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PRACTICAL 2 :

Write programs in Python using NumPy library to do the following:

```
import numpy as np
```

a) Compute the mean, standard deviation, and variance of a two dimensional random integer array along the second axis.

```
import numpy as np

arr=np.random.randint(21,size=(4,3))
print("Random array : ")
print(arr)
arr_mean=arr.mean(axis=1)
print("Mean along second axis : ",arr_mean)
arr_std_dev=arr.std(axis=1)
print("Standard deviation along second axis : ",arr_std_dev)
arr_var=arr.var(axis=1)
print("Variance along second axis : ",arr_var)
```

```
Random array :
[[ 6  5 18]
 [ 9  5 13]
 [ 3  9 11]
 [16 14 15]]
Mean along second axis :  [ 9.66666667  9.          7.66666667 15.        ]
Standard deviation along second axis :  [5.90668172 3.26598632 3.39934634 0.81649658]
Variance along second axis :  [34.88888889 10.66666667 11.55555556  0.66666667]
```

b) Get the indices of the sorted elements of a given array.

a. B = [56, 48, 22, 41, 78, 91, 24, 46, 8, 33]

```
B=np.array([56,48,22,41,78,91,24,46,8,33])
B.argsort()
```

```
array([8, 2, 6, 9, 3, 7, 1, 0, 4, 5], dtype=int32)
```

c) Create a 2-dimensional array of size m x n integer elements, also print the shape, type and data type of the array and then reshape it into nx m array, n and m are user inputs given at the run time.

```
import numpy as np

row=int(input("Enter no of rows(m) : "))
col=int(input("Enter no of col(n) : "))

array=np.random.randint(100,size=(row,col))
print("__Random 2d array__\n\n",array,"\n\n")

print("Shape of the array : ",np.shape(array))

print("Type of the array : ",type(array))

print("Data type of the array : ",array.dtype)

print("__Reshaped array (n)X(m)__ : ",col,"X",row)
print(array.reshape(col,row))
```

```
= RESTART: C:/Users/HP/py/py.py
Enter no of rows(m) : 4
Enter no of col(n) : 3
__Random 2d array__

 [[57 66 68]
 [79 38 37]
 [32 24 69]
 [38 96 15]]


Shape of the array :  (4, 3)
Type of the array :  <class 'numpy.ndarray'>
Data type of the array :  int32
__Reshaped array (n)X(m)__ :  3 X 4
[[57 66 68 79]
 [38 37 32 24]
 [69 38 96 15]]
```

d) Test whether the elements of a given array are zero, non-zero and NaN. Record the indices of these elements in three separate arrays.

```
import numpy as np

ar=np.array([[4,8,0],[np.nan,3,4],[np.nan,4,2],[3,np.nan,0]])
print(ar)

r=np.argwhere(np.isnan(ar))
print("\n")
print(r)
print("\n")

r=np.argwhere(ar==0)
print(r)
print("\n")

r=np.argwhere(ar)
print(r)
print("\n")
```

```
[[ 4.  8.  0.]
 [nan  3.  4.]
 [nan  4.  2.]
 [ 3. nan  0.]]


[[1 0]
 [2 0]
 [3 1]]


[[0 2]
 [3 2]]


[[0 0]
 [0 1]
 [1 0]
 [1 1]
 [1 2]
 [2 0]
 [2 1]
 [2 2]
 [3 0]
 [3 1]]
```