CS101- Algorithms and Programming I

Lab 06

Lab Objectives: Static methods.

- ❏ For all labs in CS 101, your solutions must conform to these CS101 style guidelines (rules!)
- ❏ Create a Lab06 workspace (i.e. the folder H:\private\cs101\lab06). This assignment has parts a, b, c each of which should be placed in a separate project within the same Lab06 workspace.

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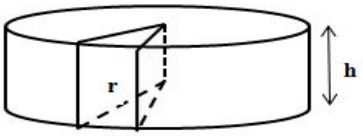
a. Create a new project Lab06a. Write a Java program that computes the volume of one slice of a birthday cake. The program first inputs two integers from the user, the radius of the cake (r) and the height of the cake (h). The program will compute and output the volume of a slice, based on the number of people (n).

Repeatedly ask the user the number of people and calculate the volume of a slice until the user enters 0.



Your program must include a static method that computes and returns the volume of one slice (double) given the height and radius of the cake and the number of people as parameters.
The volume of a cylinder is calculated using the following formula:

$$V = \pi r^2 h$$

Hint: Math class has a constant: Math.PI.

Sample run is shown below:

```
> run Lab06a
Enter radius of the cake: 4
Enter height of the cake: 2
Enter number of people: 5
Number of people is 5. Volume of a slice is 20.106192982974676

Enter number of people: 8
Number of people is 8. Volume of a slice is 12.566370614359172

Enter number of people: 1
Number of people is 1. Volume of a slice is 100.53096491487338

Enter number of people: 0
>
```

b. Create a new project Lab06b. Write a Java program that inputs a string containing only the letters {a, b, c, d}. The program will compute and output the number of substring "bc"s. Then it splits the string from the first occurrence of "bc". If the string doesn't contain any "bc"s, the program prints "The string doesn't contain any substring "bc"s!".

Your program must include two static methods:

- one that computes and returns number of a given SUB_SEQUENCE in the string passed as parameter.
- one that splits the string from the first occurrence of the SUB_SEQUENCE into two parts and displays them.

Notes:

- Define a private global constant string, SUB_SEQUENCE that stores the String "bc".
- You can only use the following `String` class methods: `length()`, `equals()`, `charAt()`, `indexOf()`, `substring()`.

Sample runs:

```
> run Lab06b
Enter the sequence : acacbcac
The number of "bc"s in the sequence : 1
First part of string is acac
Second part of string is ac
> run Lab06b
Enter the sequence : acacbcacccbc
The number of "bc"s in the sequence : 2
First part of string is acac
Second part of string is acccbc
> run Lab06b
Enter the sequence : acacbcacccbcaabcaabc
The number of "bc"s in the sequence : 4
First part of string is acac
Second part of string is acccbcaabcaabc
> run Lab06b
Enter the sequence : bcacacbcacccbcaabcaa
The number of "bc"s in the sequence : 4
First part of string is
Second part of string is acacbcacccbcaabcaa
> run Lab06b
Enter the sequence : acacaa
The string doesn't contain any substring "bc"s!
>
```

c. Create a new project Lab06c. Write a Java program that simulates a die rolling game. The program inputs the total money from the user (integer). At each time, user makes a prediction of "even" or "odd" for the face value of the rolled die, and bets some money in that prediction. If the program rolls a die whose category (even or odd) is predicted by the user, he/she wins 50% of his/her bet. If the prediction is wrong, he/she loses 25% of his/her bet. The bet must be smaller than or equal to the current total money. If not, print "Your money is not enough!" and ask the bet from user again. The program terminates when the user enters 0 or the user does not have any more money to bet.

Your program must include a static method that rolls the die, computes and returns the gain according to the face value of the die, given the prediction and the bet as parameters.

Sample run:

```
> run Lab06c
Enter your total money: 90
Enter prediction (1 for ODD, 2 for EVEN): 2
Enter the amount of money you want to bet: 100
Your money is not enough!
Enter the amount of money you want to bet: 40
The value of the die is 6
Your total money is 110.0
**************************************
Enter prediction (1 for ODD, 2 for EVEN): 2
Enter the amount of money you want to bet: 30
The value of the die is 5
Your total money is 102.5
**************************************
Enter prediction (1 for ODD, 2 for EVEN): 1
Enter the amount of money you want to bet: 50
The value of the die is 4
Your total money is 90.0
**************************************
Enter prediction (1 for ODD, 2 for EVEN): 0
>
```