**Assignment - 23**

Q1. What are the benefits of the built-in array package, if any?

Ans: The built-in array package offers efficient storage and manipulation of homogeneous data elements, providing better performance compared to standard Python lists, especially for numerical computations and data processing tasks.

Q2. What are some of the array package's limitations?

Ans: Some limitations of the array package include its inability to handle heterogeneous data types, lack of built-in support for advanced numerical operations, and limited functionality compared to more comprehensive libraries like NumPy.

Q3. Describe the main differences between the array and numpy packages.

Ans: The main differences between the array and numpy packages lie in their functionality and features. Numpy is a powerful library for numerical computing with support for multidimensional arrays, mathematical operations, linear algebra, random number generation, and more, while the built-in array package is more basic and limited in scope, primarily focused on one-dimensional arrays of homogeneous data types.

Q4. Explain the distinctions between the empty, ones, and zeros functions.

Ans: The empty function creates a new array with uninitialized values, the ones function creates an array filled with ones, and the zeros function creates an array filled with zeros, all with specified shapes and data types.

Q5. In the fromfunction function, which is used to construct new arrays, what is the role of the callable argument?

Ans: In the fromfunction function, the callable argument defines a function that computes the value for each element of the new array based on its indices.

Q6. What happens when a numpy array is combined with a single-value operand (a scalar, such as an int or a floating-point value) through addition, as in the expression A + n?

Ans: When a numpy array is combined with a single-value operand through addition, each element of the array is incremented by the scalar value. Similarly, for multiplication, each element of the array is multiplied by the scalar value.

Q7. Can array-to-scalar operations use combined operation-assign operators (such as += or \*=)? What is the outcome?

Ans: Yes, array-to-scalar operations can use combined operation-assign operators like += or \*=. The outcome is that each element of the array is modified according to the specified operation.

Q8. Does a numpy array contain fixed-length strings? What happens if you allocate a longer string to one of these arrays?

Ans: No, numpy arrays do not inherently contain fixed-length strings. If you allocate a longer string to one of these arrays, it may result in truncation or unexpected behavior.

Q9. What happens when you combine two numpy arrays using an operation like addition (+) or multiplication (\*)? What are the conditions for combining two numpy arrays?

Ans: When you combine two numpy arrays using operations like addition (+) or multiplication (\*), the arrays are combined element-wise. The conditions for combining two numpy arrays are that they must have compatible shapes or one of them must be a scalar value.

Q10. What is the best way to use a Boolean array to mask another array?

Ans: When you combine two numpy arrays using operations like addition (+) or multiplication (\*), the arrays are combined element-wise. The conditions for combining two numpy arrays are that they must have compatible shapes or one of them must be a scalar value.

Q11. What are three different ways to get the standard deviation of a wide collection of data using both standard Python and its packages? Sort the three of them by how quickly they execute.

Ans: Three different ways to get the standard deviation of a wide collection of data include using NumPy's numpy.std() function, Pandas' DataFrame.std() method, and the built-in statistics module's statistics.stdev() function. Among these, NumPy's numpy.std() function is typically the fastest.

12. What is the dimensionality of a Boolean mask-generated array?

Ans: The dimensionality of a Boolean mask-generated array is typically one, as it is created to index or filter elements from another array along a single dimension. However, depending on the original array's dimensionality, the resulting mask-generated array may have the same or reduced dimensionality.