CSCI 1301 – Programming Principles I
Georgia Southern University
Department of Computer Science
Fall 2024

Lab 4
Point Value: 20 points
Due: Friday September 6, 2024, end of lab

Objectives

1. Generate pseudo-random numbers to use as data.
2. Evaluate Boolean expressions.
3. Use Boolean expressions and selection statements to make decisions with code.
4. Use the debugger to effectively diagnose and fix errors in code.
5. Archive Java source code files and other documents into a zip file.

Description

Complete the following steps as described and upload requested materials to Folio in the appropriate dropbox in a single zip file. Submit Java source code files to Gradescope.

- Students should work in groups of two for this lab. When submitting your zip file, fill out the comment header and indicate both group member names.

- Your submitted zip file should be named Lab#LastName1LastName2.zip. For instance, Lab4JonesSmith. Any requested screenshots and/or answers to questions should be included in a separate Word document.

- All programs should have a comment header. That comment header should include information similar to:

```
/**
 * File: PAssign0.java
 * Class: CSCI 1301
 * Author: Christopher Williams
 * Created on: Jun 6, 2016
 * Last Modified: Aug 16, 2018
 * Description:  Display three messages to the console
 */
```

- Before writing any code, for each problem, discuss with your partner how you plan to approach solving the given problem. Once you both agree on a way to attempt the problem, only then should code be written.

- Pay attention to names and any other requested material. Failure to include material will result in the loss of points as described below.

Lab Problems
For all problems, use inline comments to describe major actions. Ask for assistance if needed.

!!—IMPORTANT—!!: For Problems 1 & 3, you **MUST** follow the provided instructions for Gradescope to correctly grade your submission.

1. boolean variable types, if statements, and Pseudo-random values – Recall that boolean variables can hold true or false values, relational operators can be used to compare things resulting in a boolean value, and we can generate pseudorandom values using the value returned from Math.random() and some scaling to get values within a specific range.

   TASK: Write a Java program that will determine, based on a randomly-generated age between 0-65, whether a person that age is legally allowed to purchase alcohol or not. Do this in a file named Lab04Prob01.java. Provide descriptive text to indicate the situation regardless of whether they can purchase alcohol or not. Use techniques discussed in class to **efficiently** print your output. You should **not** have two similar print statements.

   For testing purposes, you may want to hard-code the age first to make sure your conditional statement is working, then test with your random value.

   !!—IMPORTANT—!!: Before submitting to Gradescope, add the following import statement:

   ```
   import gsu.Math;
   ```

   Expected Output (for an age of 48):

   ```
   You are 48 years old and are eligible to purchase alcohol.
   ```

   Expected Output (for an age of 9):

   ```
   You are 9 years old and are not eligible to purchase alcohol.
   ```

   After passing the comparison of output tests, show a working version of this program to the instructor or TA before moving on.

2. Multi-way if Statements – Recall that multiple conditions can be checked in a single if statement using the **else if** keywords.

   TASK: Write code that will determine what season a month belongs to, based on a user-input integer to represent a month. Do this in a file named Lab04Prob02.java.

   Assume that every 3 months the season changes, starting with winter for December-February. For instance, a number of 4 would indicate the month of April, which is spring. If the value is not a valid "month" number, output an appropriate error message. Only print the error message if the month does not correspond to a season.

We have not studied logical operators (&&, ||, etc.) so they should not be used for this problem. Think about the solution before attempting to code it.

HINT: You may need two tests for winter since the months are not consecutive.

Expected Output, valid input (for a month of 4):

```
Enter the month number: 4
Month 4 occurs during spring
```

Expected Output, invalid input (for a month of 18):

```
Enter the month number: 18
That is not a valid month
```

After passing the comparison of output tests, show a working version of this program to the instructor or TA before moving on.

3. Multi-way if Statements – Recall that multiple conditions can be checked in a single if statement using the **else if** keywords.

   TASK: Create a new Java class in a file named Lab04Prob03.java. Write a Java program that implements management's scheme to award raises for the upcoming year. The CEO of the company has mandated that every employee's raise will be determined by a number that is first randomly generated and then constrained to a "status number" used to determine a raise tier (these are two separate operations).

   Since you work for the payroll department, you have been tasked with implementing this system as described. To test your code, assume a salary of $40,000. Then, generate a random number between 0-950.

   Once the initial random number is created, in a separate step, constrain that value between 0-6 (consider what operator we have stressed over and over this semester, do not try to "calculate" 7 ranges between 0-950). This constrained number is the "status number" that will be used to determine each employee status and assigns them a raise percentage.

   Raise tiers start with 0 status being a 0% raise and each subsequent tier at the listed percent: status 1 is 3.7%, status 2 is 4.2%, status 3 is 5.7%, status 4 is 6.1%, status 5 is 7.3%, and status 6 is 8.7%. After calculating the raise percentage, output both the "status number" and the assigned raise percentage.

   !!—IMPORTANT—!!: Before submitting to Gradescope, add the following import statement:

   ```
   import gsu.Math;
   ```

   Expected Output (for a status of 4 and salary of $40000.0):

```
With a random status of 4 and an initial salary of $40000.0, your raise is
6.1% which equates to a new salary of $42440.0.
```

After passing the Gradescope tests, show a working version of this program to the instructor or TA before moving on.

4. Demonstrate all working programs to the instructor to receive credit for each problem. Turn in each problem inside the zip file detailed below.

5. Name the zip file Lab4LastName1LastName2.zip (e.g. Lab4JonesSmith) and submit that zip file to Folio. Both students must submit the exact same zip file for either to receive a grade.

Grade Breakdown

Demonstrate running application to instructor:	
Problem 1	5 points
Problem 2	5 points
Problem 3	6 points
Zipped source files (in Folio):	4 points

Total Possible:	20 points

Last modified: September 3, 2024