

# NumPy - 65 Important Coding Questions (Basic to Advanced)

## BASIC LEVEL (15 Questions)

1. Create a 1D NumPy array from a Python list and print its data type.
2. Create a 2D NumPy array of shape (3,3) with values from 1 to 9.
3. Create an array of 10 zeros and an array of 10 ones.
4. Create an array of 10 random integers between 1 and 100.
5. Create an array of 10 evenly spaced values between 0 and 1.
6. Find the shape, size, and dimensions (ndim) of a given NumPy array.
7. Reshape a 1D array of 12 elements into a 3x4 matrix.
8. Access the element at the 2nd row and 3rd column of a 2D array.
9. Slice a 1D array to extract every second element.
10. Reverse the elements of a 1D array without using loops.
11. Find the maximum, minimum, mean, and standard deviation of an array.
12. Replace all even numbers in an array with -1.
13. Create an identity matrix of size 5x5.
14. Convert a Python list of lists into a NumPy array.
15. Check if two arrays are equal element-wise.

## INTERMEDIATE LEVEL (20 Questions)

16. Add, subtract, and multiply two NumPy arrays element-wise.
17. Perform matrix multiplication using NumPy.
18. Flatten a 2D array into a 1D array.
19. Stack two arrays vertically and horizontally.
20. Split a NumPy array into equal parts.
21. Create a diagonal matrix from a 1D array.
22. Replace all values greater than 50 with 50 in an array.
23. Extract all even numbers from an array.
24. Find the unique elements and their counts in a NumPy array.
25. Generate a random 3x3 matrix and normalize it (values between 0 and 1).
26. Compute the sum of all elements, along rows, and along columns.
27. Sort a NumPy array along different axes.

28. Find the index of the maximum and minimum values in an array.
29. Create a boolean mask for values greater than the mean of the array.
30. Convert a NumPy array into a Python list and vice versa.
31. Replace NaN values in an array with 0 using `np.nan_to_num()`.
32. Create a 4x4 matrix and swap its first and last rows.
33. Find the dot product and cross product of two vectors.
34. Calculate Euclidean distance between two NumPy arrays.
35. Extract the diagonal elements of a 2D matrix.

### **ADVANCED LEVEL (25 Questions)**

36. Create a checkerboard (chessboard) pattern 8x8 using 0s and 1s.
37. Generate a random matrix and find all elements greater than a threshold using `np.where()`.
38. Create a 5x5 matrix with row values ranging from 0 to 4.
39. Normalize each row of a 2D array so that the sum of each row = 1.
40. Find the most frequent value (mode) in a NumPy array.
41. Compute the correlation coefficient matrix of two arrays.
42. Replace all negative numbers in an array with 0.
43. Get all non-zero elements' indices using `np.nonzero()`.
44. Generate a random array and clip its values between 10 and 50.
45. Convert an array of Fahrenheit temperatures to Celsius.
46. Multiply a 5x3 matrix by a 3x2 matrix using broadcasting.
47. Read a CSV file into a NumPy array using `np.genfromtxt()`.
48. Generate a 1D array of 1 million elements and find its mean efficiently.
49. Compare the speed of a Python list and NumPy array for element-wise addition.
50. Find the determinant and inverse of a 3x3 matrix using NumPy.
51. Perform element-wise comparison of two arrays using broadcasting.
52. Generate a random 3D array and compute the mean along each axis.
53. Replace values in an array based on multiple conditions using `np.select()`.
54. Create a structured NumPy array with columns "name", "age", and "score".
55. Compute the cumulative sum and cumulative product of an array.
56. Generate a random matrix and find its eigenvalues and eigenvectors.
57. Simulate rolling a dice 1000 times and find the frequency of each number.
58. Create a 5x5 matrix with 1s on the border and 0s inside.
59. Extract all prime numbers from a given NumPy array.
60. Write a NumPy program to compute the matrix rank.

## **BONUS (Interview-style Practical Tasks)**

61. Given a temperature dataset, find days with above-average temperature.
62. Given a sales dataset (NumPy array), find the top 3 highest sales days.
63. Implement a function to normalize any numeric NumPy array.
64. Write a program to compute cosine similarity between two NumPy vectors.
65. Write a program to find the missing number in a given NumPy sequence.