

Implementation of Univariate Linear Regression

' Aim:

To implement univariate Linear Regression to fit a straight line using least squares.

' Equipment's required:

1. Hardware – PCs
2. Anaconda – Python 3.7 Installation / Moodle-Code Runner

' Algorithm:

1. Get the independent variable X and dependent variable Y.
2. Calculate the mean of the X -values and the mean of the Y -values.
3. Find the slope m of the line of best fit using the formula.

$$m = \frac{\sum_{i=1}^n (x_i - \bar{X})(y_i - \bar{Y})}{\sum_{i=1}^n (x_i - \bar{X})^2}$$

4. Compute the y -intercept of the line by using the formula:

$$b = \bar{Y} - m\bar{X}$$

5. Use the slope m and the y -intercept to form the equation of the line.
6. Obtain the straight line equation $Y=mX+b$ and plot the scatterplot.

' Program

```
# Program for Univariate linear regression using the least squares method.
```

```
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```

```
# RegisterNumber:22001203
```

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

```
X=np.array(eval(input()))
```

```
Y=np.array(eval(input()))
```

```
Xmean = np.mean(X)
```

```
Ymean = np.mean
```

```
num,den = 0,0
```

```
for i in range (len(X)):
```

```
    num += (X[i]-Xmean)*(Y[i]-Ymean)
```

```
    den +=(X[i]-Xmean)**2
```

```
m = num/den
```

```
c=Ymean-m*Xmean
```

```
print(m,c)
```

```
Y_pred=m*X+c
```

```
plt.scatter(X,Y)
```

```
plt.plot(X,Y_pred, color="orange")
```

```
plt.show()
```

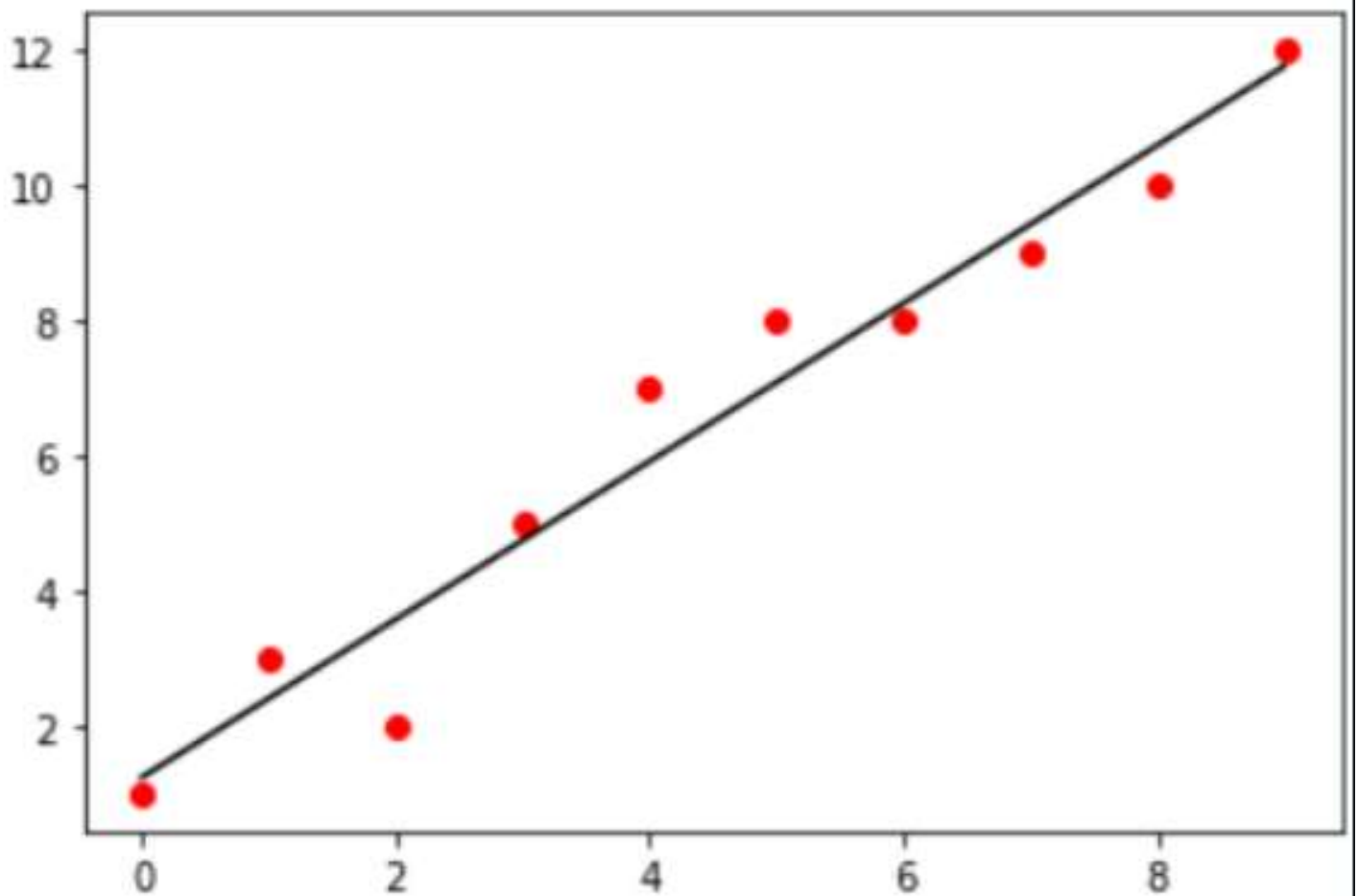
Output

	Input	Expected
✓	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9] [1, 3, 2, 5, 7, 8, 8, 9, 10, 12]	1.1696969696969697 1.2363636363636363 [1.23636364 2.40606061 3.57575758 4.74545455 5.91515152 7.08484848 8.25454545 9.42424242 10.59393939 11.76363636]

Passed all tests! ✓

Got

```
1.1696969696969697 1.2363636363636363  
[ 1.23636364 2.40606061 3.57575758 4.74545455 5.91515152 7.08484848  
8.25454545 9.42424242 10.59393939 11.76363636]
```



' Result

Thus the univariate Linear Regression was implemented to fit a straight line using least squares.