```
'''
------------ Matlab / Python Assignment --------------------
Name :- Ronak Subhash Pawar
Roll No. :- 61 , Div :- B
Class:- SY-Comp-B , Course:- Applied Mathematics-III
'''

'''
Q.1) Find the correlation coefficient without using inbuilt function of matlab
     or python.
'''
import math

def correlationCoefficient(X, Y, n) :
    sum_X = 0
    sum_Y = 0
    sum_XY = 0
    squareSum_X = 0
    squareSum_Y = 0


    i = 0
    while i < n :

        sum_X = sum_X + X[i]

        sum_Y = sum_Y + Y[i]

        sum_XY = sum_XY + X[i] * Y[i]


        squareSum_X = squareSum_X + X[i] * X[i]
        squareSum_Y = squareSum_Y + Y[i] * Y[i]

        i = i + 1


    corr = (float)(n * sum_XY - sum_X * sum_Y)/(float)(math.sqrt((n *
squareSum_X -
        sum_X * sum_X)* (n * squareSum_Y -sum_Y * sum_Y)))
    return corr


X = [69, 72, 61, 99, 55, 44, 75, 82, 91, 72, 82, 70]    #a=61
Y = [58, 74, 61, 94, 67, 75, 57, 103, 60, 60, 86, 61]   #Roll No- 61 So, 80-
61=19
```

```
n = len(X)

print("Correlation Coefficient is:- " )
print ('{0:.6f}'.format(correlationCoefficient(X, Y, n)))

'''
Output:-
Correlation Coefficient is:-
0.375630
'''

'''
Q.2) Find the rank correlation coefficient without using inbuilt function of
     matlab or python.
'''
def printVector(X):
    print(*X)

def rankify(X):

    N = len(X)

    Rank_X = [None for _ in range(N)]

    for i in range(N):

        r = 1
        s = 1

        for j in range(i):
            if (X[j] < X[i]):
                r += 1
            if (X[j] == X[i]):
                s += 1

        for j in range(i+1, N):
            if (X[j] < X[i]):
                r += 1
            if (X[j] == X[i]):
                s += 1


        Rank_X[i] = r + (s-1) * 0.5

    return Rank_X


def correlationCoefficient(X, Y):
    n = len(X)
```

```
    sum_X = 0
    sum_Y = 0
    sum_XY = 0
    squareSum_X = 0
    squareSum_Y = 0

    for i in range(n):

        sum_X = sum_X + X[i]

        sum_Y = sum_Y + Y[i]

        sum_XY = sum_XY + X[i] * Y[i]

        squareSum_X = squareSum_X + X[i] * X[i]
        squareSum_Y = squareSum_Y + Y[i] * Y[i]

    corr = (n * sum_XY - sum_X * sum_Y) / ((n * squareSum_X -
                                            sum_X * sum_X) * (n * squareSum_Y
- sum_Y * sum_Y)) ** 0.5

    return corr


X = [69, 72, 61, 99, 55, 44, 75, 82, 91, 72, 82, 70]  #a=61
Y = [58, 74, 61, 94, 67, 75, 57, 103, 60, 60, 86, 19] #Roll No- 61 So, 80-
61=19

rank_x = rankify(X)

rank_y = rankify(Y)

print("Vector X")
printVector(X)

print("Rankings of X")
printVector(rank_x)

print("Vector Y")
printVector(Y)

print("Rankings of Y")
printVector(rank_y)

print("Spearman's Rank correlation: ")
print(correlationCoefficient(rank_x, rank_y))

'''
Output:-
```

```
Vector X
69 72 61 99 55 44 75 82 91 72 82 70
Rankings of X
4.0 6.5 3.0 12.0 2.0 1.0 8.0 9.5 11.0 6.5 9.5 5.0
Vector Y
58 74 61 94 67 75 57 103 60 60 86 19
Rankings of Y
3.0 8.0 6.0 11.0 7.0 9.0 2.0 12.0 4.5 4.5 10.0 1.0
Spearman's Rank correlation:
0.27240815355827896
'''
```