

Homework 2: Introduction to Python

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1  import numpy as np
2  import matplotlib.pyplot as plt
3
4  #Question 1: Show if  $f(g(2)) = g(f(2))$ 
5  def f(x):
6      f = x**2 - 6*x + 2
7      return f
8
9  def g(x):
10     g = -2*x
11     return g
12
13  def test_f_of_g():
14     x = 2
15     assert f(g(x)) == g(f(x))
16
17  #Question 2: Find geometric mean
18  def GM(A):
19     n = len(A)
20     mean = A[0]
21     for i in range(1,n):
22         mean = A[i]*mean
23     geo_mean = mean**(1/n)
24     return geo_mean
25
26  #Question 3: Filter a list for numbers divisible by 5 or 8
27  def list_breaker(data):
28     x = [x for x in data if x % 5 == 0 or x % 8 == 0]
29     return x
30
31  #Question 4: Write a recursive function for f
32  def fn(function, n, x):
33     fun = function(x)
34     for i in range(1,n):
35         fun = function(fun)
36     return fun
37
38  #Question 5: Plot a new function
39  def new_f(x):
40     function = np.exp(-x)*np.cos(2*np.pi*x)
41     return function
```

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42
43 def plot_f(x, function):
44     plt.plot(x,function(x))
45     plt.show()
46
47 x = np.linspace(0,5,1000)
48 plot_f(x, new_f)
49
```

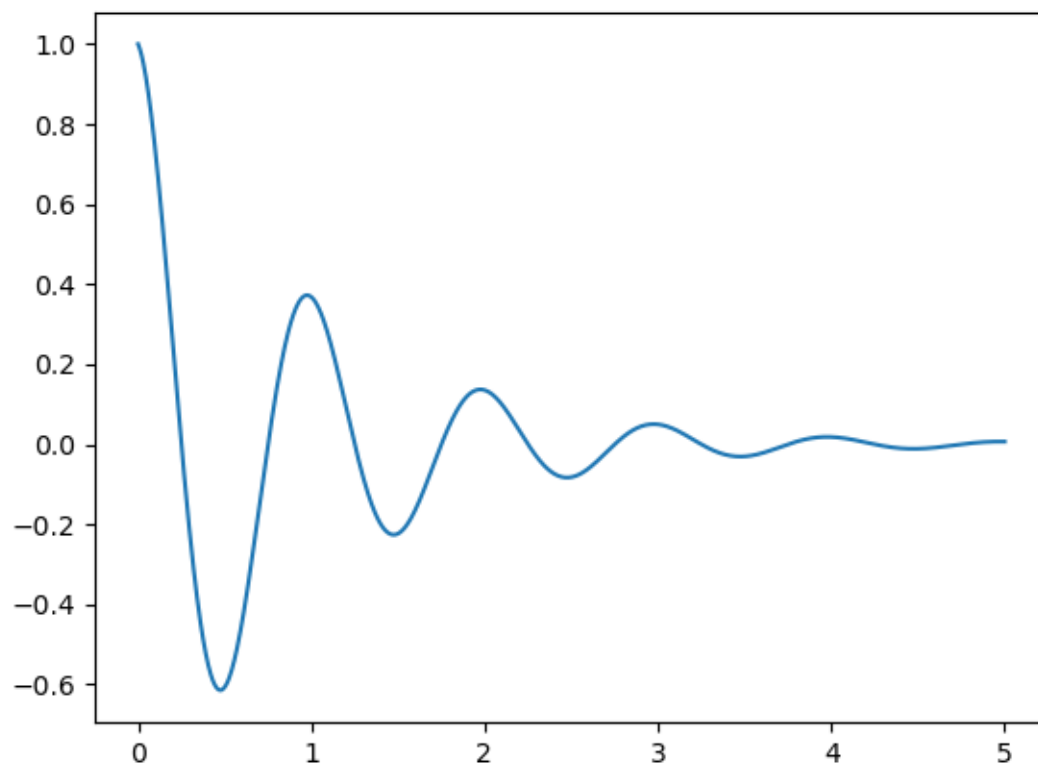


Figure 1: Plot of New $f(x)$