TASK 4: SALES PREDICTION

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Domain : Data Science

Sales prediction involves forecasting the amount of a product that customers will purchase, taking into account various factors such as advertising expenditure, target audience segmentation, and advertising platform selection.

IMPORTING IMPORTANT LIBRARIES

In [1]:

```
import numpy as np
import pandas as pd
```

IMPORTING DATASET

In [2]:

```
ds=pd.read_csv('advertising.csv')
```

In [3]:

```
ds.head()
```

Out[3]:

	TV	Radio	Newspaper	Sales
0	230.1	37.8	69.2	22.1
1	44.5	39.3	45.1	10.4
2	17.2	45.9	69.3	12.0
3	151.5	41.3	58.5	16.5
4	180.8	10.8	58.4	17.9

In [4]:
```
ds.shape
```

Out[4]:
```
(200, 4)
```

In [5]:
```
ds.describe()
```

Out[5]:

	TV	Radio	Newspaper	Sales
count	200.000000	200.000000	200.000000	200.000000
mean	147.042500	23.264000	30.554000	15.130500
std	85.854236	14.846809	21.778621	5.283892
min	0.700000	0.000000	0.300000	1.600000
25%	74.375000	9.975000	12.750000	11.000000
50%	149.750000	22.900000	25.750000	16.000000
75%	218.825000	36.525000	45.100000	19.050000
max	296.400000	49.600000	114.000000	27.000000

In [6]:
```
ds.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 4 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   TV         200 non-null    float64
 1   Radio      200 non-null    float64
 2   Newspaper  200 non-null    float64
 3   Sales      200 non-null    float64
dtypes: float64(4)
memory usage: 6.4 KB
```

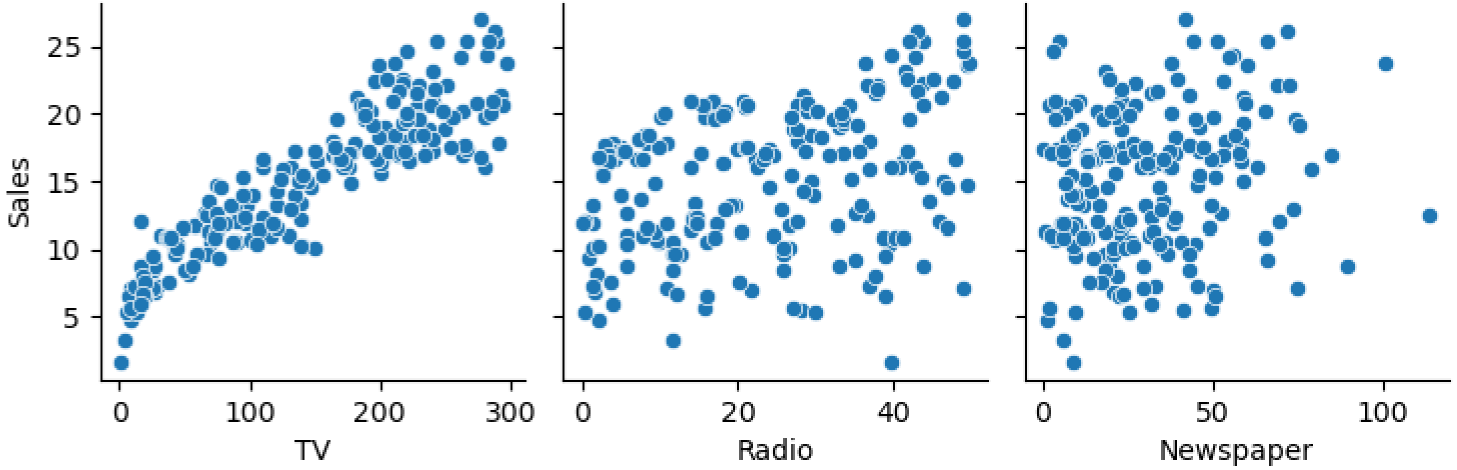
```
In [7]: ds.isnull().sum()
```

```
Out[7]: TV           0
        Radio        0
        Newspaper    0
        Sales        0
        dtype: int64
```

DATA VISUALIZATION

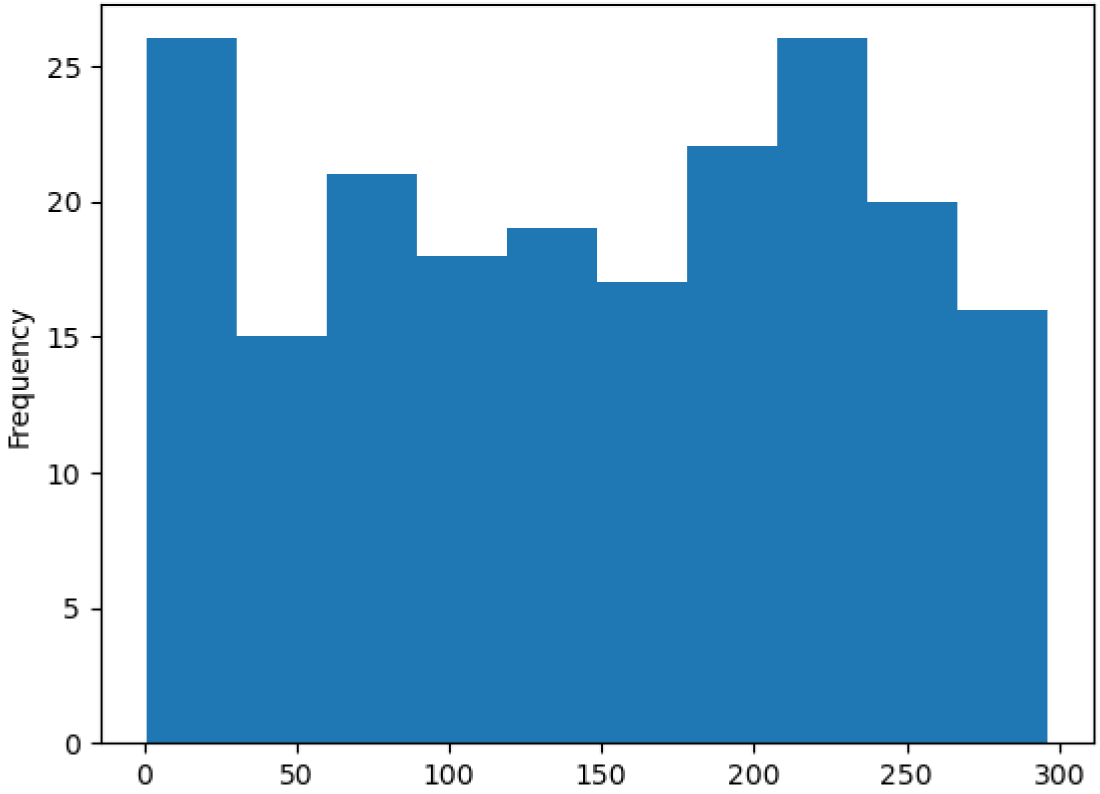
```
In [12]: import matplotlib.pyplot as plt
         import seaborn as sbs
```

```
In [13]: sbs.pairplot(ds ,x_vars =('TV' , 'Radio' , 'Newspaper'), y_vars='Sales' , kind = 'scatter')
         plt.show()
```



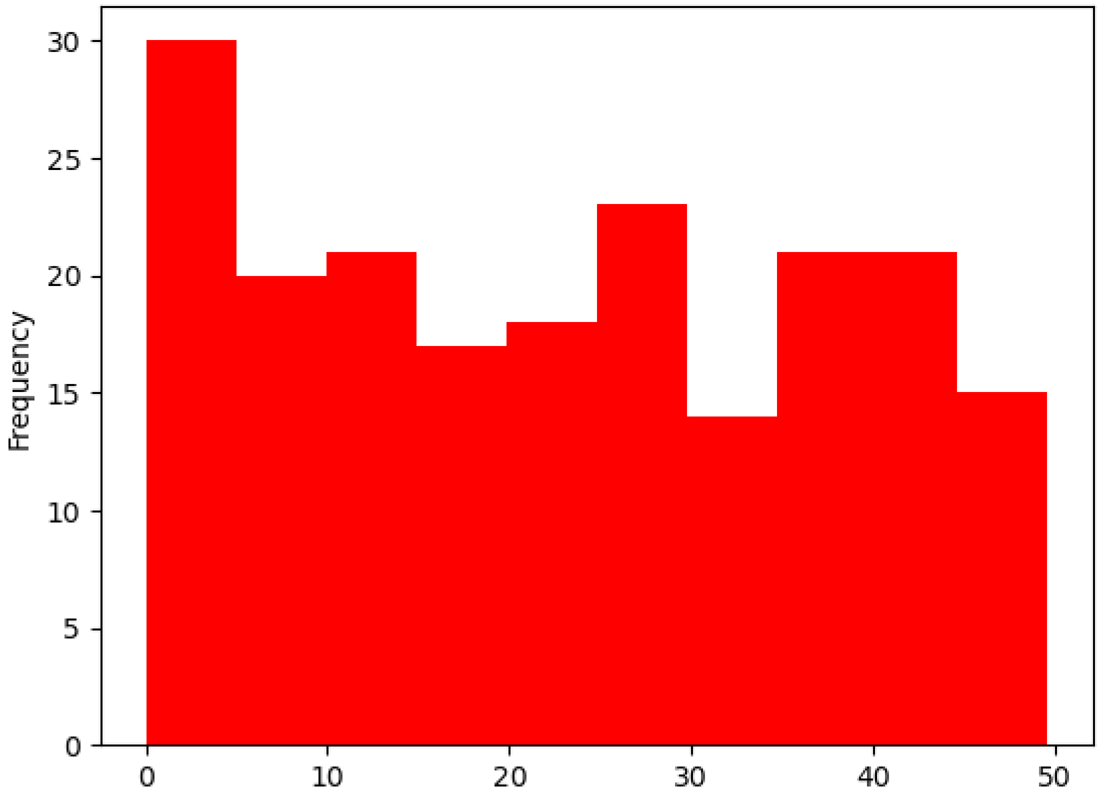
```
In [17]: ds['TV'].plot.hist(bins=10, xlabel="TV")
```

```
Out[17]: <Axes: ylabel='Frequency'>
```



