

Python Programming in Finance

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Lecture 1

Python Programming

<https://docs.python.org/3.7/>

Program ~ Data
+ Algorithm

Basic I/O

`input` `print`

Variable

Data Types

String

`str()`

Type Conversion

```
int()
```


Floats

```
float()
```

Arithmetic Operators

`+`, `-`, `*`, `**`, `/`, `//`, `%`

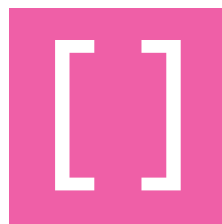
Numerical Error

Assignment Operator

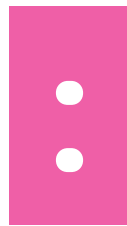


$$X = X + 1$$

List



Slicing



Append

```
append()
```


Deletion

del

More APIs of List

help

Membership of List



Boolean Values

True

False

Rational Operators

<, <=, >, >=, ==, !=

Logical Operators

and, or, not

Conditional Statements

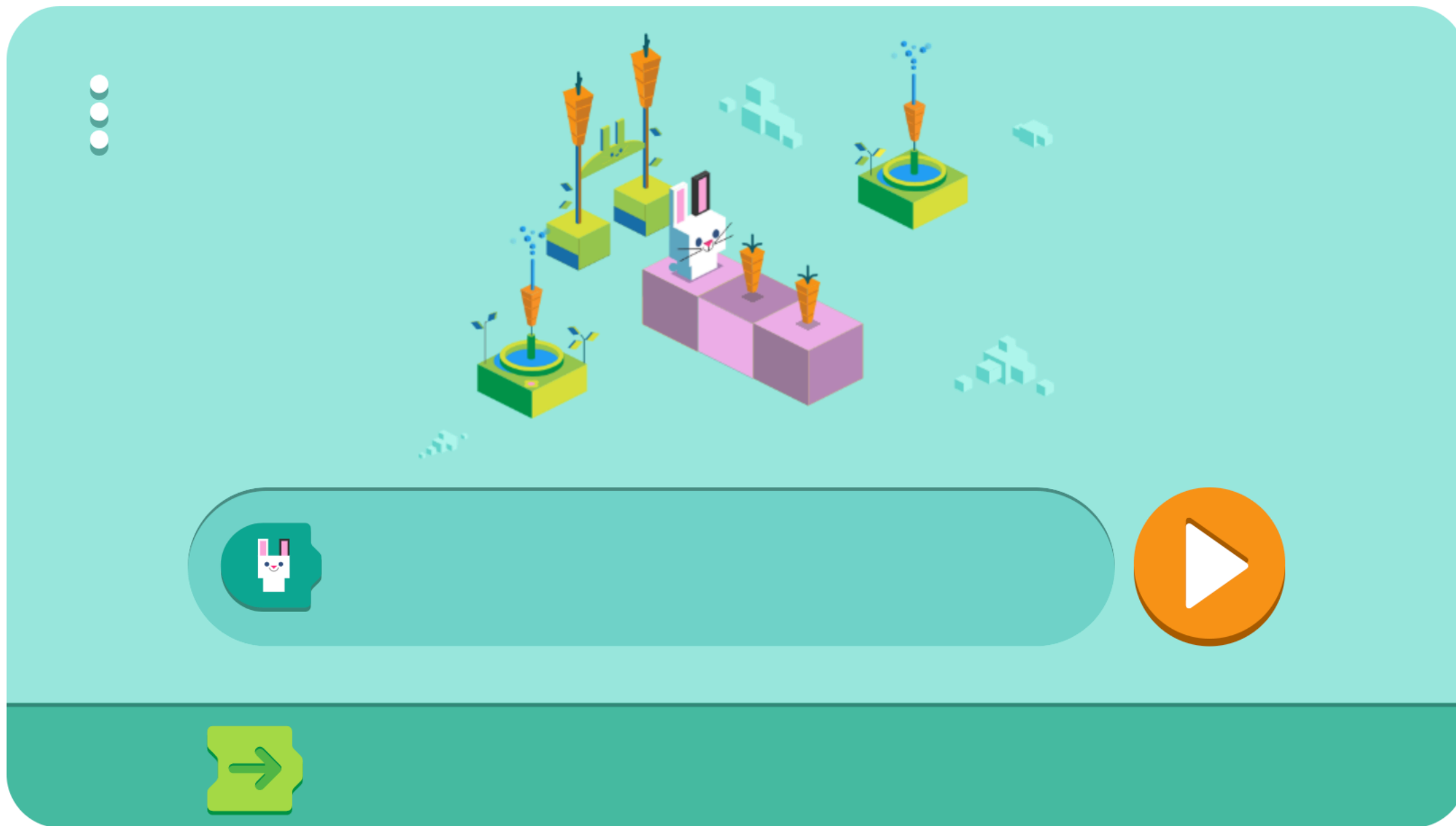
`if-elif-else`

For Loops

for

Range-Based

`range()`

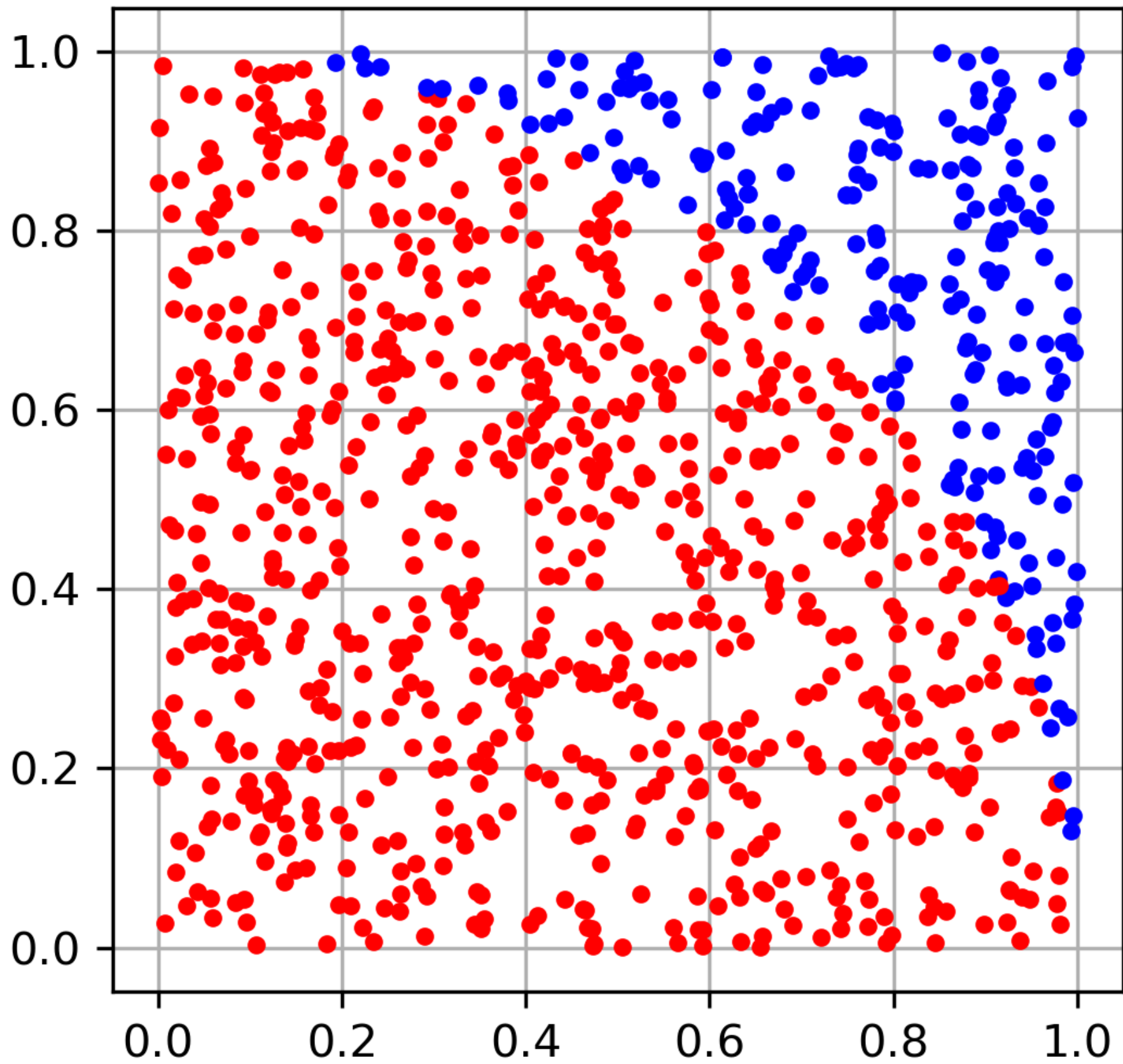


<https://www.google.com/doodles/celebrating-50-years-of-kids-coding>

Monte Carlo

[Wiki](#)

[EMPP lec1.pdf](#)



