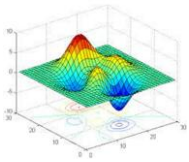


Activity 01

Python Basics

1. Create a module

Write a python module and save under .py file, including the following components:

a. Dictionary : this dictionary will contain fundamental information about "electron" as follows:

- class : fundamental particle
- discovery year: 1897
- by scientist: J. J. Thomson
- Mass [kg]: 9.901×10^{-31}
- Charge[C]: 1.602×10^{-19}
- Spin : $1/2$

Remember that a dictionary is written as follows in python: `Dict = {'key': value, …}`. Thus, you have to determine what are the keys and the corresponding values in this case.

- Use this dictionary to generate a text with python to describe the particle "electron".

b. Math function: Write a function giving the value of the following quadratic exponential mathematical function, known as "Normal distribution":

$$f(x) = \frac{1}{b\sqrt{2\pi}} . exp\left[-\frac{1}{2}\left(\frac{x-a}{b}\right)^2\right]$$

In this case, you should define your function according to the main arguments : a, b, and d where:

$\boldsymbol{a}$: *the mean or expectation (usually given by symbol* μ)

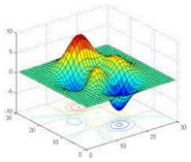
$\boldsymbol{b}$: *the standard deviation (usually given by symbol* σ)

$\boldsymbol{d}$: *is the definition interval of* x *(usually in this case* $d = [-\infty, +\infty]$*, but we will take finite one)*

Remember the definition of function is done as follows:

```
def function(a, b, d):
    Line 1
    Line 2
    ….
    return value
```

- Discuss with your teacher what you should put in your function definition.
- Examine some cases of normal function according to a and b values.



Activity 01

Python Basics

2. Import and use your module

Be sure that your module is within the same folder TP01 on your Computer session.

a. Open your notebook TP01 and create a new cell code, in which you should write the importation instruction:

```
import mymodule
```

now open another cell codes and write consecutively the following output instructions

```
print(mymodule.electron)
```

```
print(mymodule.myfunction)
```

```
X, Y = mymodule.myfunction(1,2,5)
print(X,Y)
```

b. Now, we will import the same module but differently:

```
import mymodule as my
```

redo the same instructions as above by using `my` instead of `mymodule`

c. This time import the same module as follows:

```
From mymodule import *
```

Then write the following instructions in separate cell codes:

```
print(electron)
```

```
X, Y = myfunction(1,2,5)
print(X, Y)
```

3. Plot your math function :

To plot your normal distribution function, write the following instructions in separate cell code:

```
import matplotlib.pyplot as plt
```

```
plt.scatter(X, Y)
```

```
plt.plot(X, Y)
```

Now, try to improve your plotting output by exploring the matplotlib options. Ask your teacher, google or go to take watch on: https://matplotlib.org