



## COURSE - 3 PYTHON PROGRAMMING

### UNIT-3 Numpy

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#### **\*\*Lab exercise to practice \*\***

**It is important to note that these are not internal or final assessments, and learners are encouraged to practice in class, ask any questions they may have, and seek help from staff on the ground.**

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1. How do you install NumPy using pip?
2. Write a Python code to import NumPy as np.
3. Create a 1-D NumPy array from a Python list **[1, 2, 3, 4, 5]**.
4. How can you create a 2-D NumPy array with the elements **[[1, 2, 3], [4, 5, 6]]**?
5. Write a code snippet to generate a 3-D NumPy array.
6. How do you create a NumPy array with a specified number of dimensions using the **ndmin** parameter?
7. Demonstrate how to create a random 2-D NumPy array.
8. How can you create a NumPy array of zeros with a specified shape?
9. Explain how to create a NumPy array of ones.
10. What is the method to create an empty NumPy array?
11. Show how to create a NumPy array with a range of elements using **np.arange**.
12. How do you create a NumPy array with evenly spaced intervals using **np.linspace**?
13. What is the output of **np.array([[1, 2, 3], [4, 5, 6]]).shape**?
14. How can you find the total number of elements in a NumPy array?
15. Explain how to get the number of dimensions of a NumPy array.
16. Write a code snippet to change the data type of a NumPy array to **float64**.
17. Convert the data type of a NumPy array to an integer?
18. Find the minimum and maximum values in a NumPy array **[3, 7, 1, 8, 4, 6, 0, 2, 5]**.
19. Demonstrate how to reshape a NumPy array.



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20. How can you split a NumPy array into three equal parts?
21. Explain horizontal and vertical splitting of NumPy arrays.
22. How do you add a new dimension to a 1-D NumPy array?
23. Write a code to flatten a 2-D NumPy array.
24. Demonstrate how to sort a NumPy array.
25. Show how to concatenate two NumPy arrays.
26. Write a code snippet for element-wise addition of two NumPy arrays.
27. How can you perform element-wise exponentiation of a NumPy array?
28. Calculate the sum, mean, and median of a NumPy array **[1, 2, 3]**.
29. Demonstrate how matrix multiplication works in NumPy.
30. Demonstrate the transposition of a matrix in NumPy.
31. What is the purpose of the **np.dot** function in NumPy?
32. How can you invert a matrix using NumPy?
33. Demonstrate how to perform linear algebra operations, like matrix multiplication, using NumPy.
34. How do you handle missing values in a NumPy array?
35. Explain the use of the **np.where** function in NumPy.
36. Show how to perform element-wise multiplication of two NumPy arrays.
37. How can you calculate both the mean and median of each row in a 2-D NumPy array?
38. How can you calculate the standard deviation of a NumPy array?
39. Explain the difference between shallow copy (**view**) and deep copy (**copy**) in NumPy.
40. Demonstrate how to use slicing to extract a sub-array from a NumPy array.
41. How do you find the index of a specific value in a NumPy array?
42. Show how to slice elements from the start to a specific index in a NumPy array.
43. How to select every nth element in a NumPy array.
44. Demonstrate how to extract a specific column from a 2-D NumPy array.
45. How can you reverse the rows of a 2-D NumPy array?
46. Show how to extract a diagonal from a 2-D NumPy array.



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47. Explain slicing with boolean arrays in NumPy.
48. How do you select elements based on condition (e.g., all elements greater than a value)?
49. Demonstrate how to slice a 3-D NumPy array.
50. Show how to extract specific rows from a 2-D array based on a condition.
51. Explain the common mistakes to avoid when broadcasting arrays in NumPy.
52. Demonstrate the use of logical operations (like **and**, **or**, **not**) on NumPy arrays.
53. How do you perform element-wise division between two NumPy arrays?
54. Explain the functionality of the **np.unique** function.
55. Show how to compute the correlation coefficient of two NumPy arrays.
56. How do you iterate over each element in a NumPy array?
57. Array Linear Spacing: Generate an array of 20 elements linearly spaced between 5 and 15.
58. Manhattan Distance: Write a function to compute the Manhattan distance between two 1D arrays, **array1** and **array2**, of equal length.
59. Flatten Array: Flatten a given 3x3 2D array into a 1D array.
60. NaN Check: Write a script to create an array and then check if it contains any NaN values.
61. Array Rank Determination: Determine the rank of a given 4x4 matrix.
62. Descending Sort: Sort the elements of a given 1D array in descending order.
63. 3D Array Slicing: Slice a 3x3x3 array to extract a 2x2x2 sub-array from its corner.
64. Median Calculation: Calculate the median of a given 1D array without using NumPy's median function.
65. Array Concatenation: Concatenate two given 2D arrays of the same shape along the second axis.