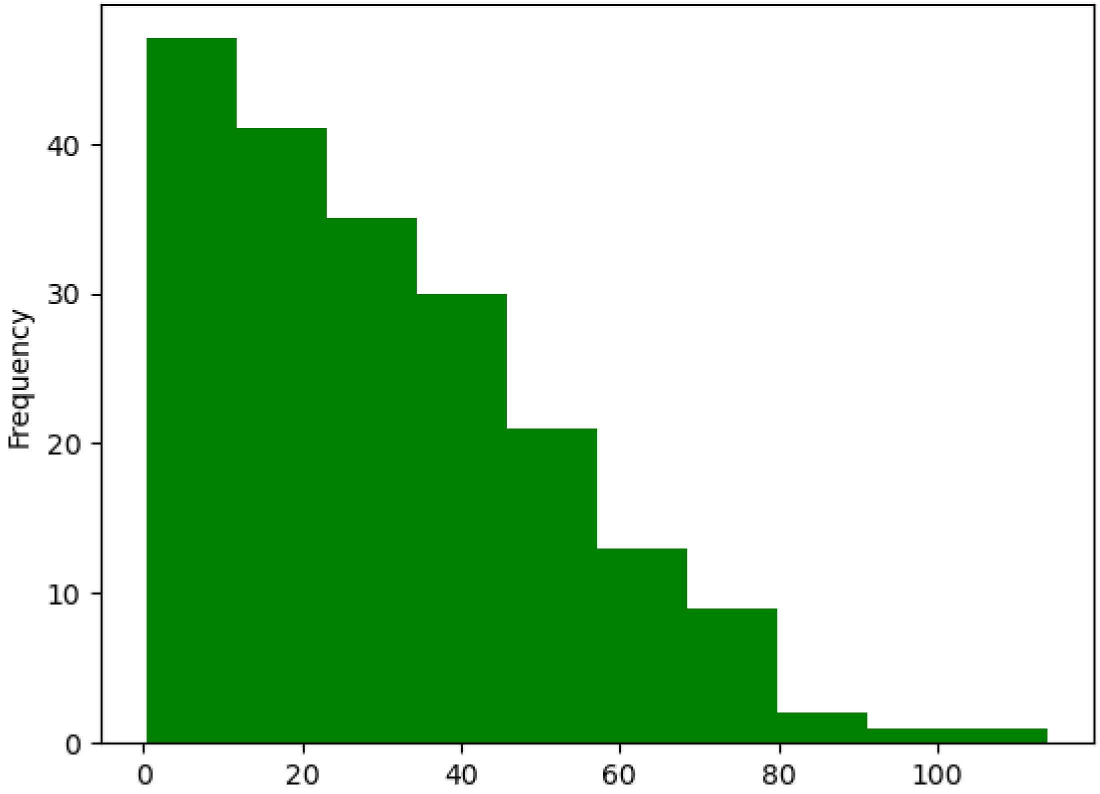
```
In [15]: ds['Radio'].plot.hist(bins=10,color="red",xlabel="Radio")
```

```
Out[15]: <Axes: ylabel='Frequency'>
```