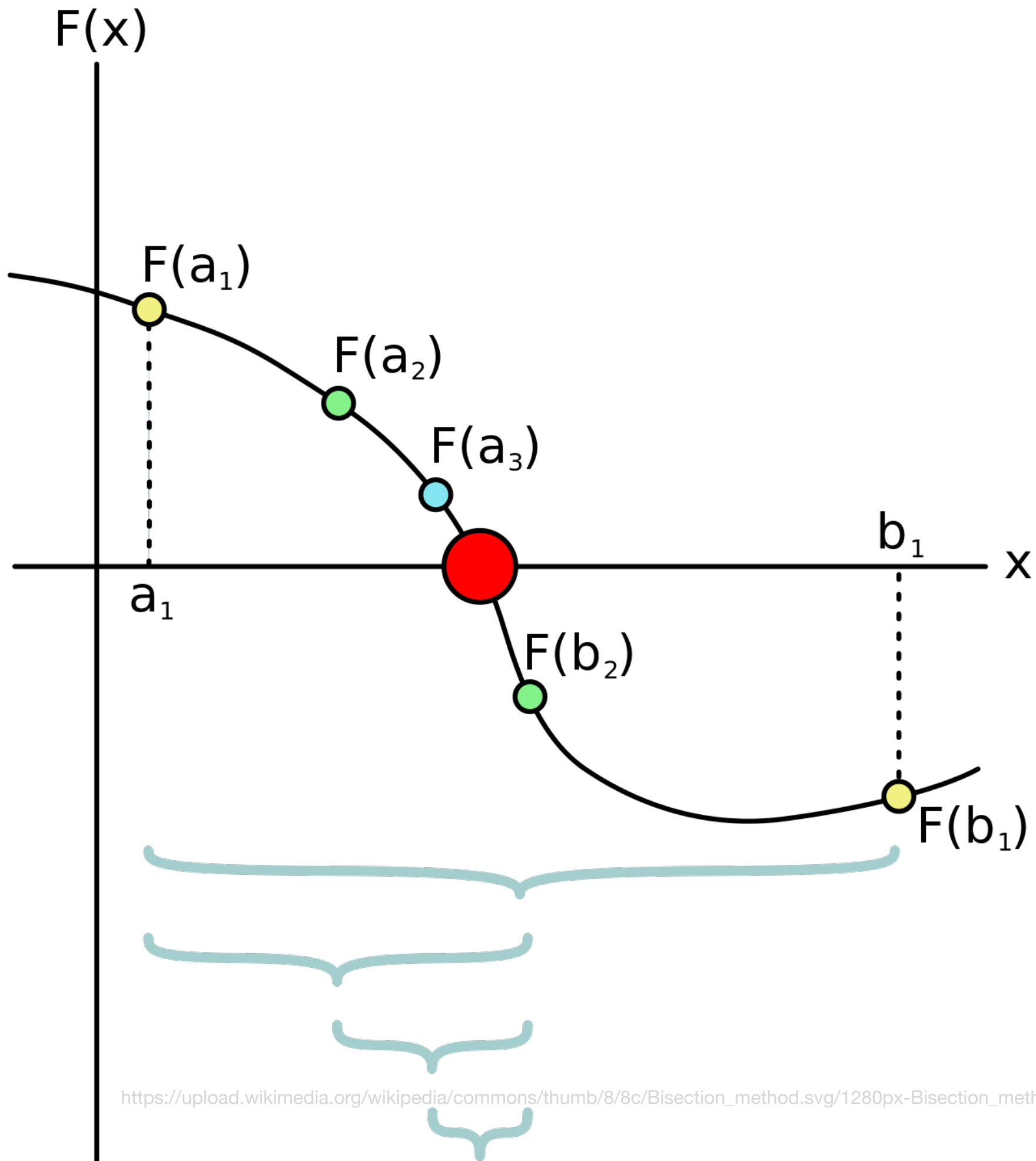
While Loops

while

Bisection Method

[Wiki: bisection method](#)

