**Numpy Test Paper**

1. Explain the difference between deep copy and shallow copy in NumPy arrays.
2. Explain the difference between array and list?
3. Given an array a = np.array([10, 20, 30]), how do you square every element in the array?
4. How do you create an array of zeros with shape (3, 4)?
5. Given the 1D array a = np.array([1, 2, 3, 4, 5]), how do you calculate the cumulative sum of the elements?
6. How do you reverse the elements in a NumPy array a = np.array([1, 2, 3, 4, 5])?
7. How do you find the indices of elements that are greater than 4 in the array a = np.array([1, 2, 3, 4, 5, 6, 7])?
8. How do you create a 2D array with random floating-point numbers between 0 and 1 of shape (3, 3)?
9. Extract the elements at indices [0, 2, 4] from the array a = np.array([10, 20, 30, 40, 50]).
10. Given the array a = np.array([10, 20, 30, 40]), how do you normalize the array so that its values are between 0 and 1?
11. How do you concatenate two arrays a = np.array([1, 2, 3]) and b = np.array([4, 5, 6]) along the first axis?
12. How do you find the dot product of two arrays a = np.array([1, 2, 3]) and b = np.array([4, 5, 6])?
13. How do you create an identity matrix of size 4x4?
14. How do you generate an array with random integers between 1 and 100, of shape (4, 4)?
15. How do you split a NumPy array a = np.array([1, 2, 3, 4, 5, 6]) into three sub-arrays?
16. Given the 2D array a = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]]), how do you compute the sum of all elements along the second axis?
17. How do you compute the element-wise maximum of two arrays a = np.array([1, 2, 3]) and b = np.array([3, 2, 1])?
18. How do you find the unique elements in the array a = np.array([1, 2, 2, 3, 3, 4, 5])?
19. How do you use np.arange to create an array of values between 1 and 50 with a step of 3, and then filter the elements that are divisible by 5?
20. Given the array a = np.array([1, 2, 3, 4, 5]) and b = np.array([6, 7, 8, 9, 10]), use np.where to replace elements in a that are less than 3 with -3, then horizontally stack a and b.
21. How do you generate a 3D array of shape (4, 3, 2) where each 2D slice (3x2) is filled with random values between 0 and 1, and then normalize the entire 3D array to values between 0 and 1 (with respect to the min and max of the array)?
22. Given a 2D array of shape (5, 5) filled with random integers between 1 and 100, replace all odd numbers with -1 and all even numbers with 1.
23. Given a large 1D array of 10 million random floating-point numbers between 0 and 1, find the 10th and 90th percentile of the values.
24. Given a 5x5 matrix arr, use np.where to:

* Replace all elements greater than 10 with the value 100.
* Replace all elements less than or equal to 10 with the value -100

1. **Given a 2D array arr = np.array([[1, 2, 3, 4], [5, 6, 7, 8], [9, 10, 11, 12]]), perform the following operations:**

* Horizontally split the array into two equal parts.
* Vertically split the array into three equal parts.
* Stack the split parts vertically and horizontally.