

## Loop Problems 3

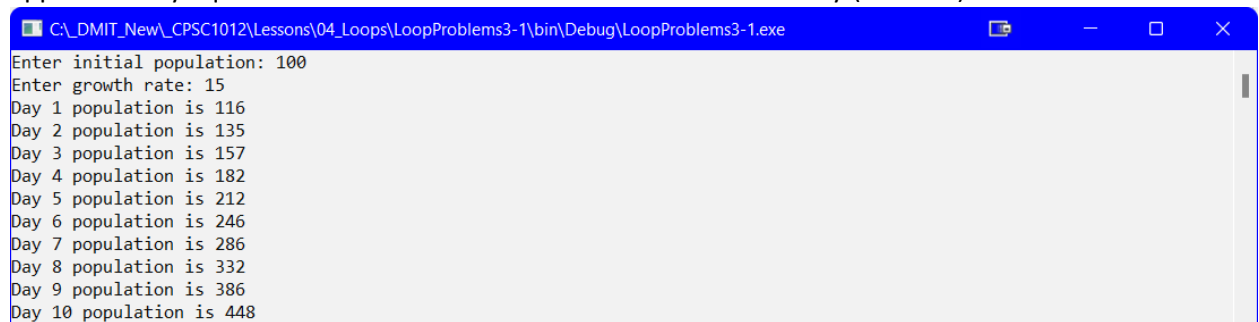
Provide solutions to each of the problems below.

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:

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

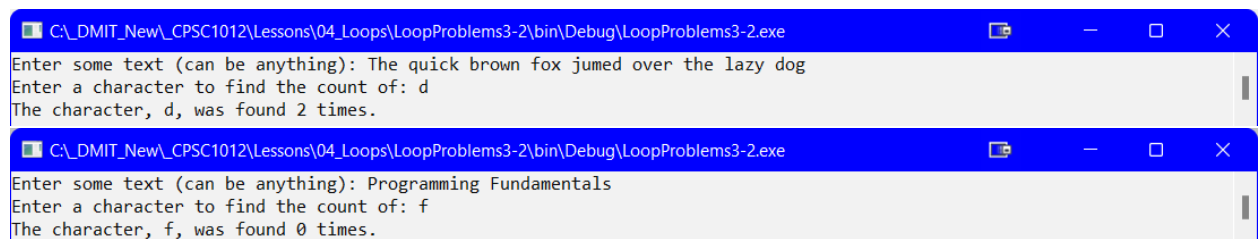
Where InitialPopulation is the number present at the beginning of the observation period (**Note:** InitialPopulation does not change its value). Let the user input the InitialPopulation, which is the number of bacteria present at the beginning of the trial and the GrowthRate (as a percentage). Then 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).



```
C:\DMIT_New\CPSC1012\Lessons\04_Loops\LoopProblems3-1\bin\Debug\LoopProblems3-1.exe
Enter initial population: 100
Enter growth rate: 15
Day 1 population is 116
Day 2 population is 135
Day 3 population is 157
Day 4 population is 182
Day 5 population is 212
Day 6 population is 246
Day 7 population is 286
Day 8 population is 332
Day 9 population is 386
Day 10 population is 448
```

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.



```
C:\DMIT_New\CPSC1012\Lessons\04_Loops\LoopProblems3-2\bin\Debug\LoopProblems3-2.exe
Enter some text (can be anything): The quick brown fox jumped over the lazy dog
Enter a character to find the count of: d
The character, d, was found 2 times.

C:\DMIT_New\CPSC1012\Lessons\04_Loops\LoopProblems3-2\bin\Debug\LoopProblems3-2.exe
Enter some text (can be anything): Programming Fundamentals
Enter a character to find the count of: f
The character, f, was found 0 times.
```

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).

```
C:\DMIT_New\CPSC1012\Lessons\04_Loops\LoopProblems3-3\bin\Debug\LoopProblems3-3.exe
Select the service package from the options below:
  A - $9.95 per month for up to 10 hours; additional hours are billed at $2.00 per hour
  B - $13.95 per month for up to 20 hours; additional hours are billed at $1.00 per hour
  C - $19.95 per month for unlimited hours
Option: a
Enter hours used: 15
The bill is $19.95

Another Package (Y): y
Select the service package from the options below:
  A - $9.95 per month for up to 10 hours; additional hours are billed at $2.00 per hour
  B - $13.95 per month for up to 20 hours; additional hours are billed at $1.00 per hour
  C - $19.95 per month for unlimited hours
Option: b
Enter hours used: 23
The bill is $16.95

Another Package (Y): y
Select the service package from the options below:
  A - $9.95 per month for up to 10 hours; additional hours are billed at $2.00 per hour
  B - $13.95 per month for up to 20 hours; additional hours are billed at $1.00 per hour
  C - $19.95 per month for unlimited hours
Option: c
The bill is $19.95

Another Package (Y): n
```