**Question 1: Create a 4X2 integer array and Prints its attributes**

**Note:** The element must be a type of unsigned int16. And print the following Attributes: –

* The shape of an array.
* Array dimensions.
* The Length of each element of the array in bytes.

Expected Output:

Printing Array

[[64392 31655]

[32579 0]

[49248 462]

[ 0 0]]

Printing numpy array Attributes

1> Array Shape is: (4, 2)

2>. Array dimensions are 2

3>. Length of each element of array in bytes is 2

**Solution**:

import numpy

firstArray = numpy.empty([4,2], dtype = numpy.uint16)

print("Printing Array")

print(firstArray)

print("Printing numpy array Attributes")

print("1> Array Shape is: ", firstArray.shape)

print("2>. Array dimensions are ", firstArray.ndim)

print("3>. Length of each element of array in bytes is ", firstArray.itemsize)

[Show Solution](javascript:;)

**Question 2: Create a 5X2 integer array from a range between 100 to 200 such that the difference between each element is 10**

Expected Output:

Creating 5X2 array using numpy.arange

[[100 110]

[120 130]

[140 150]

[160 170]

[180 190]]

**Solution**:

import numpy

print("Creating 5X2 array using numpy.arange")

sampleArray = numpy.arange(100, 200, 10)

sampleArray = sampleArray.reshape(5,2)

print (sampleArray)

[Show Solution](javascript:;)

**Question 3: Following is the provided numPy array. return array of items in the third column from all rows**

import numpy

sampleArray = numpy.array([[11 ,22, 33], [44, 55, 66], [77, 88, 99]])

Expected Output:

Printing Input Array

[[11 22 33]

[44 55 66]

[77 88 99]]

Printing array of items in the third column from all rows

[22 55 88]

**Solution**:

import numpy

sampleArray = numpy.array([[11 ,22, 33], [44, 55, 66], [77, 88, 99]])

print("Printing Input Array")

print(sampleArray)

print("\n Printing array of items in the third column from all rows")

newArray = sampleArray[...,1]

print(newArray)

[Show Solution](javascript:;)

**Question 4: Following is the given numpy array return array of odd rows and even columns**

import numpy

sampleArray = numpy.array([[3 ,6, 9, 12], [15 ,18, 21, 24],

[27 ,30, 33, 36], [39 ,42, 45, 48], [51 ,54, 57, 60]])

Expected Output:

Printing Input Array

[[ 3 6 9 12]

[15 18 21 24]

[27 30 33 36]

[39 42 45 48]

[51 54 57 60]]

Printing array of odd rows and even columns

[[ 6 12]

[30 36]

[54 60]]

**Solution**:

import numpy

sampleArray = numpy.array([[3 ,6, 9, 12], [15 ,18, 21, 24],

[27 ,30, 33, 36], [39 ,42, 45, 48], [51 ,54, 57, 60]])

print("Printing Input Array")

print(sampleArray)

print("\n Printing array of odd rows and even columns")

newArray = sampleArray[::2, 1::2]

print(newArray)

[Show Solution](javascript:;)

**Question 5: Add the following two NumPy arrays and Modify a result array by calculating the square root of each element**

import numpy

arrayOne = numpy.array([[5, 6, 9], [21 ,18, 27]])

arrayTwo = numpy.array([[15 ,33, 24], [4 ,7, 1]])

Expected Output:

addition of two arrays is

[[20 39 33]

[25 25 28]]

Result array after calculating the square root of all elements

[[ 400 1521 1089]

[ 625 625 784]]

**Solution**:

import numpy

arrayOne = numpy.array([[5, 6, 9], [21 ,18, 27]])

arrayTwo = numpy.array([[15 ,33, 24], [4 ,7, 1]])

resultArray = arrayOne + arrayTwo

print("addition of two arrays is \n")

print(resultArray)

for num in numpy.nditer(resultArray, op\_flags = ['readwrite']):

num[...] = num\*num

print("\nResult array after calculating the square root of all elements\n")

print(resultArray)

[Show Solution](javascript:;)

**Question 6: Split the array into four equal-sized sub-arrays**

**Note**: Create an 8X3 integer array from a range between 10 to 34 such that the difference between each element is 1 and then Split the array into four equal-sized sub-arrays.

Expected Output:

Creating 8X3 array using numpy.arange

[[10 11 12]

[13 14 15]

[16 17 18]

[19 20 21]

[22 23 24]

[25 26 27]

[28 29 30]

[31 32 33]]

Dividing 8X3 array into 4 sub array

[array([[10, 11, 12],[13, 14, 15]]),

array([[16, 17, 18],[19, 20, 21]]),

array([[22, 23, 24],[25, 26, 27]]),

array([[28, 29, 30],[31, 32, 33]])]

**Solution**:

import numpy

print("Creating 8X3 array using numpy.arange")

sampleArray = numpy.arange(10, 34, 1)

sampleArray = sampleArray.reshape(8,3)

print (sampleArray)

print("\nDividing 8X3 array into 4 sub array\n")

subArrays = numpy.split(sampleArray, 4)

print(subArrays)

[Show Solution](javascript:;)

**Question 7; Sort following NumPy array**

* 7.1- by the second row and
* 7.2-by the second column

import numpy

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

Expected Output:

Printing Original array

[[34 43 73]

[82 22 12]

[53 94 66]]

Sorting Original array by secoond row

[[73 43 34]

[12 22 82]

[66 94 53]]

Sorting Original array by secoond column

[[82 22 12]

[34 43 73]

[53 94 66]]

**Solution**:

import numpy

print("Printing Original array")

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

print (sampleArray)

sortArrayByRow = sampleArray[:,sampleArray[1,:].argsort()]

print("Sorting Original array by secoond row")

print(sortArrayByRow)

print("Sorting Original array by secoond column")

sortArrayByColumn = sampleArray[sampleArray[:,1].argsort()]

print(sortArrayByColumn)

[Show Solution](javascript:;)

**Question 8: Following is the 2-D array. Print max from axis 0 and min from axis 1**

import numpy

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

Expected Output:

Printing Original array

[[34 43 73]

[82 22 12]

[53 94 66]]

Printing amin Of Axis 1

[34 12 53]

Printing amax Of Axis 0

[82 94 73]

**Solution**:

import numpy

print("Printing Original array")

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

print (sampleArray)

minOfAxisOne = numpy.amin(sampleArray, 1)

print("Printing amin Of Axis 1")

print(minOfAxisOne)

maxOfAxisOne = numpy.amax(sampleArray, 0)

print("Printing amax Of Axis 0")

print(maxOfAxisOne)

[Show Solution](javascript:;)

**Question 9: Following is the input NumPy array delete column two and insert following new column in its place.**

import numpy

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

newColumn = numpy.array([[10,10,10]])

Expected Output:

Printing Original array

[[34 43 73]

[82 22 12]

[53 94 66]]

Array after deleting column 2 on axis 1

[[34 73]

[82 12]

[53 66]]

Array after inserting column 2 on axis 1

[[34 10 73]

[82 10 12]

[53 10 66]]

**Solution**:

import numpy

print("Printing Original array")

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

print (sampleArray)

print("Array after deleting column 2 on axis 1")

sampleArray = numpy.delete(sampleArray , 1, axis = 1)

print (sampleArray)

arr = numpy.array([[10,10,10]])

print("Array after inserting column 2 on axis 1")

sampleArray = numpy.insert(sampleArray , 1, arr, axis = 1)

print (sampleArray)

[Show Solution](javascript:;)

**Question 10: Create a two 2-D array and Plot it using matplotlib**

**Solution**: