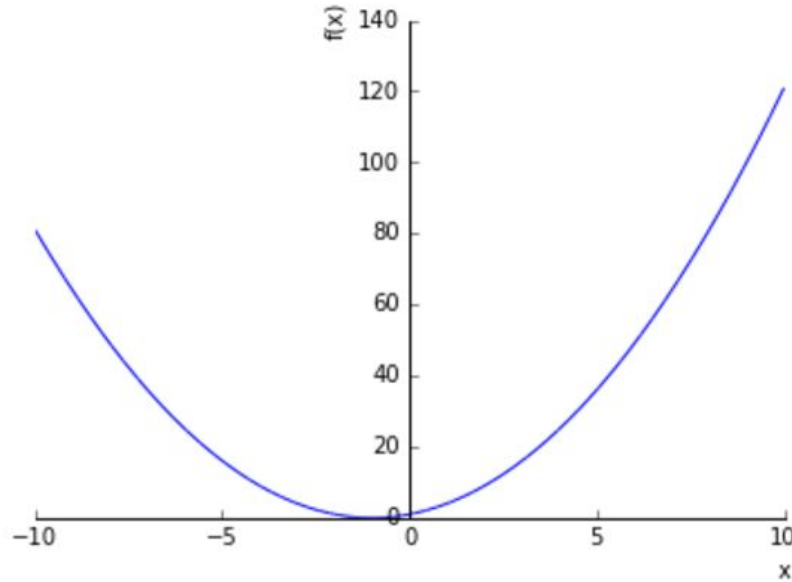
*math, statistics, others*

*(Notebook: Scientific Calculator)*

Question time!

# How many lines in a program to do this?

Enter an expression in x to graph:  $x^2 + 2x + 1$



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

$$\sin(x) + 1 \leq 0$$

*(Notebook: Awesome Calculator - 3)*

Question time!

# Limit of a function

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

*(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

$$\int x \sin(x)$$

*(Notebook: Awesome Calculator - 6)*

# Definite Integral of a function

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

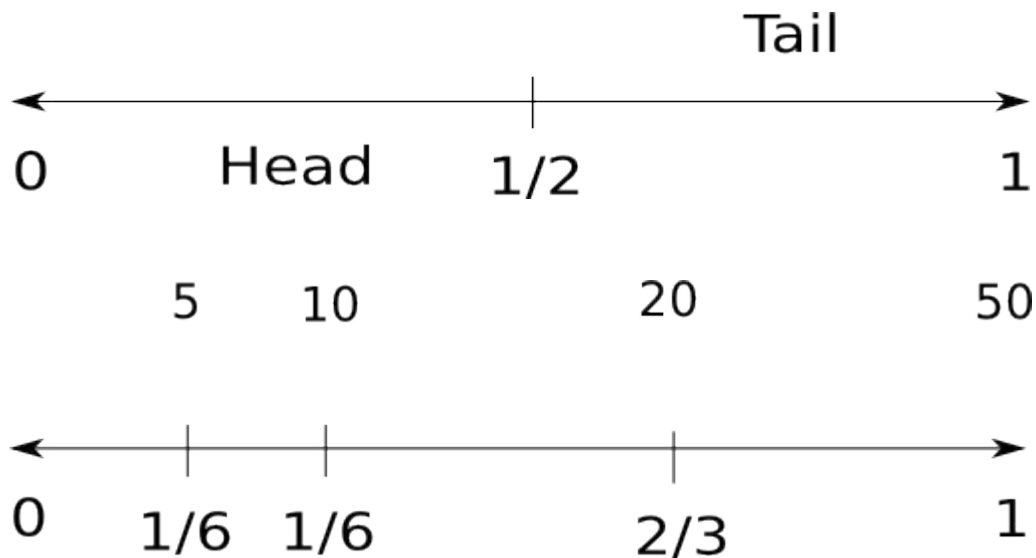
*(Notebook: Awesome Calculator - 7)*



# #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.

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@mathwithpython

Check out:

<https://doingmathwithpython.github.io>

