Assignment_1

Write a Python program to compute following computation on matrix:
a) Addition of two matrices
b) Subtraction of two matrices
c) Multiplication of two matrices
d) Transpose of a matrix

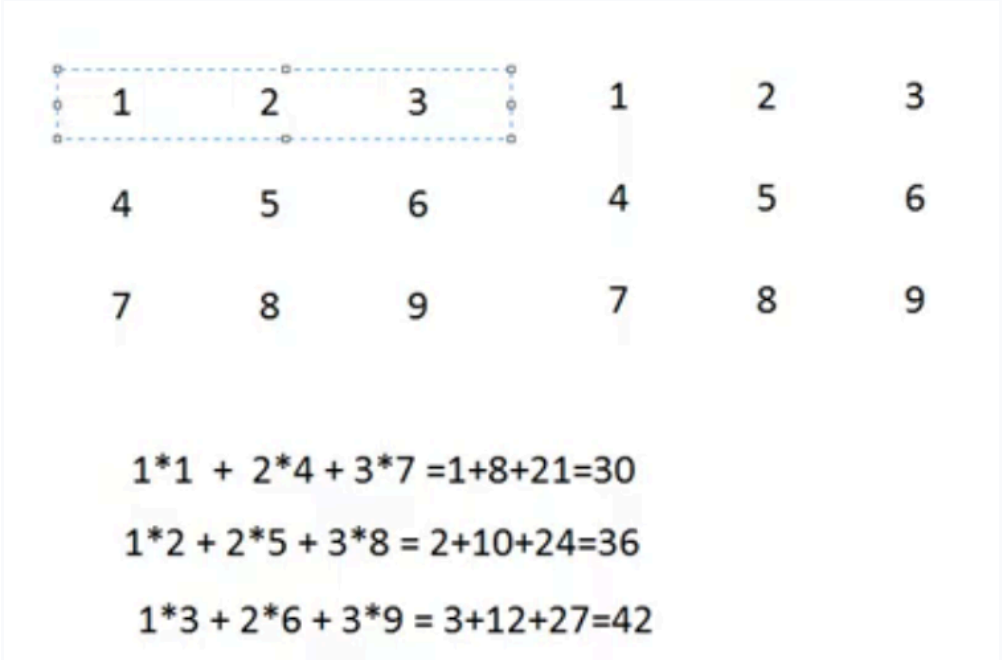
```
# Program to add two matrices using nested loop

X = [[12,7,3],
    [4 ,5,6],
    [7 ,8,9]]

Y = [[5,8,1],
    [6,7,3],
    [4,5,9]]

result = [[0,0,0],
          [0,0,0],
          [0,0,0]]

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

for r in result:
   print(r)
```

Python Program to Multiply Two Matrices

In Python, we can implement a matrix as nested list (list inside a list).

We can treat each element as a row of the matrix.

For example `X = [[1, 2], [4, 5], [3, 6]]` would represent a `3x2` matrix.
The first row can be selected as `X[0]`. And, the element in first row, first column can be selected as `X[0][0]`.
Multiplication of two matrices `X` and `Y` is defined only if the number of columns in `X` is equal to the number of rows `Y`.
If `X` is a `n x m` matrix and `Y` is a `m x l` matrix then, `XY` is defined and has the dimension `n x l` (but `YX` is not defined). Here are a couple of ways to implement matrix multiplication in Python.




```
# Program to multiply two matrices using nested loops

# 3x3 matrix
X = [[12,7,3],
   [4 ,5,6],
   [7 ,8,9]]
# 3x4 matrix
Y = [[5,8,1,2],
   [6,7,3,0],
   [4,5,9,1]]
# result is 3x4
result = [[0,0,0,0],
        [0,0,0,0],
        [0,0,0,0]]

# iterate through rows of X
for i in range(len(X)):
  # iterate through columns of Y
  for j in range(len(Y[0])):
     # iterate through rows of Y
     for k in range(len(Y)):
        result[i][j] += X[i][k] * Y[k][j]

for r in result:
  print(r)
```

Python Program to Transpose a Matrix

In Python, we can implement a matrix as a nested list (list inside a list). We can treat each element as a row of the matrix.

For example `X = [[1, 2], [4, 5], [3, 6]]` would represent a 3x2 matrix. The first row can be selected as `X[0]`. And, the element in the first-row first column can be selected as `X[0][0]`.
Transpose of a matrix is the interchanging of rows and columns. It is denoted as `X'`. The element at `ith` row and `jth` column in `X` will be placed at `jth` row and `ith` column in `X'`. So if `X` is a 3x2 matrix, `X'` will be a 2x3 matrix.
Here are a couple of ways to accomplish this in Python.

```
# Program to transpose a matrix using a nested loop

X = [[12,7],
    [4 ,5],
    [3 ,8]]

result = [[0,0,0],
          [0,0,0]]

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

for r in result:
   print(r)
```