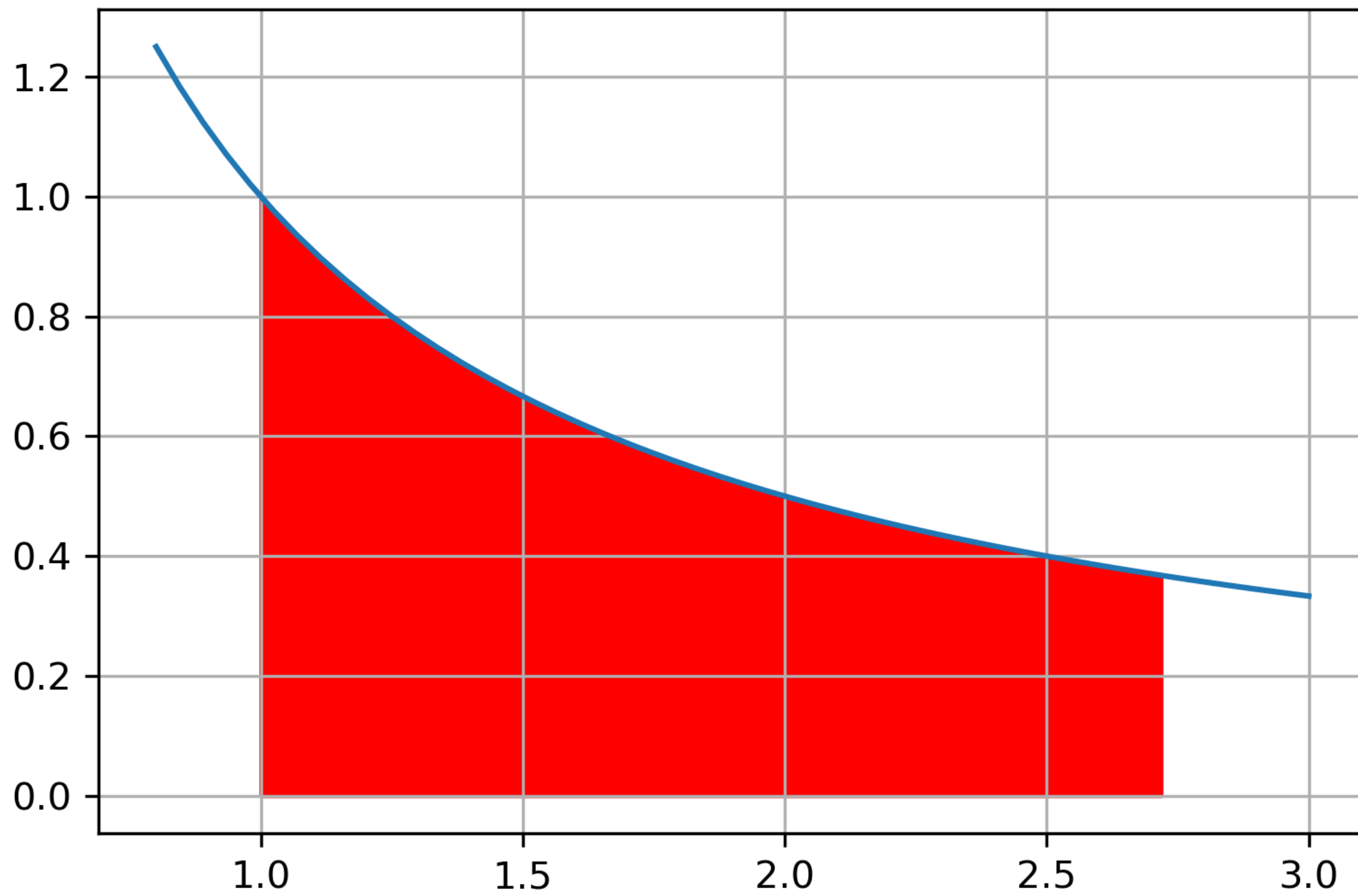
[Wiki: root-finding algorithms](#)



https://upload.wikimedia.org/wikipedia/commons/thumb/8/8c/Bisection_method.svg/1280px-Bisection_method.svg.png

Exercise

Monte Carlo Again



Jump Statements

`break`

`continue`

`pass`

Loop Techniques

`enumerate()`

`zip()`

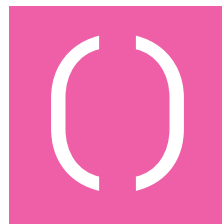
`sorted()`

`reversed()`

Dictionary: **Key** & **Value**

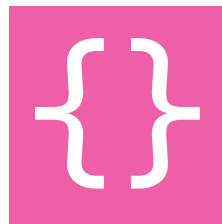
{K:V}

Tuple



$$X, y = y, X$$

Set with Operations



Comprehension

Function

def return

Scope

`globals()`

`locals()`

Default Argument

Positional & Keyword Argument

Example

print()

Built-in Functions in Python 3

<https://docs.python.org/3/library/functions.html>

Lambda Expression

Lambda

Functional Programming

`map()`

`filter()`

Exercise

Monte Carlo Again!

```
import random

N = 100000
x = [random.uniform(0, 1) for _ in range(N)]
y = [random.uniform(0, 1) for _ in range(N)]
p = tuple(zip(x, y))
predicate = lambda x: x[0]**2 + x[1]**2 < 1
M = len(list(filter(predicate, p)))
print(4 * M / N)
```

