Q10

In [ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score, mean_squared_error
```

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 [ ]:
```
class Linear_Regression_Gradient_Descent:

    def __init__(self):
        self.slope = 0
        self.intercept = 0


    def fit(self, X , y , L=.0001 , n = 1000 ):
        # 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

        self.slope = m
        self.intercept = c

    def predict(self, X):
        return self.slope*X + self.intercept
```

In [ ]:
```
X_train, X_test, y_train, y_test = train_test_split(data["Radio"] , data["Sales"],r
```

In [ ]:
```
model = Linear_Regression_Gradient_Descent()
model.fit(X_train, y_train)
```

In [ ]:
```
preds = model.predict(X_test)
print(f"MSE : {mean_squared_error(y_test, preds)}")
print(f"R2 score : {r2_score(y_test, preds)}")
```

```
MSE : 34.02575687759605
R2 score : -0.730772515216807
```

In [ ]:
```
print("Line")
print(f"Slope : {model.slope}")
print(f"Intercept : {model.intercept}")
```

```
Line
Slope : 0.47989071486978124
Intercept : 0.09238662391493048
```