Q7

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

In [ ]:
```
data = pd.read_csv("../data/advertising.csv", index_col="ID")
data
```

Out[ ]:

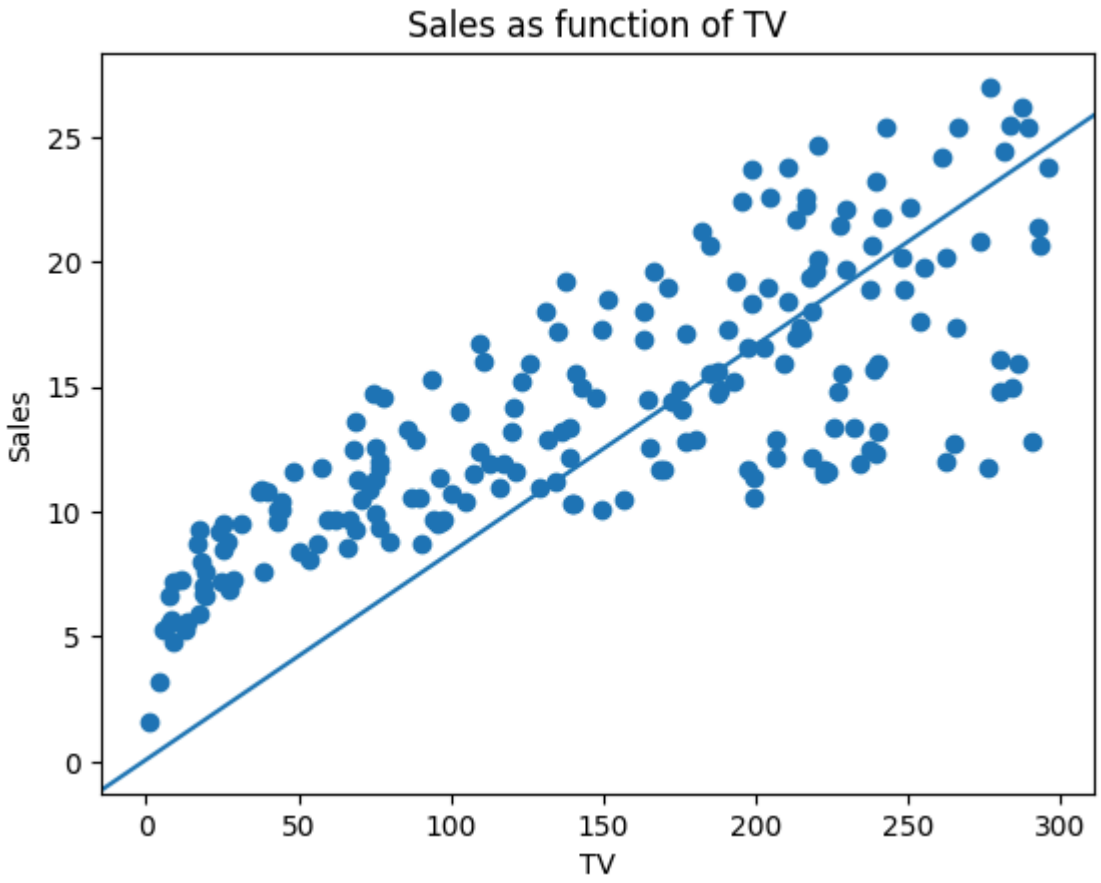
ID	TV	Radio	Newspaper	Sales
1	230.1	37.8	69.2	22.1
2	44.5	39.3	45.1	10.4
3	17.2	45.9	69.3	9.3
4	151.5	41.3	58.5	18.5
5	180.8	10.8	58.4	12.9
...	...	...	...	...
196	38.2	3.7	13.8	7.6
197	94.2	4.9	8.1	9.7
198	177.0	9.3	6.4	12.8
199	283.6	42.0	66.2	25.5
200	232.1	8.6	8.7	13.4

