Task 3

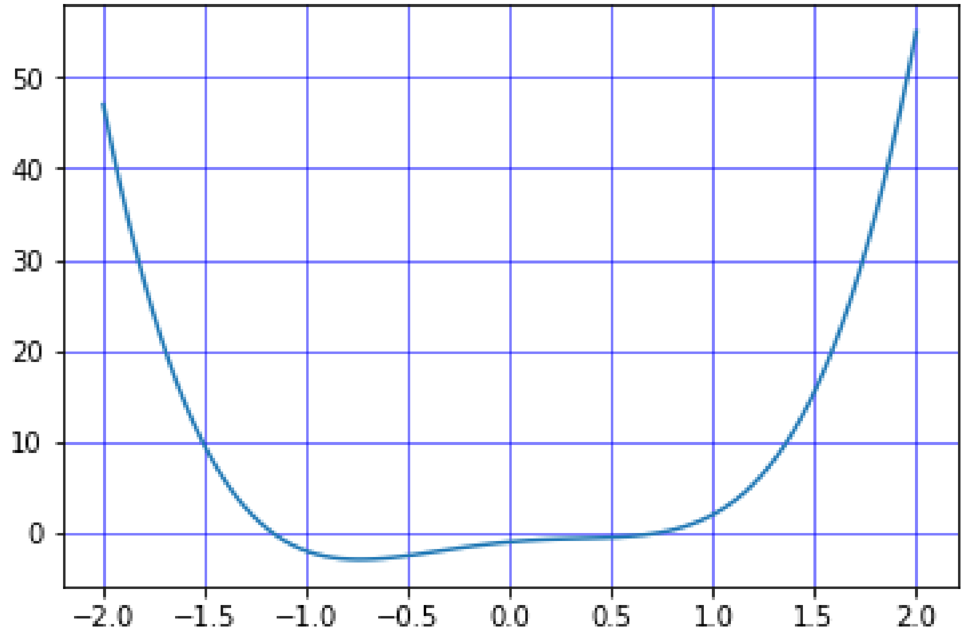
December 13, 2020

1 Task 3: Slide 69

1.1

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

        # import useful libraries
        import numpy as np
        import matplotlib.pyplot as plt
        from mpl_toolkits.mplot3d import Axes3D
        import scipy.stats as stats
        import csv
        # this line plots graphs in line
        %matplotlib inline
```

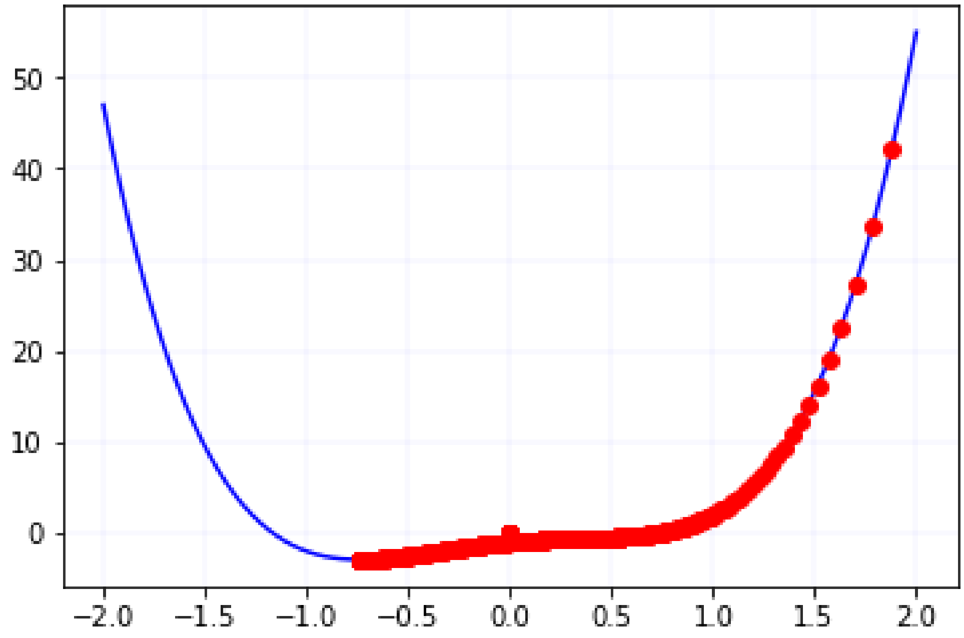
```
In [41]: # 1
         x = np.linspace(-2,2,100)

         y = (4*(x**4))-(3*(x**2))+ (2*x) -1

         plt.plot(x,y)
         plt.grid(color='b', linestyle='-', linewidth=0.5)
```



```
In [42]: #Gradeint = dy/dx = 2x-4
         b =0
         def dy_dx ( b):
             return (16*(b**3))-(6*(b))+2

