```python
                                                                    #GE ASSIGNMENT LAB3
import numpy as np

#write a program to perform the following functions
arrA=np.array([[-5,1,-3],[6,0,2],[2,6,1]])
arrB=np.array([[2,4,5],[-8,10,3],[-2,-3,-9]])
print(arrA)
print(arrB)


#Write Program To Add,Subtract and Multiply Matrix A and B
arrA=np.array([[-5,1,-3],[6,0,2],[2,6,1]])
arrB=np.array([[2,4,5],[-8,10,3],[-2,-3,-9]])
print('Addition of These Two Matrices\n',arrA+arrB)
print('Subtraction of These Two Matrices\n',arrA-arrB)
arrC=np.dot(arrA,arrB)
print('Multiplication of These Two Matrices\n',arrC)


#Write a Program To Find the Determinant of A and B
DETA=np.linalg.det(arrA)
DETB=np.linalg.det(arrB)
print('Determinant of Matrix A is\n',DETA)
print('Determinant of Matrix B is\n',DETB)


#Determine The Rank and Nullity of MATRIX_1
arr1=np.array([[0,0,0,0],[4,2,3,0],[1,0,0,0],[4,0,3,0]])
RANK1=np.linalg.matrix_rank(arr1)
columns1=arr1.shape[1]
print('The Matrix is\n',arr1)
print('Rank of The Matrix is\n',RANK1)
print('Nullity of The Matrix is\n',columns1-RANK1)

#Determine The Rank and Nullity of MATRIX_2
arr2=np.array([[5,4,7],[5,-6,5],[4,2,-3]])
RANK2=np.linalg.matrix_rank(arr2)
columns2=arr2.shape[1]
print('The Matrix is\n',arr2)
print('Rank of The Matrix is\n',RANK2)
print('Nullity of The Matrix is\n',columns2-RANK2)

#Determine The Rank and Nullity of MATRIX_3
arr3=np.array([[1,0,1],[2,1,0],[0,-1,2]])
RANK3=np.linalg.matrix_rank(arr3)
columns3=arr3.shape[1]
print('The Matrix is\n',arr3)
print('Rank of The Matrix is\n',RANK3)
print('Nullity of The Matrix is\n',columns3-RANK3)
```

NAME: HARSH ARORA
ROLL NUMBER: AE-1218
COURSE:BSC(HONS.) CS

```python
#Determine The Rank and Nullity of MATRIX_4
arr4=np.array([[1,1,2],[3,4,-1],[-1,-2,5]])
RANK4=np.linalg.matrix_rank(arr4)
columns4=arr4.shape[1]
print('The Matrix is\n',arr4)
print('Rank of The Matrix is\n',RANK4)
print('Nullity of The Matrix is\n',columns4-RANK4)

#Determine The Rank and Nullity of MATRIX_5
arr5=np.array([[1,3,4],[3,9,12],[1,3,4]])
RANK5=np.linalg.matrix_rank(arr5)
columns5=arr5.shape[1]
print('The Matrix is\n',arr5)
print('Rank of The Matrix is\n',RANK5)
print('Nullity of The Matrix is\n',columns5-RANK5)
```

```python
                                          #GE ASSIGNMENT LAB3
import numpy as np

#write a program to perform the following functions
arrA=np.array([[-5,1,-3],[6,0,2],[2,6,1]])
arrB=np.array([[2,4,5],[-8,10,3],[-2,-3,-9]])
print(arrA)
print(arrB)



#Write Program To Add,Subtract and Multiply Matrix A and B
arrA=np.array([[-5,1,-3],[6,0,2],[2,6,1]])
arrB=np.array([[2,4,5],[-8,10,3],[-2,-3,-9]])
print('Addition of These Two Matrices\n',arrA+arrB)
print('Subtraction of These Two Matrices\n',arrA-arrB)
arrC=np.dot(arrA,arrB)
