assignment02

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1 This is assignment02

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1.3 import packages for plotting graphs and manipulating data:

```
In [1]: import matplotlib.pyplot as plt
        import numpy as np
```

1.4 Define the function

$$f(x) = sin(x) * x$$

```
In [2]: def Function(x):
            f = np.sin(x) * x
            return f
```

1.5 define the derivative of my function

$$f'(x) = cos(x) * x + sin(x)$$

```
In [3]: def DerivativeFunction(x):
            Df = np.cos(x) * x + np.sin(x)
            return Df
```

1.6 define the function of tangent line

$$y - f(a) = f'(a)(x - a)$$

```
In [4]: def Slope_of_tangent_line(a):
            St = DerivativeFunction(a)*(x-a) + Function(a)
            return St
```

1.7 define the domain of the function

$$x = [-10 : 0.01 : 10]$$

```
In [5]: x = np.arange(-10, 10, 0.01)
```

1.8 compute the graph

```
In [6]: fx = Function(x)
        Dfx = DerivativeFunction(x)
```

1.9 Pick 3 points in the domain

```
In [7]: p1 = Slope_of_tangent_line(1)
        p2 = Slope_of_tangent_line(-5)
        p3 = Slope_of_tangent_line(8)
```

1.10 plot the graphs for the function, its derivative, Taylor approximation at the given points

```
In [8]: plt.figure(1)

        plt.plot(x, fx, 'b', label="function")
        plt.plot(x, Dfx, 'r', label="derivative")
        plt.plot(x, p1, 'g--', label="p1")
        plt.plot(x, p2, 'y--', label="p2")
        plt.plot(x, p3, 'm--', label="p3")

        plt.legend(loc='best')
        plt.show()
```