1.   An ndarray X contains the following data:
[[0 1 2 3]
[4 5 6 7]
[8 9 10 11]
[12 13 14 15]]
What will be returned by the statements:
i)   print(X[0:2,0:2]
ii)   print(X[2:0,2:0]
iii)   print(X[2:0:-1,2:0:-1])

2.   Given the following ndarray
Ary1 [[1 2 3],
      [4 5 6],
      [7 8 9]]
Write array slices to print:
a) Hoizontal rows separately
b) Veritcal columns separately

3.   Consider the two arrays:
ar1=[[0 1 2],
     [3 4 5],
     [6 7 8]]
     ar2=[[10 11 12]
     [13 14 15]
     [16 17 18]]
     i)Write command to concatenate ar1 and ar2- i) rowwise and ii) columnwise
     ii)What be the resultant array if the follwing statement is given?
     np.hstack([ar1,ar2])

4.   Given a list L=[3,4,5] and an ndarray N having elements 3,4,5. What will be the result produced by:
a)   L*3   b) N*3 c) L+L d) N+N Ans:

5.   Write a code to create an ndarray having six zeros in it. Write statements to change 3rd and 5th elements of this array to 15 and 25 respectively.

6.   Consider the following ndarrays:
      A=[10,20,30,40,50,60,70,80,90]
      B=[[0,1,2,3],
      [4,5,6,7],
      [8,9,10,11],

[12,13,14,15]]
What will be the array slices as per the following?
i)   B[0:2,1:3]
ii)   A[2:6:3]
iii)   A[-1:-3]
iv)   B[::-1]
v)   B[:3,2:]

7.   Predict the output of the following code fragements:
a) x=np.array([1,2,3])
y=np.array([3,2,1])
z=np.concatenate([x,y])
print(z)
b) grid=np.array([[1,2,3],[4,5,6]])
g2=np.concatenate([grid,grid])
print(g2)
c) grid=np.array([[1,2,3],[4,5,6]])
g2=np.concatenate([grid,grid],axis=1)
print(g2)

8.   Predict the output of the following code fragements:
a) x=np.array([1,2,3])
g=np.array([[9,8,7],[6,5,4]])
r=np.vstack([x,g])
print(r)
b) g=np.array([[9,8,7],[6,5,4]])
y=np.array([[99],[99]])
r=np.hstack([g,y])
print(r)

9.   Write commands to perform following operations on two 4×4 ndarrays namely P and Q:
a)   adding 10 to P
b)   Multplication of two arrays P and Q
c)   Divide all elements of Q by 7
d)   Calculate the remainder of all elements of P when divided by 7
e)   Calculate the square root of all elements of Q Ans:

10.   Write a program to create a 4×4 ndarray having values ranging 0 to 15(both inclusive)

11.   Write a NumPy program to create a 10×10 matrix , in which all the elements on the border will be equal to 1 and inside 0

12.   Write a Numpy program to store elements in 3 ×3 2D array and compute:
i)   Sum of all elements
ii)   Sum of elements in each row
iii) Sum of elements in each column Ans:

13.   Write a Numpy program to extract all odd numbers from a 1-D array.

14.   Write a Numpy program to convert a 1D array into a 2D array with 3 rows.

15.   Write a Numpy program to replace all even numbers in an array with -3 and copy the contents to a new array. The original array shouldn't be modified.

16.   Find the output of following program.
import numpy as np d=np.array([10,20,30,40,50,60,70])
print(d[-4:])

17.   Write the output of the following code :
import numpy as np
array1=np.array([10,12,14,16,18,20,22])
array2=np.array([10,12,15,16,12,20,12])
a=(np.where(array1==array2))
print(array1[a])

18.   Given following ndarray
A:
([[2, 4, 6],
[7, 8, 9],
[1, 2, 3]])
Write the python statements to perform the array slices in the way so as to extract
(i) First row   (ii) Second Column

19.   Write python statement to create a two- dimensional array of 4 rows and 3 columns. The array should be filled with ones.

20.   Consider the ndarrays Arr1 and Arr2 .
Arr1= array([[0,1,2],
[3,4,5],
[6,7,8]])

Arr2= array([[10,20,30],
[40,50,60],
[70,80,90]])
What will be the resultant array, if the following statement is executed? np.hstack((Arr2,Arr1))

21.   Write python statement to create a one –dimensional array using arange() function .Elements will be in the range 10 to 30 with a step of 4 (including both 10 and 30). Reshape this one- dimensional array to two dimensional array of shape(2,3). Then display only those elements of this two –dimensional array which are divisible by 5.