print('Multiplication of These Two Matrices\n',arrC)



#Write a Program To Find the Determinant of A and B
DETA=np.linalg.det(arrA)
DETB=np.linalg.det(arrB)
print('Determinant of Matrix A is\n',DETA)
print('Determinant of Matrix B is\n',DETB)
```

```
Python 3.11.0 (main, Oct 24 2022, 18:2
Type "help", "copyright", "credits" or
>>>
==== RESTART: C:/Users/Harsh/AppData/L
[[-5  1 -3]
 [ 6  0  2]
 [ 2  6  1]]
[[ 2  4  5]
 [-8 10  3]
 [-2 -3 -9]]
Addition of These Two Matrices
 [[-3  5  2]
 [-2 10  5]
 [ 0  3 -8]]
Subtraction of These Two Matrices
 [[ -7  -3  -8]
 [ 14 -10  -1]
 [  4   9  10]]
Multiplication of These Two Matrices
 [[-12  -1   5]
 [  8  18  12]
 [-46  65  19]]
Determinant of Matrix A is
 -49.9999999999999
Determinant of Matrix B is
 -254.0
```

```python
#Determine The Rank and Nullity of MATRIX_1
arr1=np.array([[0,0,0,0],[4,2,3,0],[1,0,0,0],[4,0,3,0]])
RANK1=np.linalg.matrix_rank(arr1)
columns1=arr1.shape[1]
print('The Matrix is\n',arr1)
print('Rank of The Matrix is\n',RANK1)
print('Nullity of The Matrix is\n',columns1-RANK1)
```

```
========== RESTART: C:/Users
The Matrix is
 [[0 0 0 0]
 [4 2 3 0]
 [1 0 0 0]
 [4 0 3 0]]
Rank of The Matrix is
 3
Nullity of The Matrix is
 1
```

```python
#Determine The Rank and Nullity of MATRIX_2
arr2=np.array([[5,4,7],[5,-6,5],[4,2,-3]])
RANK2=np.linalg.matrix_rank(arr2)
columns2=arr2.shape[1]
print('The Matrix is\n',arr2)
print('Rank of The Matrix is\n',RANK2)
print('Nullity of The Matrix is\n',columns2-RANK2)
```

```
The Matrix is
 [[ 5   4   7]
  [ 5  -6   5]
  [ 4   2  -3]]
Rank of The Matrix is
 3
Nullity of The Matrix is
 0
```

```python
#Determine The Rank and Nullity of MATRIX_3
arr3=np.array([[1,0,1],[2,1,0],[0,-1,2]])
RANK3=np.linalg.matrix_rank(arr3)
columns3=arr3.shape[1]
print('The Matrix is\n',arr3)
print('Rank of The Matrix is\n',RANK3)
print('Nullity of The Matrix is\n',columns3-RANK3)
```

```
The Matrix is
 [[ 1   0   1]
  [ 2   1   0]
  [ 0 -1   2]]
Rank of The Matrix is
 2
Nullity of The Matrix is
 1
```

```python
#Determine The Rank and Nullity of MATRIX_4
arr4=np.array([[1,1,2],[3,4,-1],[-1,-2,5]])
RANK4=np.linalg.matrix_rank(arr4)
columns4=arr4.shape[1]
print('The Matrix is\n',arr4)
print('Rank of The Matrix is\n',RANK4)
print('Nullity of The Matrix is\n',columns4-RANK4)
```

```
The Matrix is
  [[ 1  1  2]
   [ 3  4 -1]
   [-1 -2  5]]
Rank of The Matrix is
  2
Nullity of The Matrix is
  1
```

```python
#Determine The Rank and Nullity of MATRIX_5
arr5=np.array([[1,3,4],[3,9,12],[1,3,4]])
RANK5=np.linalg.matrix_rank(arr5)
columns5=arr5.shape[1]
print('The Matrix is\n',arr5)
print('Rank of The Matrix is\n',RANK5)
print('Nullity of The Matrix is\n',columns5-RANK5)
```

```
The Matrix is
  [[ 1  3   4]
   [ 3  9  12]
   [ 1  3   4]]
Rank of The Matrix is
  1
Nullity of The Matrix is
  2
```