3.1444

Iterator

`next()`

Generator

yield

Objects

class

Application: String



Application: File I/O

with-as

Application: Time

Application: Exception

raise

try-except-else-finally

Importing Packages

`import`

`from-import`

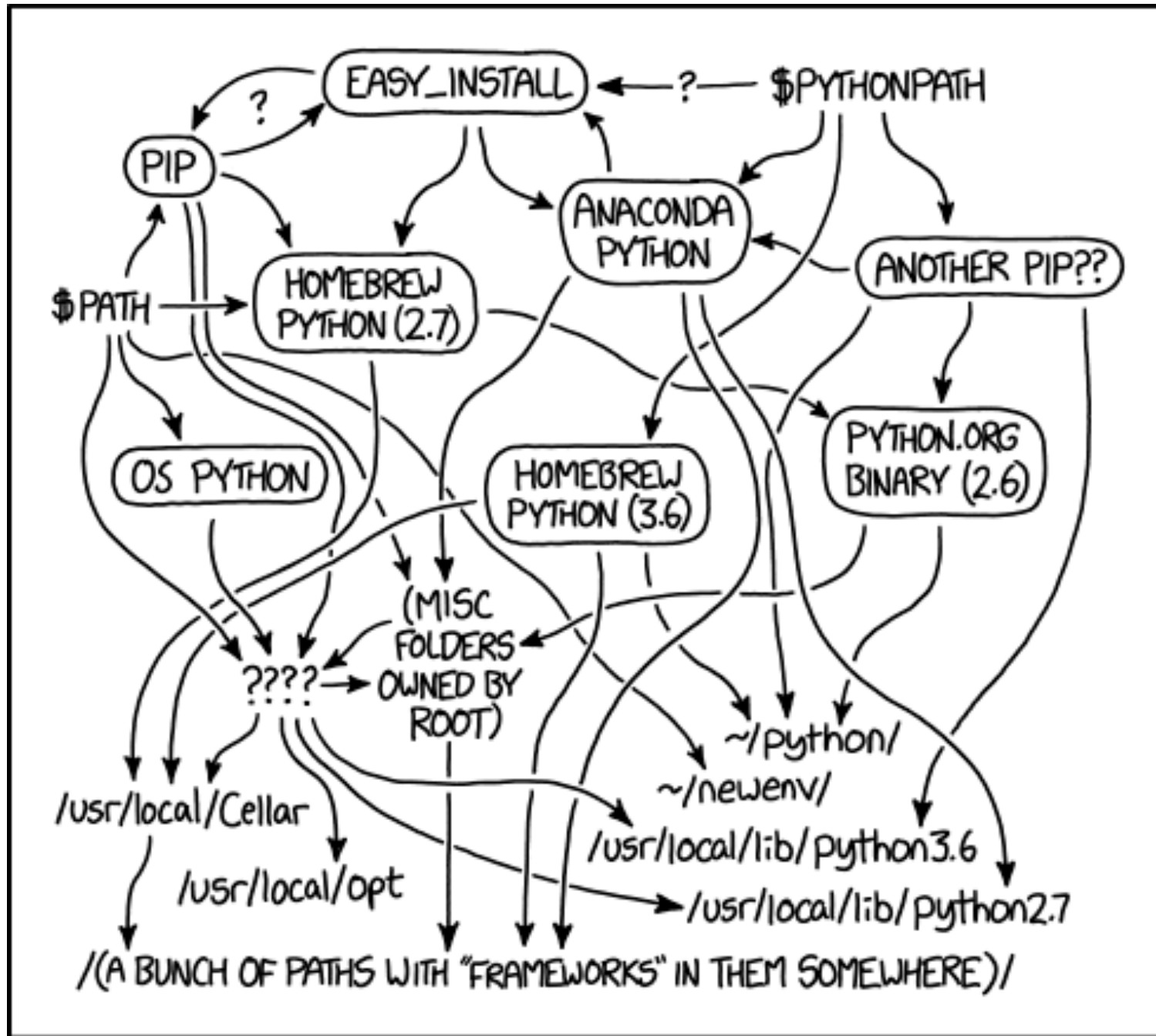
Package Installation

```
pip install xxx
```

```
!pip install xxx
```

```
!pip --user install xxx
```

[撥開 Python, pip, site-packages 的藍色蜘蛛網](#) ❌



MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

<https://xkcd.com/1987/>