

# Lab 3

*Become accustomed to new syntax and process – conditional statements and random numbers.*

*In this Lab, you will learn about different conditional statements (if, if-else, if-else if, and switch case), how to write conditions and different operators you use for conditions (such as the syntax for “equals”, “and”, “or”, “greater than”, etc.), and how to generate a random number between a specific range. With the introduction to conditional statements, you will also learn how to create a flowchart to show a program’s flow of logic.*

## In-Lab Activities

For each of these Activities, draw the program’s **flowchart** in your **notebooks** before you begin coding, even if the activity does not specifically instruct to do so.

*Don’t forget to also answer the **Guided Inquiry Questions** in your **notebooks** as well.*


### Warm-Ups

Go to the Google Forms link on the board and complete your Warm-Up Questions. You have 10 minutes to complete this. If you finish early, feel free to begin the Lab Activities, but make sure your partner is ready as well.

### Activity 1

A new restaurant near university is celebrating its 3rd year of opening. For this occasion, they are giving away special offers to customers. The manager wants you to write a program for customers that will do the following things:

1. Draw a **flowchart** in your **notebook** to show the logic flow of this program. You may read through the rest of the steps to get a better idea, but **make sure you create the flowchart before coding**.
2. Write your **comments**! You should always write comments, even if it doesn’t say so in the steps/instructions.
3. Have a welcome **message** to the customer that describes this special event as well as the possible discounts: a 50/50 chance to either get a 20% discount, or a 25% discount.
4. Simulate a coin toss to determine which discount the customer will get. How can you do this using **random numbers**?
5. Display which discount the customer has received along with a nice message. How will you display a specific message depending on the coin toss’s result?



What variables need to be declared before starting? What **data types** must be used?




Throughout these activities, pay attention to the difference between a **switch statement** and an **if / if else statement**. How is the organization different, and how can you take advantage of this to keep your code more easily readable?



### Activity 2

As another offer to its membered customers, the restaurant wants to give discounts based on each individuals’ membership status code. Write a new program for the manager that does the following things:

1. Have a welcome message to the customer and ask for their membership status code.
2. If the code is 2014, the customer gets a 15% discount; if it is 2015, they get a 10% discount; and if it is 2016, the customer gets a 5% discount. Which **data type** will you use to hold this code? There are actually multiple possibilities.
3. Display a message informing the customer of their discount amount. Use a **switch statement** to do this.
4. Also add a message stating that the customer has received no discount if they did not enter any of the above codes. Which **keyword** must you use in the **switch statement** to do this?
5. Do not forget to have your comments! 

### Activity 3



Update the above program such that the program asks the user about the bill amount and then calculate the final price depending on the discount. Do not forget to add a 4.6% sales tax to the final price and print the total. Use a **constant** to hold the sales tax. Here are some points to think about that should help guide you:

1. What additional **variables** will you need to **declare**?
2. Will there be any user **input** required? If so, what **variable** will you save the input in? What **data type** must this be?
3. Don't forget to have good **output** displayed back to the user – what kinds of messages will be most helpful to them?



#### CHECKPOINT

45 MINUTES



#### Brainstorming Individually

(3-5 minutes)

Read the next Activity and write your thoughts about the process and make a **flowchart** in your **notebook**. Do this *individually* for 3 to 5 minutes and then come together afterwards to compare, discuss, and code. 😊



### Activity 4

Write code that asks the user to enter the year and determines whether or not that particular year is a leap year. To determine if a year is a leap year, you must check various points:

1. It must be divisible by 4.
2. Even if it is divisible by 4, it *must not* be divisible by 100.
3. The only time when a leap year is divisible by 100 is when it is *also* divisible by 400.

For example, 2000 is a leap year but 1900 is not.



Before writing the code, write the **pseudocode** in the header comments.

What are the **compound conditions** in this code?



## Activity 5

You have been provided some Java code in a class called Activity5. Download this class from this week's Module and import it to the project. One way to import it is by dragging the specific class file from the File Explorer to your source code folder from within Eclipse.

The program gives a runtime error when int b is set to 0. Write an if statement so that the error is no longer received and the program can continue. Read the comments for hints.



### CHECKPOINT

30 MINUTES



## Activity 6

You have been provided a Java class called Activity6 - import this class to the project. The program compiles correctly but for some reason, it does not give us the correct average of tests. This is called a logic error. As a programmer, your job is to rectify the reason, or it may create consequences for your firm.

After reading through and understanding the code, draw this program's **flowchart**.



## Activity 7

You have been provided a Java class called Activity7 - import this class to the project. There is some problem with the code, as it does not compile. What type of error would this be? What do you see at the error screen and what do you understand from it? How do you fix it? Fix the error and show it to your TA.

After reading through and understanding the code, draw this program's **flowchart**.



Put some comments (dashed lines, etc.) surrounding the **blocks**.  
What is the importance of **braces**?



### CHECKPOINT

25 MINUTES



## Activity 8

You have been provided a Java class called Activity8 - import it to your project and use it to create an error free program for a cloth seller. It should ask for the user's choice and, depending on that choice, it will complete specific tasks. Follow the comments in the code, as these include more instructions. The code should be able to calculate the total and then add the tax of 2.3%, to print out the final total.

After reading through and understanding the code, draw this program's **flowchart**.



## Challenge Activity: Sort Three Integers

Create a new project with a class called "SortThreeIntegers". Write the program to prompt the user to enter two integers. The program will then generate three random numbers between those two user-inputted integers, and display those integers in increasing order (from smallest to largest).



Before Writing the code, write the **pseudocode** in the header comments, and draw a **flow chart** in your notebook.



### CHECKPOINT

40 MINUTES

## Reflection

Go to the Google Forms link given by your TA to work on your Reflection for Lab 3. This counts as a part of your participation grade, and it is important that you put as much detail as possible.