Lab: Exploring NumPy Arrays and Random Value Generation

Objective:

In this lab, you will practice working with NumPy arrays, subsetting, and generating random values using the `numpy.random` function. By completing these tasks, you will enhance your ability to manipulate arrays and perform basic operations on random datasets.

Instructions:

1. **Task 1: Creating a 1D NumPy Array**
   - Create a NumPy array containing the numbers from 1 to 30.
   - Print the array and its shape.
   - Access and print the element at index 10.
2. **Task 2: Creating a 2D NumPy Array**
   - Reshape the 1D array from Task 1 into a 2D array of shape (6, 5).
   - Print the entire 2D array.
   - Access and print the element at row 3, column 4.
3. **Task 3: Subsetting a 2D Array**
   - Extract and print the third row from the 2D array created in Task 2.
   - Extract and print the first two rows and the last three columns.
4. **Task 4: Generating Random Integer Array**
   - Use the `numpy.random` module to generate a 1D array of 15 random integers between 10 and 100.
   - Print the array and find its maximum and minimum values.
5. **Task 5: Generating a 2D Random Array**

- Generate a 2D array of shape (4, 4) with random integers between 0 and 50.
- Print the array and find the sum of all the elements in the array.

6. **Task 6: Manipulating Arrays**
    - Create a 2D array of random integers (shape 5, 5) between 1 and 20.
    - Print the array.
    - Set all values in the second row to 0.
    - Replace all values greater than 10 with the value 99.
7. **Task 7: Arithmetic Operations on Arrays**
    - Create two 1D arrays of length 5 with random integers between 1 and 10.
    - Perform element-wise addition, subtraction, and multiplication on the two arrays.
    - Print the results.
8. **Task 8: Broadcasting in NumPy**
    - Create a 1D array of length 4 with values [2, 4, 6, 8].
    - Create a 2D array of shape (3, 4) with random integers between 1 and 5.
    - Add the 1D array to each row of the 2D array using broadcasting, then print the result.
9. **Task 9: Filtering an Array**
    - Generate a 1D array of 20 random integers between 1 and 100.
    - Print all elements of the array that are greater than 50.
    - Replace all values less than 30 with -1 and print the modified array.
10. **Task 10: Reshaping Arrays**
    - Create a 1D array of 12 random integers between 1 and 50.
    - Reshape the array into a 3×4 2D array.
    - Transpose the array (swap rows and columns) and print the result.

Submission Guidelines:

- Ensure your code is well-structured and commented.
- Submit your completed Python script by the end of the session.
- Optional: Attempt additional improvements or experiments with the tasks.
