Probability and Statistics in Engineering

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Today’s Topics

ทฤษฎีความน่าจะเป็นเบื้องต้น

- การทดลองสุ่ม
- Sample Space
- เหตุการณ์
- Axiom of Probability
- การคำนวณความน่าจะเป็น
- การตีความ “ความน่าจะเป็น” และการนำไปใช้

In-Class Lab Exercise

- Python
  - https://www.python.org/ftp/python/3.6.3/python-3.6.3.exe
- Anaconda Package
  - https://www.anaconda.com/download/
  - Spyder, Jupyter notebook, Numpy, Pandas
- Coin toss simulation

Learning Statistics through Programming

- ภาษา R
- ภาษา python

Python

- Python is an interpreted language
- Focuses on simplicity, making programmers’ lives easier

Anaconda Package for Python

- Numpy, Scikit-learn, Jupyter Notebook, Spyder
- Spyder is an IDE

Basic Python

- Type in Spyder console:
  - 3+4
  - 1+2*3+5/2
  - 3/4
  - 3./4
  - 2**3
  - type(3)
  - type(3.)
  - clear

Basic Python

- Type in Spyder console:
  - 3+4
  - 1+2*3+5/2
  - 3/4
  - 3./4
  - 2**3
  - type(3)
  - type(3.)

Variables

- Type in Spyder console:
  - a = 3
  - a
  - print(a)
  - print(“a=”, a)
  - float(a)/7
  - nums = [1, 2, 3]
  - print(nums[0])

Math Functions

- Type in Spyder console:
  - exp(2.0)
  - sin(2.0)

  - Error… why ?

Importing Math Library

- Type in Spyder console:
  - import math
  - math.exp(2.0)
  - math.pi
  - math.sin(math.pi)

Different ways of importing

- import math
- import math as m
- from math import pi, exp
- from math import *

- Useful:
  - dir(math)

Writing a script

```
from math import *


a = [0, pi/2, pi]
x = a[2]
if sin(x) == 0:
    print("zero")
elif sin(x) == 1:
    print("one")
else:
    print("huh")
```

Writing a script

```
from math import *


a = [0, pi/2, pi]
x = a[2]
if sin(x) == 0:
    print("zero")
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```

Numpy Basics

```
import numpy as np


a = np.array([[0,-1],[1,0]])
b = np.array([3,4])


print(a)
print(b)
print(a.dot(b))
```

Plotting with matplotlib

```
import numpy as np
import matplotlib.pyplot as plt


n = 1000
x = np.arange(n)
y = np.random.rand(n)
plt.scatter(x,y)
```