



Nested Lists

Nested Lists

- A list within another list is called Nested List. It is used to perform matrix operations and to handle different data sets.

```
>>> L1=[['a','b','c'],[10,20,30,40]]
```

```
>>> L1
```

```
[['a', 'b', 'c'], [10, 20, 30, 40]]
```

```
>>> len(L1)
```

```
2
```

```
>>> L1[0]          # With one index, you get an entire row and with two  
['a', 'b', 'c']    indices, you get an item within the list
```

```
>>> L1[0][0]       # The first [] indicates the index of the outer list. the  
'a'               second [] indicates the index nested lists.
```

```
>>> L1[1][3]
```

```
40
```

```
>>> len(L1[0])
```

```
3
```

```
>>> len(L1[1])
```

```
4
```

Nested Lists

```
>>> L1=[['a','b','c'],[10,20,30,40]]
```

```
>>> L1[0].append('d')
```

```
>>> L1
```

```
 [['a', 'b', 'c', 'd'], [10, 20, 30, 40]]
```

```
>>> L1[1].remove(40)
```

```
>>> L1
```

```
 [['a', 'b', 'c', 'd'], [10, 20, 30]]
```

```
>>> L1=[['a', 'b', 'c', 'd'], [10, 20, 30]]
```

```
>>> L1[0][1]='B'
```

```
>>> L1
```

```
 [['a', 'B', 'c', 'd'], [10, 20, 30]]
```

```
>>> L1[1][3:3]=[40]
```

```
>>> L1
```

```
 [['a', 'B', 'c', 'd'], [10, 20, 30, 40]]
```

Matrix Creation

- A basic 3×3 matrix using nested lists can be represented as follows.

```
>>>matrix = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

```
>>> matrix=[[1,2,3],  
            [4,5,6],  
            [7,8,9]]
```

```
>>> matrix[0]
```

```
[1, 2, 3]
```

```
>>> matrix[1]
```

```
[4, 5, 6]
```

```
>>> matrix[2]
```

```
[7, 8, 9]
```

```
>>> matrix[0][1]
```

```
2
```

```
>>> matrix[2][0]
```

```
7
```

Sample Program 17

- Write a program to sort the elements of a list based on the length of the elements.

Ex : **Input :** L1=['cat', 'elephant', 'goat', 'tiger']

Output : L=['cat', 'goat', 'tiger', 'elephant']

```
L1=['elephant', 'goat', 'cat', 'giraffe']
```

```
i=0;j=1
```

```
while i<len(L1)-1:
```

```
    while j<len(L1):
```

```
        if len(L1[i])>len(L1[j]):
```

```
            L1.insert(i,L1[j])
```

```
            del L1[j+1]
```

```
            j=j+1
```

```
        i=i+1; j=i+1
```

```
print(L1)
```

Sample Program 18

- Write a program to Pascal's triangle based on the number of rows through user input.

Ex : Input : No. of rows : 5

Output :

```
      1
     1 1
    1 2 1
   1 3 3 1
```

```
              1
            1 1
          1 2 1
        1 3 3 1
      1 4 6 4 1
    1 5 10 10 5 1
  1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
```

Sample Program 18

```
n=int(input("Enter no. of rows : "))
```

```
L1=[];L2=[1] ;c=0
```

```
for i in range(0,n):
```

```
    L1.append(1)
```

```
    print(' '* (n-i-1), '1' ,end="")
```

```
    if c>0: #Works even if n=1
```

```
        j=0
```

```
        while j<c:
```

```
            if c==j+1:
```

```
                L1.append(1)
```

```
                if i!=0:
```

```
                    print('1', end="")
```

```
            else:
```

```
                L1.append(L2[j]+L2[j+1])
```

```
                print(L2[j]+L2[j+1], end="")
```

```
            j=j+1
```

```
    print(' '* (n-i-1))
```

```
    L2=L1.copy()
```

```
    L1.clear()
```

```
    c=c+1
```

```
n=int(input("Enter no. of rows : "))
```

```
L1=[];L2=[1] ;c=0
```

```
for i in range(0,n):
```

```
    L1.append(1)
```

```
    print(' '* (n-i-1), '1' ,end="")
```

```
    if c>0: #Works even if n=1
```

```
        j=0
```

```
        while j<c:
```

```
            if c==j+1:
```

```
                L1.append(1)
```

```
                if i!=0:
```

```
                    print('1', end="")
```

```
            else:
```

```
                L1.append(L2[j]+L2[j+1])
```

```
                print(L2[j]+L2[j+1], end="")
```

```
            j=j+1
```

```
    print(' '* (n-i-1))
```

```
    L2=L1.copy()
```

```
    L1.clear()
```

```
    c=c+1
```

Sample Program 19

- Write a program to read matrix elements through user input.

Ex : Input : No. of rows : 3 ; No. of columns : 3

```
r=int(input("Enter no of rows: "))
c=int(input("Enter no of columns: "))
matrix=[];b=0
for i in range(r):                # A for loop for row entries
    a=[]
    for j in range(c):            # A for loop for column entries
        a.append(int(input("Enter element value: ")))
    matrix.append(a)

# For printing the matrix
for i in range(r):
    for j in range(c):
        print(matrix[i][j], end = " ")
    print()
```


Sample Program 20

- Write a program to perform matrix addition between two matrices .

#Matrix addition for any size

```
r1=int(input("Enter no. of rows for 1st matrix: "))
c1=int(input("Enter no. of columns for 1st matrix: "))
r2=int(input("Enter no. of rows for 2nd matrix: "))
c2=int(input("Enter no. of columss for 2nd matrix: "))
if r1==r2 and c1==c2: # Verifying the size of both matrices
    mat1=[];mat2=[];mat3=[]
    for i in range(0,2): # Reading matrix elements
        for j in range(0,r1):
            a=[]
            for k in range(0,c1):
                e=int(input("Enter matrix element value :"))
                a.append(e)
            if i==0:
                mat1.append(a)
            else:
                mat2.append(a)
    print(mat1, mat2) # Printing matrix elements
```

#Continued in next page