assignment02

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1 THis is a assignment02

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4 link:https://github.com/pcyyyy/assignment02.git

5 import packages for plotting graphs and manipulating data:

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

6 define my function: $f(x) = \cos^2(x)$

```
In [2]: def myFunction(x):
            f=np.square(np.cos(x))
            return f
```

7 define the derivative of my function: $f'(x) = -2 \cdot sin(x) \cdot cos(x)$

```
In [6]: def myDerivativeFunction(x):
            Df=-2*np.sin(x)*np.cos(x)
            return Df
```

8 define the domain of the function: $x = [-10 : 0.1 : 10]$

```
In [4]: x = np.arange(-10,10,0.1)
```

9 Pick 3 points in the domain : $x = -4, -2, 6$

```
In [5]: x1,x2,x3 = -4,-2,6
```

10 define a Taylor function : $T = f(x) + f'(x) \cdot (x - x_0)$

```
In [7]: def Talyor(f,Df,x,n):
            T=f+Df*(x-n)
            return T
```

11 compute the graph

```
In [8]: f1=myFunction(x1)
        f2=myFunction(x2)
        f3=myFunction(x3)
        Df1=myDerivativeFunction(x1)
        Df2=myDerivativeFunction(x2)
        Df3=myDerivativeFunction(x3)
        T1=Talyor(f1,Df1,x,x1)
        T2=Talyor(f2,Df2,x,x2)
        T3=Talyor(f3,Df3,x,x3)
        f=myFunction(x)
        Df=myDerivativeFunction(x)
```

12 plot the graphs for the function and its derivative

```
In [9]: plt.figure(1)
        plt.plot(x,f,'b',label="function")
        plt.plot(x,Df,'r',label="derivative")
        plt.plot(x,T1,'g',label="T1")
        plt.plot(x,T2,'y',label="T2")
        plt.plot(x,T3,'gray',label="T3")
        plt.legend(bbox_to_anchor=(1.05,1),loc=2,borderaxespad=0.)
        plt.show ()
```