200 rows × 4 columns

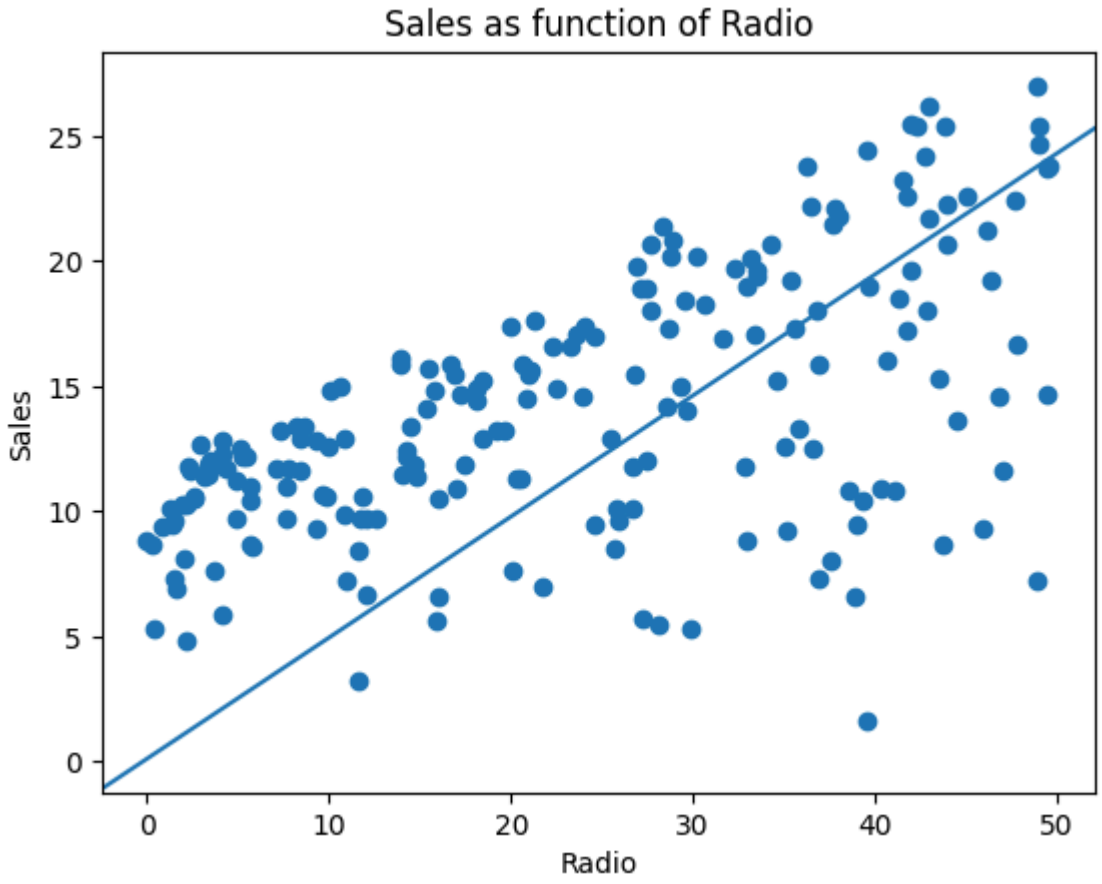
In [ ]:
```
def sales_regression_gradient_descent(feature):
    X = data[feature]
    y = data["Sales"]


    # starting params
    m = 0
    c = 0
    L = .0001 # ;earning param
    n = 1000 # iterations


    for i in range(n):
        y_pred = X*m + c

        D_m = -2/n * (X * ( y - y_pred)).sum()
```

```
        D_c = -2/n *  ( y - y_pred).sum()

        m -= L * D_m
        c -= L * D_c


    # plotting
    plt.scatter(X,y)
    plt.axline((0,c) , slope=m)
    plt.xlabel(feature)
    plt.ylabel("Sales")
    plt.title(f"Sales as function of {feature}")
```

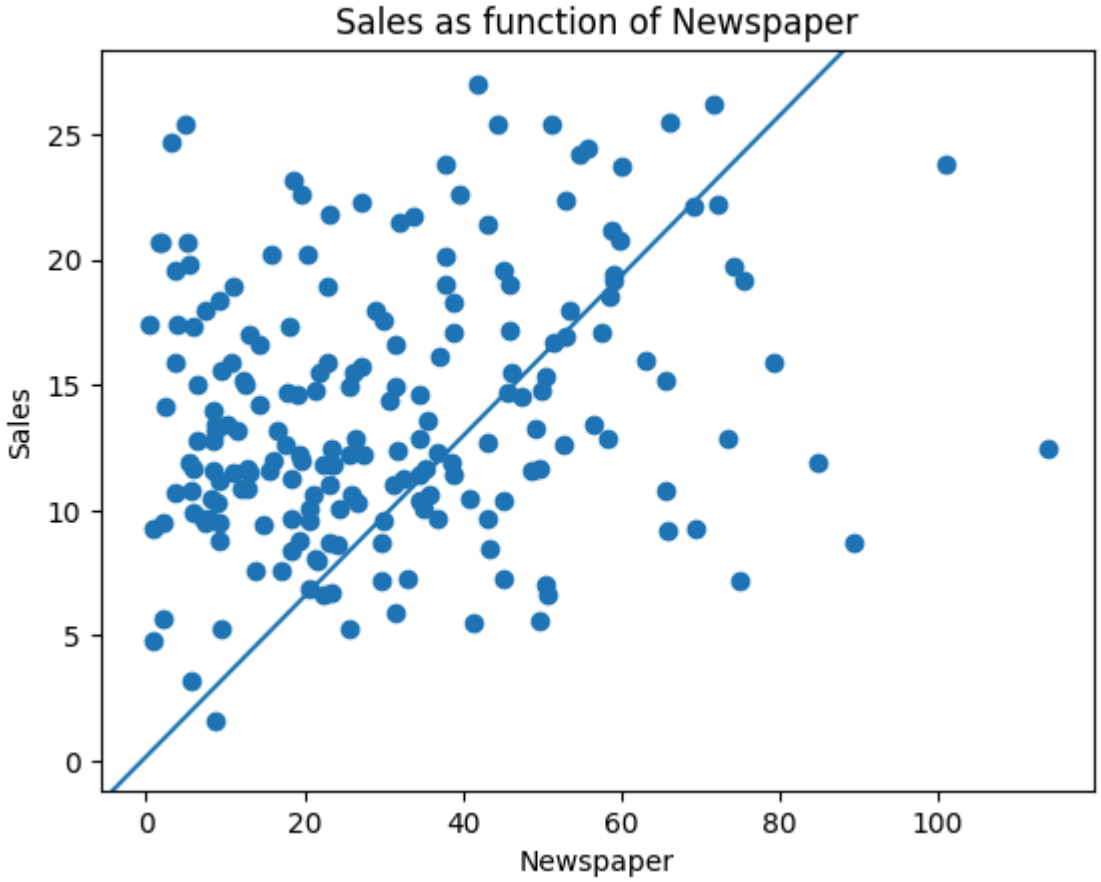
In [ ]:
```
sales_regression_gradient_descent("TV")
```



In [ ]:
```
sales_regression_gradient_descent("Radio")
```



In [ ]:
```
sales_regression_gradient_descent("Newspaper")
```


Sales as function of Newspaper
Sales
Newspaper
0
5
10
15
20
25
0
20
40
60
80
100