In [91]: # 3 and 4
         a=0.001
         Xnew =2
         N=900000
         xx =np.zeros(N)
         yy =np.zeros(N)

         for i in range(N):


             Xnew= Xnew - a*dy_dx(Xnew)

             xx[i]= Xnew

             yy[i] =(4*(Xnew**4))-(3*(Xnew**2))+ (2*Xnew) -1


             #print(Xnew)
             if(abs(dy_dx(Xnew))<0.000001):
                 print("Conv")
                 print(i)
```

```
        break


print("Final Min X :",Xnew)

plt.plot(x, y, 'b',xx, yy ,'ro')
plt.grid(color='b', linestyle='-', linewidth=0.05)
```

```
Conv
1720
Final Min X : -0.7378432095512858
```

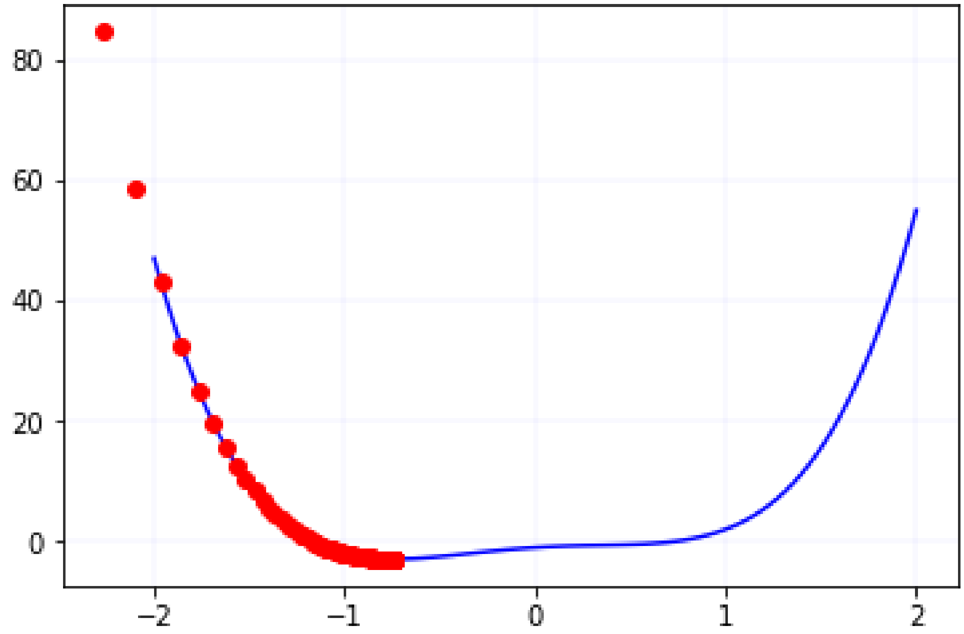


```
In [ ]:
```

```
In [96]: # 3 and 4
         a=0.001
         Xnew =-2.5
         N=400
         xx =np.zeros(N)
         yy =np.zeros(N)

         for i in range(N):
```

```
        Xnew= Xnew - a*dy_dx(Xnew)

        xx[i]= Xnew

        yy[i] =(4*(Xnew**4))-(3*(Xnew**2))+ (2*Xnew) -1

        if(abs(dy_dx(Xnew))<0.000001):
            print("Conv")
            print(i)
            break




    print("Final Min X :",Xnew)

    plt.plot(x, y, 'b',xx, yy ,'ro')
    plt.grid(color='b', linestyle='-', linewidth=0.05)
```

```
Final Min X : -0.7379493387944193
```



```
In [ ]:
```

Params for gradent decent - just the x value, as long as you have the original function and it's differnencation

Iterations required for convergance - That depends on your learning rate, and also which side you start from

In [ ]:

In [ ]:

In [ ]: