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Exercise Set 6: FUN with functions

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ENGR 1330 ES6 - Homework

```
In [1]: # Preamble script block to identify host, user, and kernel
import sys
! hostname
! whoami
print(sys.executable)
print(sys.version)
print(sys.version_info)

DESKTOP-6HAS1BN
desktop-6has1bn\medra
C:\Users\medra\anaconda3\python.exe
3.8.5 (default, Sep 3 2020, 21:29:08) [MSC v.1916 64 bit (AMD64)]
sys.version_info(major=3, minor=8, micro=5, releaselevel='final', serial=0)
```

Exercise 1

Make a function that cubes its input:

$f(x) = x^3$

and test it for the following values of x:

- -1
- 0.0
- 1.0
- 2.0
- 3.0

```
In [2]: def cubed(x):
        return x*x*x
```

```
In [3]: print(cubed(-1))
print(cubed(0.0))
print(cubed(1.0))
print(cubed(2.0))
print(cubed(3.0))
```

```
-1
0.0
1.0
8.0
27.0
```

Exercise 2

Generate two lists:

1. x ranging from 0 to 9 in steps of 1
2. $f(x)$ from your function in Exercise 1

Use the `plotAline()` function (below) to create a plot of

$$y = x^3$$

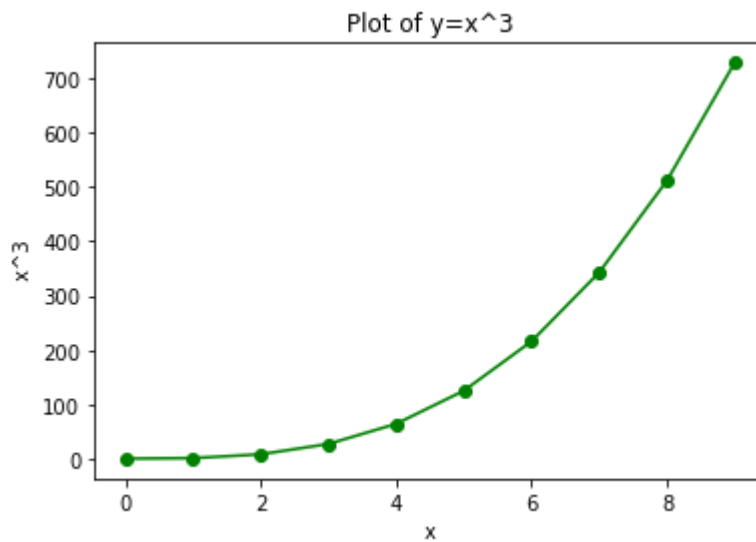
for x ranging from 0 to 9 (inclusive) in steps of 1.

Label the plot and the plot axes.

A wrapper script is included below that needs completion to work and draw the plot.

```
In [8]: def plotAline(list1,list2,strx,stry,strttitle): # plot list1 on x, list2 on y, xlabel, y
import matplotlib.pyplot # import the plotting library from matplotlib.pyplot
matplotlib.pyplot.plot( list1, list2, color='green', marker='o', linestyle='solid')
matplotlib.pyplot.title(strttitle)# add a title
matplotlib.pyplot.ylabel(stry)# add a label to the x and y-axes
matplotlib.pyplot.xlabel(strx)
matplotlib.pyplot.show() # display the plot
return #null return
def f(x):
    return x**3
```

```
In [9]: # wrapper script
x = [] # define two lists
y = []
# populate x and y for plotting
for j in range(0,10):
    x.append(j)
    y.append(f(j))
# then plot
plotAline(x,y,"x"," x^3","Plot of y=x^3")
```



Exercise 3

Modify the wrapper script above to create a plot of the parametric functions $x(t)$ and $y(t)$

$x(t) = 16\sin^3(t)$ $y(t) = 13\cos(t) - 5\cos(2t) - 2\cos(3t) - \cos(4t)$
for t ranging from $[0, 2\pi]$ (inclusive).

Label the plot and the plot axes.

```
In [15]: import matplotlib.pyplot as plt
from math import sin, cos, pi
import numpy as np

def sin_func(t):
    return (16*sin(t)**3)

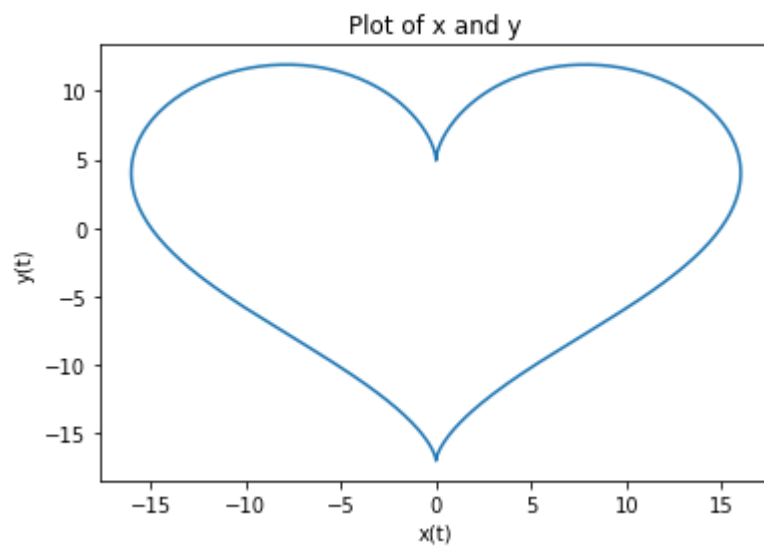
def cos_func(t):
    return (13*cos(t)-5*cos(2*t)-2*cos(3*t)-cos(4*t))

k = np.arange(0, 2*pi, .01)

x = []
y = []

for j in k:
    x.append(sin_func(j))
    y.append(cos_func(j))

plt.plot(x,y)
plt.xlabel("x(t)")
plt.ylabel("y(t)")
plt.title("Plot of x and y")
plt.show()
```



In []: