Loop Problems 3

Provide solutions to each of the problems below.

1. A bacteriologist determines that the approximate final population of bacteria present in a culture after time (in days) is given by the following formula:

$$FinalPopulation = InitialPopulation \times e^{(GrowthRate \times Time)}$$

Where `InitialPopulation` is the number present at the beginning of the observation period (**Note**: `InitialPopulation` does not change its value). Let the user input the `InitialPopulation`, which is the number of bacteria present at the beginning of the trial and the `GrowthRate` (as a percentage). Then compute the number of bacteria in the culture after each day for the first 10 days (Time will have values 1 through 10). Do this in a loop so the user can see the results in a table (properly format your table with column headers and a title). The output table should have headings for Day and Number of Bacteria Present (on that day).

NOTE: The number **e** is a mathematical constant that is the base of the **natural logarithm**. It is approximately equal to 2.71828 and is available in the C# Math library (`Math.E`).

2. Write a program that will prompt the user for a string (could be anything), and then prompts the user for a single character. The program should then display a count of the number of times the character entered appears in the string.

3. Write a program for an Internet service provider so they can calculate how much to bill their customers. The provider offers customers 3 packages:

PACKAGE	COST CALCULATION
A	$9.95 per month for 10 hours; additional hours are billed at $2.00 per hour
B	$13.95 per month for 20 hours; additional hours are billed at $1.00 per hour
C	$19.95 per month of unlimited hours

The program should prompt for the letter of the service package (A, B, or C) and the number of hours they have used. The program should then display the total amount billed. The program should allow for multiple bills to be processed (i.e., use a loop).