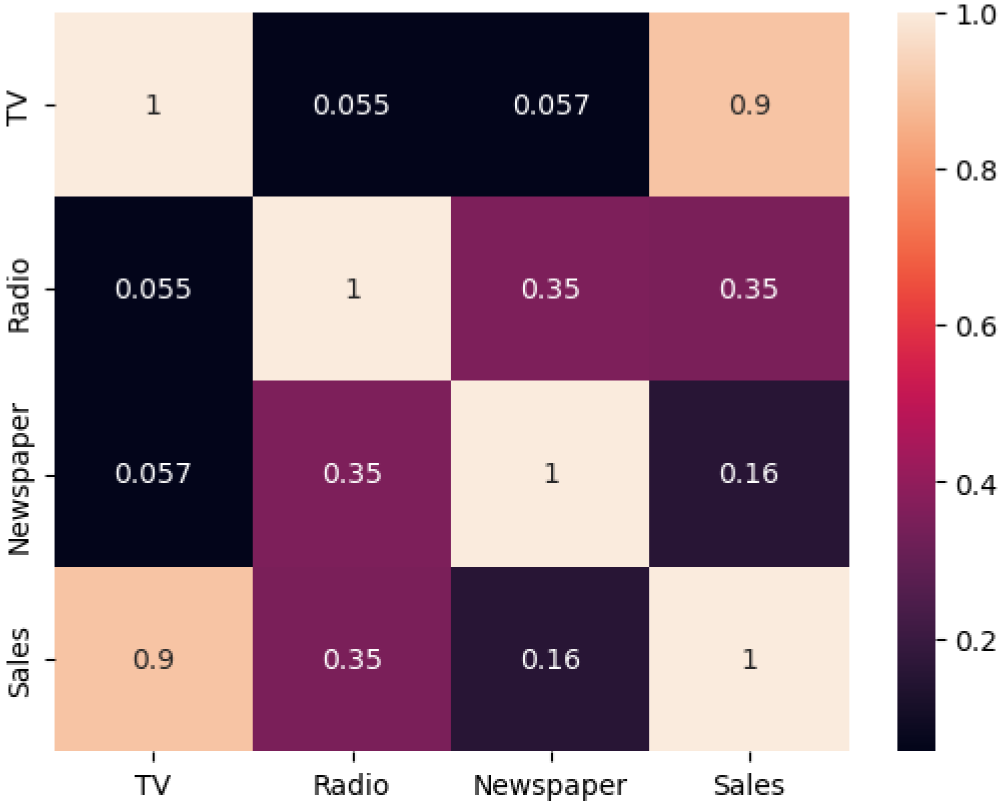


```
In [18]: ds['Newspaper'].plot.hist(bins=10,color="green",xlabel="Newspaper")
```

```
Out[18]: <Axes: ylabel='Frequency'>
```



In [20]:
```
sbs.heatmap(ds.corr(),annot =True)
plt.show()
```



In [22]:
```
from sklearn.model_selection import train_test_split
x_train , x_test, y_train ,y_test = train_test_split(ds[['TV']],ds[['Sales']], test_size = 0.3 , random_state=0)
```

In [23]:

```
print(x_train)
```

```
        TV
131  265.2
96   197.6
181  218.5
19   147.3
153  171.3
..     ...
67   139.3
192   17.2
117   76.4
47   239.9
172   19.6

[140 rows x 1 columns]
```

In [24]:

```
print(y_train)
```

```
     Sales
131   17.7
96    16.7
181   17.2
19    14.6
153   16.0
..     ...
67    13.4
192    5.9
117    9.4
47    23.2
172    7.6

[140 rows x 1 columns]
```

In [25]:

```
print(x_test)
```

```
        TV
18    69.2
170   50.0
107   90.4
98   289.7
177  170.2
182   56.2
5      8.7
146  240.1
12    23.8
152  197.6
61   261.3
125   87.2
180  156.6
154  187.8
80    76.4
7    120.2
33   265.6
130    0.7
37    74.7
74   213.4
183  287.6
145  140.3
45   175.1
159  131.7
60    53.5
123  123.1
179  165.6
185  205.0
122  224.0
44    25.1
16    67.8
55   198.9
150  280.7
111  241.7
22    13.2
189   18.7
129   59.6
4    180.8
83    68.4
106   25.0
```

```
134   36.9
66    31.5
26   142.9
113  209.6
168  215.4
63   102.7
8      8.6
75    16.9
118  125.7
143  104.6
71   109.8
124  229.5
184  253.8
97   184.9
149   44.7
24    62.3
30   292.9
160  172.5
40   202.5
56     7.3
```