22.   Write output of the following:
```
import numpy as np
a= np.array([[11,2,3,4],[10,20,30,40]])
print(a) print(a[1][2])
print(a[1,2])
```

23.   Find the output:
```
import numpy as np
a1=np.array([10,11,12,13])
a2=np.array([[2,4,6],[1,3,5]])
print(type(a1))
print(a1.shape)
print(a2.shape)
print(a1.dtype)
print(a1.itemsize)
```

24.   Find the output:
```
import numpy as np
a=np.array([[0,2,4,6],[8,10,12,14],[16,18,20,22],[24,26,28,30]])
print(a)
print(a[:3,3:])
print(a[1::2,:3])
print(a[-3:-1,-4::2])
print(a[::-1,::-1])
```

25.   Find the output:
```
import numpy as np
l1=[10,11,12] l2=[[1,2,3],[4,5,6]] l3=[[6],[7]]
a1=np.vstack((l1,l2))
print(a1)
```

```
print(a1.shape)
a2=np.hstack((l2,l3))
print(a2)
print(a2.shape)
```

26.   Find the output:
```
import numpy as np
a1=np.array([[1,2],[3,4]])
a2=np.array([[5,6],[7,8]])
a3=np.vstack((a1,a2))
print(a3)
a4=np.hstack((a1,a2))
print(a4)
```

27.   Find the output:
```
import numpy as np
a1=np.array([[1,2,3],[4,5,6],[7,8,9]])
a2=np.array([[11,12,13],[14,15,16]])
a3=np.concatenate((a1,a2),axis=0)
print(a3)
a3=np.concatenate((a1,a2),axis=None)
print(a3)
```

28.   Find the output:
```
import numpy as np
a=np.array([[1,2,3,4],[1,2,3,4],[1,2,3,4]])
print(a)
print(np.hsplit(a,2))
print(np.hsplit(a,4))
print(np.vsplit(a,3))
a1,a2=np.hsplit(a,2)
print(a1)
print(a2)
```

29.   Create a ndarray with values ranging from 10 to 49 each saved with a difference of 3.

30.   What is the output of following code? import numpy as np
```
a = np.array([[1,2],[3,4]], dtype=np.int32)
b = np.array([[5,6],[7,8]], dtype=np.int32)
print(np.add(a,b))
```

print(a+b)

31.   What will be the output:
import numpy as np
a = np.array([[1,2,3],[0,1,4]])
print (a.size)

32.   Write a program to create the two one dimensional random array of size 10 between the range of 1 to 10. Display the elements which are equal.

33.   Write a program to create the 4 X 4 NumPy array with random element between the ranges of 15 to 85. Extract the elements from the array containing elements whose square is fully divisible by 4.

34.   Predict the output of the following code fragments.
import numpy as np
A=np.array([[7,5], [1,6]])
X=np.array([[1,2],[8,9]])
print(np.vstack([A,X]))
print(np.hstack([A,X]))

35.   Write a Numpy program to create an array of 10 zeros, 10 ones and 10 fives. Modify the array by adding 10 nines in it.

36.   Fill in the blank with appropriate values to create a 3 X 3 numpy array having random numbers between 10 and 50.
import numpy as np
np.random.randint(,   , size=(3,3))

37.   Write a python program to create a 3 X 3 numpy array having 5's. Replace all the boundary elements with 0.

38.   Fill in the blank with appropriate values to create a 3 X 3 numpy array having numbers between 10 and 50.
import numpy as np
a = np.arange(,   ).reshape((3,3))

39.   Write the output of the following code :
A = np.ones(3)*1
B = np.ones(3)*2 print(np.divide(A,B))
print(A)

print(B)

40.   Write a python program to
(i)   Create two 3 X 3 numpy array having random numbers from 0 to 10.
(ii)   Stack them in such a way that resultant array will have 6 row and columns.
(iii) Display the number of elements in the final array.

41.   Predict the output of the following code fragment:
x=[1,2,3,99,99,3,2,1]
x1,x2,x3=np.split(x,[3,5])
print(x1,x2,x3)