NumPy Array Indexing, Slicing, and Array Creation Practice Questions

1. Create a 1D NumPy array of numbers from 10 to 20. Extract:

- Elements at indices 2, 4, and 6.

- All elements except the last two.

- Elements from index 3 to 7.

2. Create a 2D array with shape (4, 5) using np.arange() and extract:

- The first row.

- The last column.

- The element at the 3rd row and 2nd column.

- A sub-array consisting of the first two rows and the last three columns.

3. Create a 3x3 array and set all elements in the first column to 0.

4. Reverse the order of elements in a 1D array [10, 20, 30, 40, 50].

5. Replace all odd numbers in a 1D array [1, 2, 3, 4, 5, 6] with -1.

6. Convert a Python list [5, 10, 15, 20] into a NumPy array using np.array() and np.asarray().

- Explain the difference between the two methods.

7. Create a 2D NumPy array from the nested list [[1, 2], [3, 4], [5, 6]].

8. If a NumPy array is created as x = np.array([10, 20, 30]), update the second element to 50 and print the array.

9. Demonstrate how np.asarray() handles changes made to the original data:

- Create a Python list, convert it to an array using np.asarray(), and modify the original list. Observe the changes in the NumPy array.

10. Use np.arange() to create:

- A 1D array of numbers from 0 to 10.

- A 1D array of even numbers from 2 to 20.

- A 1D array of numbers from 10 to 0 in reverse order.

11. Generate an array of values between 5 and 20 with a step size of 2 using np.arange().

12. Create a 2D array with shape (4, 4) using np.arange() and reshape it.

13. Generate 10 equally spaced values between 0 and 1 using np.linspace().

14. Create a NumPy array with 5 equally spaced points between 50 and 100 (inclusive).

15. Compare np.arange(1, 10, 2) and np.linspace(1, 10, 5) in terms of their output.

16. Generate an array of 5 logarithmically spaced values between 10^1 and 10^3 using np.logspace().

17. Create a NumPy array with 8 values spaced logarithmically between 10^0 and 10^2.

18. Demonstrate the difference between np.linspace() and np.logspace() with an example.

19. Create a 4x4 array using np.arange() and set the diagonal elements to 0.

20. Replace all elements greater than 5 in the array [1, 3, 5, 7, 9] with 0.

21. Combine np.linspace() and np.logspace() to create two arrays and stack them vertically.

22. Use slicing to modify a sub-array of a larger array. For example:

- Create a 5x5 array using np.arange().

- Replace the central 3x3 block with ones.