In [27]:

```
print(y_test)
```

```
     Sales
18    11.3
170    8.4
107   12.0
98    25.4
177   16.7
182    8.7
5      7.2
146   18.2
12     9.2
152   16.6
61    24.2
125   10.6
180   15.5
154   20.6
80    11.8
7     13.2
33    17.4
130    1.6
37    14.7
74    17.0
183   26.2
145   10.3
45    16.1
159   12.9
60     8.1
123   15.2
179   17.6
185   22.6
122   16.6
44     8.5
16    12.5
55    23.7
150   16.1
111   21.8
22     5.6
189    6.7
129    9.7
4     17.9
83    13.6
106    7.2
```

```
134    10.8
66     11.0
26     15.0
113    20.9
168    17.1
63     14.0
8       4.8
75      8.7
118    15.9
143    10.4
71     12.4
124    19.7
184    17.6
97     20.5
149    10.1
24      9.7
30     21.4
160    16.4
40     16.6
56      5.5
```

MODEL TRAINING

In [30]:

```
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(x_train,y_train)
```

Out[30]:

```
LinearRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

```
In [31]: res= model.predict(x_test)
         print(res)
```

```
[[10.93127621]
 [ 9.88042193]
 [12.09159447]
 [22.99968079]
 [16.45920756]
 [10.21976029]
 [ 7.6199906 ]
 [20.28497391]
 [ 8.4464437 ]
 [17.95886418]
 [21.44529217]
 [11.91645209]
 [15.71485245]
 [17.42249065]
 [11.32534656]
 [13.72260788]
 [21.68063975]
 [ 7.18213465]
 [11.23230217]
 [18.82362968]
 [22.88474361]
 [14.82272095]
 [16.72739433]
 [14.35202581]
 [10.07198391]
 [13.88133066]
 [16.20744039]
 [18.36388094]
 [19.40378881]
 [ 8.51759529]
 [10.85465142]
 [18.03001578]
 [22.50709285]
 [20.3725451 ]
 [ 7.86628457]
 [ 8.16731053]
 [10.40584907]
 [17.03936669]
 [10.88749061]
 [ 8.51212209]
 [ 9.16343282]
 [ 8.86788005]
 [14.96502414]
 [18.61564811]
 [18.93309367]
 [12.76479799]
 [ 7.6145174 ]
 [ 8.06879294]
 [14.02363385]
 [12.86878878]
 [13.15339515]
 [19.70481478]
 [21.03480222]
 [17.26376787]
 [ 9.59034237]
 [10.55362545]
 [23.17482317]
 [16.58509115]
 [18.22705095]
 [ 7.54336581]]
```

```
In [32]: model.coef_
```

```
Out[32]: array([[0.05473199]])
```

```
In [33]: model.intercept_
```

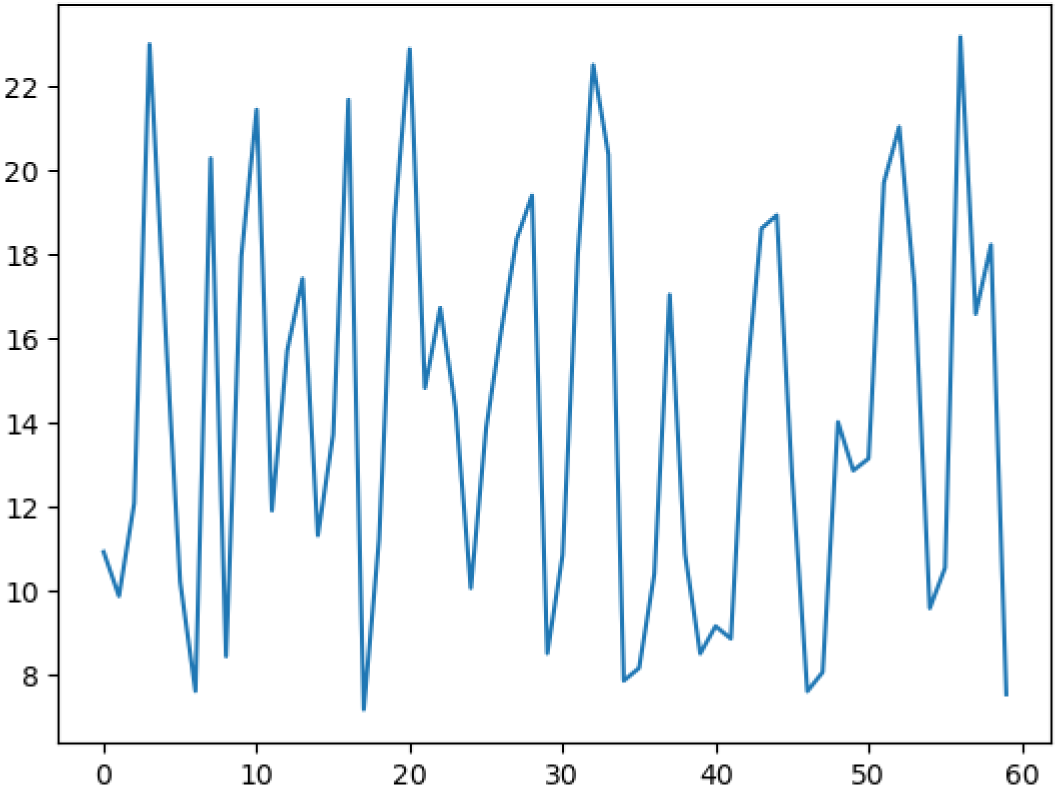
```
Out[33]: array([7.14382225])
```

