

assignment02

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1 Assignment 02 : Python Programming - Taylor Approximation

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```
In [1]: import numpy as np
import matplotlib.pyplot as plt
import random
from scipy.misc import derivative
```

4 Define my function: $f(x) = \frac{1}{1+e^{-x}}$

```
In [2]: def my_func(x):
result = 1/(1+np.exp(-x))
return result
```

5 Define my deravative function: $f'(x) = \frac{e^{-x}}{(1+e^{-x})^2}$

```
In [3]: def deravative_func(x):
return derivative(my_func, x, dx = 1e-5)
```

6 Define taylor approxiamtion form.

```
In [4]: def taylor_approximation(domain, point):
result = deravative_func(point) * (domain - point) + my_func(point)
return result
```

7 Define domain and ouput of above functions.

```
In [5]: x=np.arange(-5,5,0.1)
y=my_func(x)
```

8 Randomly choose 3 points.

```
In [6]: point = np.zeros(3)

        for i in range(3):
            point[i] = random.choice(x)
            print(point[i])

-3.6000000000000005
-1.7763568394002505e-14
2.3999999999999737
```

9 Compute the graphs

```
In [7]: plt.figure(1)
        plt.plot(x, y, 'b', label="function")
        plt.plot(x,taylor_approximation(x,point[0]), 'g', label="taylor approximation on fist po
        plt.plot(x,taylor_approximation(x,point[1]), 'y', label="taylor approximation on second
        plt.plot(x,taylor_approximation(x,point[2]), 'c', label="taylor approximation on third p
        plt.legend(bbox_to_anchor=(1.05, 1), loc=2, borderaxespad=0.)
        plt.show()
```

