CMPSC 111
Introduction to Computer Science I
Spring 2016

Lab 3
Assigned: February 3, 2016
Due: Wednesday, February 10, 2016 by 2:30 pm

Objectives

To gain more experience working with variables and expressions you will write a Java program that performs user input by correctly employing a `java.util.Scanner` object and its methods.

General Guidelines for Labs

- **Work on the Alden Hall computers.** If you want to work on a different machine, be sure to transfer your programs to the Alden machines and re-run them before submitting.
- **Update your repository often!** You should add, commit, and push your updated files each time you work on them. I will not grade your programs until the due date has passed.
- **Review the Honor Code policy.** You may discuss programs with others, but programs that are nearly identical to others will be taken as evidence of violating the Honor Code.

Reading Assignment

To learn more about variables, expressions, and user input, review Sections 2.1–2.6 in your textbook. Please pay close attention to the `Scanner` methods in Figure 2.7 and the program in Listing 2.8.

Create a New Directory and Read the Template

In your `cs111S2016-<your user name>` directory type the command "`mkdir lab3`" to create a new directory for the third laboratory. Type "`cd lab3`" to change into this new directory. To create the required file, type "`gvim Lab3.java`". Begin your program by including the `Template.java` file that you created during the last laboratory session (if, for some reason, you don't have one, you can still create one if you'd like—it will save you time!). Assuming that your `Template.java` file is inside the `labs/` directory, but not inside the `lab3/` directory, you need to type: "`:r../Template.java`" in `gvim` to read your program template. See last week's laboratory assignment for more information about creating and using this template. Remember, in `gvim` and the terminal window "`..`" stands for "go back one directory" and "`.`" means "the current directory".

Tip and Bill Calculator

This laboratory assignment asks you to write a Java program named "`Lab3.java`" that will calculate the tip, the total bill for the user, and each person's share of the restaurant bill (if there are two or more people). In particular, your program needs to do the following:

1. Ask the user to enter a name (remember to save the user's input into a variable so that it can be used later in the program and in the program's output).

2. Using this name, display a friendly and appropriate welcome message to the user.
3. Ask the user to enter the restaurant's bill amount (remember to save the user's input into an appropriate variable). You should allow for floating point (e.g., decimal or fractional) values.
4. Ask the user to enter the desired tip percentage as a number between 0 and 100 or as a decimal number between 0 and 1. You have to decide which range you want to use for your program and specify it when prompting for the user's input (after picking the correct data type for the percentage, remember to save the user's input into an appropriate variable).
5. Calculate the tip as $tip = \frac{percentage}{100} \times bill$ if the percentage ranges between 0 and 100 or as $tip = percentage \times bill$ if the percentage ranges between 0 and 1.
6. Calculate the total bill as $total\_bill = bill + tip$
7. Display to the user:
   - The original bill (before the tip)
   - The tip amount
   - The total bill (including the tip)
8. Ask the user how many people will be splitting the total bill (remember to save the user's input into a variable so that it can be used later in the program and in the program's output).
9. Calculate each person's share. For example, if you saved the number of people splitting the bill into a variable called *num_people*, then you would calculate each person's share as $share = \frac{total\_bill}{num\_people}$. You should think (or rethink) your views concerning the data types you are using and whether a data conversion is required at this point in your program.
10. Display to the user an exit message that is suitable for an academic setting.

A sample run of this program is shown below:

```
gkapfham@aldenv5:~/lab3$ javac Lab3.java
gkapfham@aldenv5:~/lab3$ java Lab3
Gregory Kapfhammer
Lab 3
Wed Feb 3 13:15:39 EST 2016
Please enter your name: Timothy
Timothy, welcome to the Tip Calculator!
Please enter the amount of your bill: 50
Please enter the percentage that you want to tip: 15
Your original bill was $50
Your tip amount is $7.5
Your total bill is $57.50
How many people will be splitting the bill? 2
Each person should pay $28.75
Have a nice day! Thank you for using our service.
```

Some points to remember as your complete this laboratory assignment:

- You will need to use the `Scanner` class. Don't forget to import it at the top of your program. You may refer to the textbook for code samples demonstrating the use of the `Scanner`.
- Students who want to learn more about how to use the `Scanner` class can refer to pages 90 and 91 of the textbook, focusing on the `GasMileage` class provided in Listing 2.9.
- You should think carefully about what data type you want to use for your variables.
- As in past assignments, your program only needs to have one `main` method.
- To display a dollar sign, you can just type "$" inside the string of your output statement.
- Note that your program will alternate between printing and computing—this is okay!
- Don't forget to review the assignment sheets from the previous laboratory and practical assignments as they contain insights that will support your completion of this assignment.

Summary of the Required Deliverables

In addition to submitting signed and printed versions, for this assignment you are invited to turn in electronic versions of the following deliverables through your Bitbucket repository. As you complete this step, you should make sure that you created a `lab3/` directory within the Git repository. Then, you can save all of the required deliverables in the `lab3/` directory; please see the course instructor or a teaching assistant if you are not able to properly create your directory for this assignment.

1. A completed, fully commented, and properly formatted `Lab3.java` program. Please make sure that your program prints your name, the lab number, and the date as the first few output lines of every program you write, and that it includes the comment header file with the Honor Code, your name, date, and the complete description of the program.
2. Three outputs from running `Lab3` in the terminal window three times with three different user inputs for the bill, tip, and the number of people splitting the bill. You may use `gvim` to save all three of your outputs as follows: using the mouse, select everything from the "`java Lab3`" command to the end of your output. Right-click on the selected text and copy it. Type "`gvim output`"—note that this *not* a Java program!—and use the "Edit/Paste" menu item to paste your program's output into the file. Now, use "`:w`" or the "File/Save" menu item to save this file. Please see the course instructor if you cannot save your output files.

Share your program and the output file with me through your Git repository by correctly using "`git add`", "`git commit`", and "`git push`" commands. When you are done, please ensure that the Bitbucket Web site has a `lab3/` directory in your repository with the two files called `Lab3.java` and `output`. You should see the instructor if you have questions about assignment submission.

A Special Challenge

You may decide to try to format your floating-point-valued output to contain only a certain number of decimal places. Read ahead to Section 3.6 in Chapter 3 to see how you can do this—or ask your instructor or a teaching assistant for some suggestions for completing this challenge! While it is not mandatory for you to explore this challenge, you are invited to consider the advanced concept of "output formatting" if you have already finished the required parts of this assignment.