Experiment No. 3

Linear Regresssion

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Semester: 5th **Subject: Machine Learning Lab**

1. **Aim:** Implement Linear Regression on any data set.
2. **Software/Hardware Requirements:** Windows 7 & above version
3. **Tools to be used:**
    - Anaconda Navigator
    - Jupiter Notebook
4. **Implementation:**

In [13]:
```python
import numpy as np
import matplotlib.pyplot as plt

def estimate_coef(x, y):
    # number of observations/paints
    n = np.size(x)

    #mean of x and y vector
    m_x=np.mean(x)
    m_y=np.mean(y)

    #calculating cross-deviation and deviation about x
    SS_xy= np.sum(y*x) - n*m_y*m_x
    SS_xx= np.sum(x*x) - n*m_x*m_x

    # calculating regression coefficients
    b_1= SS_xy/ SS_xx
    b_0= m_y- b_1*m_x

    return(b_0, b_1)

def plot_regression_line(x, y, b):
    # plotting the actual points as scatter plot
    plt.scatter(x, y, color="b", marker="o", s=40)

    #predicted response vector
    y_pred=b[0]+b[1]*x

    #plotting the regression line
    plt.plot(x, y_pred, color="g")
```

```
    #putting labels
    plt.xlabel('x')
    plt.ylabel('y')

    #function to show plot
    plt.show()
def main():
    #observations / data
    x=np.array([0,1,2,3,4,5,6,7,8,9])
    y=np.array([1,3,2,5,7,8,8,9,10,12])

    # estimating coefficients
    b=estimate_coef(x,y)
    print("Estimated coefficients:\nb_0 = {} \\nb_1 = {}".format(b[0],b[1]))

    #plotting regression line
    plot_regression_line(x, y, b)

if __name__=="__main__":
    main()
```

```
Estimated coefficients:
b_0 = 1.2363636363636363
b_1 = 1.1696969696969697
```