Tutorial 8

You will be expected to engage with the tutor and discuss solutions to the problems presented here. The content covered in the tutorials will assist in your understanding of the practical requirements for the checkpoints.

Array Concepts

1. Which of the following are valid declarations? Which instantiates an array object? Explain your answers.

i. `int primes = {2, 3, 4, 5, 7, 11};`

ii. `float elapsedTimes[] = {11.47, 12.04, 11.72, 13.88};`

iii. `int[] scores = int[30];`

iv. `int[] primes = new {2,3,5,7,11};`

v. `int[] scores = new int[30];`

vi. `char grades[] = {'a', 'b', 'c', 'd', 'f'};`

vii. `char[] grades = new char[];`

2. Describe the problem with the following code extract. What modifications should be made to eliminate the problem?

```
int[] numbers = {3, 2, 3, 6, 9, 10, 12, 32, 3, 12, 6};

for (int count = 1; count <= numbers.length; count++)
  System.out.println (numbers[count]);
```

3. Write an array declaration and any necessary supporting classes to represent the following statements:

i. students' names for a tutorial class of 25 students.

ii. students' test grades for a tutorial class of 40 students.

iii. credit-card transactions that contain a transaction number, the merchant name, and a charge amount.

iv. students' names for a tutorial class and homework grades for each student.

v. for each employee of the L&L International Corporation: the employee number, hire date, and the amount of the last five pay rises.

4. Write code that prints the values stored in an array called `names` backwards.

5. Write code that sets each element of a boolean array called `flags` to alternating values (`true` at index 0, `false` at index 1, etc.).

6. Write a method called `sumArray` that accepts an array of floating point values and returns the sum of the values stored in the array.

7. Write a method called `switchThem` that accepts two integer arrays as parameters and switches the contents of the arrays. You should check the size of the arrays before switching and only attempt to swap them if they are the same size; if they are different sizes, output an appropriate message instead.

8. Write a method called `containsPair` that accepts an array of integers as a parameter and returns `true` if it contains two integers that are equal or `false` otherwise.

9. Write the declaration for an array of `doubles` called **`averages`** that is initialised with an initialiser list (pick any values you like).

10. Write the declaration for a two-dimensional array of integers that can be thought of as a table with three rows and three columns. Assign the value 3 to the cell that is in the second row and the third column.

11. Write a method that accepts an array of integers as a parameter and returns a reference to an array that contains the even numbers in the original array. The returned array should have a size equal to the number of even numbers in the original array.

12. Write a program that computes and prints the mean and standard deviation of a list of integers x_1 through x_n. Assume that there will be no more than 50 input values. Compute both the mean and standard deviation as floating point values using the following formulas:

$$mean = \frac{\sum_{i=1}^{n} X_i}{n}$$

$$sd = \sqrt{\frac{\sum_{i=1}^{n} (X_i - mean)^2}{n-1}}$$