In [18]:
```
import numpy as np

Y = np.array([[9, 7.4, 8.6, 9.4, 6.8], [9, 7.4, 8.6, 9.4, 6.8]])

np.shape(Y)
```

Out[18]:
```
(2, 5)
```

In [24]:
```
#PROGRAM to find theta value using MLR

import numpy as np

Y = [9, 7.4, 8.6, 9.4, 6.8]

X = [[1, 95, 5, 5.84],
      [1, 56, 2, 5.19],
      [1, 87, 3, 5.78],
      [1, 121, 6, 5.89],
      [1, 35, 2, 5.57]]

Xtransp = [[0, 0, 0, 0,0],
          [0, 0, 0, 0,0],
          [0, 0, 0, 0,0],
          [0, 0, 0, 0,0]]

matmulresult = [[0, 0, 0, 0,0],
                [0, 0, 0, 0,0],
                [0, 0, 0, 0,0],
                [0, 0, 0, 0,0],
                [0, 0, 0, 0,0]]

result1 = [[0, 0, 0, 0,0],
           [0, 0, 0, 0,0],
           [0, 0, 0, 0,0],
           [0, 0, 0, 0,0],
           [0, 0, 0, 0,0]]

result2 = [[0, 0, 0, 0,0],
           [0, 0, 0, 0,0],
           [0, 0, 0, 0,0],
           [0, 0, 0, 0,0],
           [0, 0, 0, 0,0]]

thetamatrix = [0, 0, 0, 0, 0]


# iterate through rows
for i in range(len(X)):
   # iterate through columns
   for j in range(len(X[0])):
       Xtransp[j][i] = X[i][j]


print('ORIGINAL MATRIX:')
for p in X:
   print(p)

print(' ')


print('TRANSPOSED MATRIX:')
for r in Xtransp:
   print(r)
```

```
#MATRIX MULTIPLICATION LOGIC
# iterating by row of X
for i in range(len(X)):

    # iterating by coloum by Xtransp:
    for j in range(len(Xtransp[0])):

        # iterating by rows of B
        for k in range(len(Xtransp)):
            matmulresult[i][j] += X[i][k] * Xtransp[k][j]

print(' ')

print('RESULT OF Xtransp * X MATRIX MULTIPLICATION')
for r in matmulresult:
        print(r)

#CODE FOR MATRIX INVERSION
#RESULT OF X * TRANSPOSE(X) IS IN THE MATRIX matmulresult
matinv =  np.linalg.inv(matmulresult)

print(' ')

print("Inverse of the (X * TRANSPOSE(X)) matrix:")

print(' ')

#INVERSE(X * TRANSPOSE(X) is in 'matinv matrix')
print(matinv)

#print(len(matinv))

#print(len(matinv[0]))
print(' ')
print('Dimensions of inverted matrix(X * Xtransp) are:')
np.shape(matinv)
```

```
ORIGINAL MATRIX:
[1, 95, 5, 5.84]
[1, 56, 2, 5.19]
[1, 87, 3, 5.78]
[1, 121, 6, 5.89]
[1, 35, 2, 5.57]

TRANSPOSED MATRIX:
[1, 1, 1, 1, 1]
[95, 56, 87, 121, 35]
[5, 2, 3, 6, 2]
[5.84, 5.19, 5.78, 5.89, 5.57]

RESULT OF Xtransp * X MATRIX MULTIPLICATION
[9085.1056, 5361.3096, 8314.7552, 11560.3976, 3368.5288]
[5361.3096, 3167.9361, 4908.9982, 6819.5691, 1993.9083]
[8314.7552, 4908.9982, 7612.4084, 10580.0442, 3084.1946]
[11560.3976, 6819.5691, 10580.0442, 14712.6921, 4280.8073]
[3368.5288, 1993.9083, 3084.1946, 4280.8073, 1261.0249]

Inverse of the (X * TRANSPOSE(X)) matrix:

[[ 1.90532975e+12  1.99580630e+11  1.43698054e+11 -1.46492183e+12
  -7.83686609e+11]
 [ 1.99580630e+11  2.09057924e+10  1.50521703e+10 -1.53448515e+11
  -8.20900777e+10]
 [ 1.43698054e+11  1.50521704e+10  1.08375628e+10 -1.10482931e+11
  -5.91048559e+10]
 [-1.46492183e+12 -1.53448515e+11 -1.10482931e+11  1.12631210e+12
   6.02541170e+11]
 [-7.83686609e+11 -8.20900777e+10 -5.91048559e+10  6.02541170e+11
   3.22340372e+11]]

Dimensions of inverted matrix(X * Xtransp) are:
```

Out[24]:
```
(5, 5)
```