```
In [34]: 0.05473199* 69.2 + 7.14382225
```

```
Out[34]: 10.931275958
```

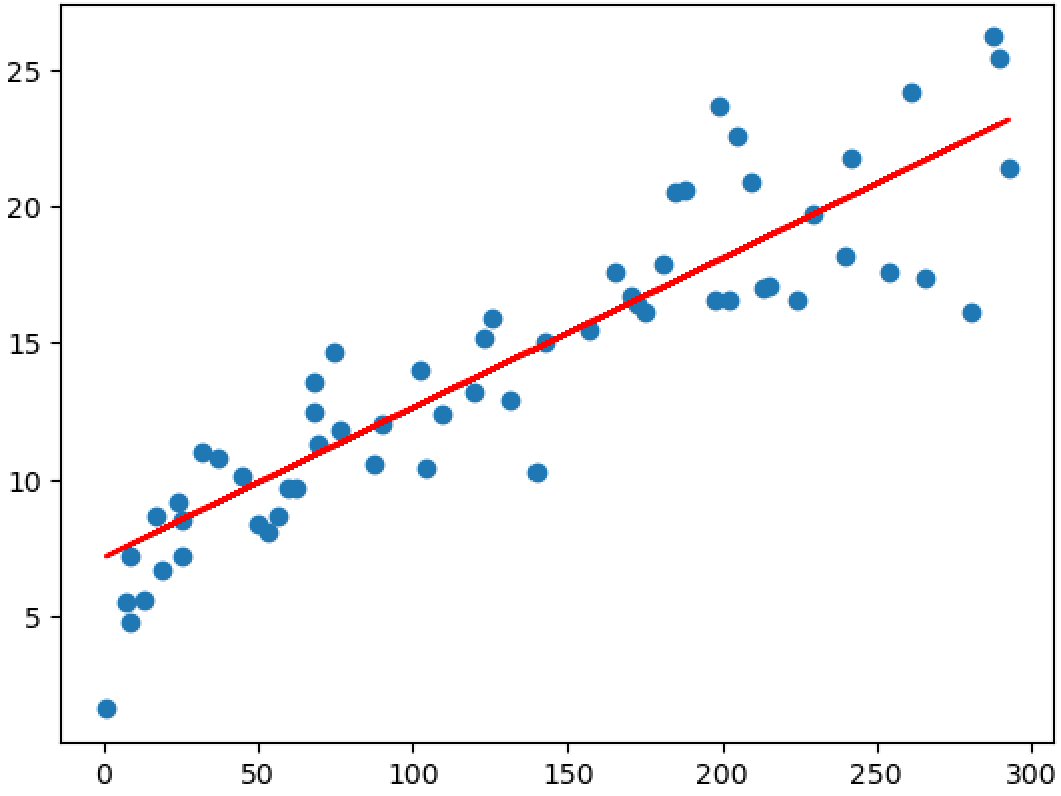
```
In [35]: plt.plot(res)
```

```
Out[35]: [<matplotlib.lines.Line2D at 0x1ac7ae2dc50>]
```



In [36]:

```
plt.scatter(x_test,y_test)
plt.plot(x_test , 7.14382225 + 0.05473199 * x_test,'r')
plt.show()
```



Successfully able to predict the sale using Advertising platform dataset

In [ ]:

```
```