# CIS 36A: Lab 2 - Data Types and Operations

Student Name: Esmatullah Nickzad

## Task 1: Definitions & Concepts

**Instructions:** Answer the questions below. Write your own answers, do not copy/paste from anywhere.

1. What is the scope of a variable?   
   => Answer: it is the place in our program where it can be referenced or reached.
2. In general, when a cast is needed?   
   => when we want to do widening or narrowing . means , when we want to change form bigger data type to smaller data type or from smaller data type to bigger data type.

## Task 2: Understanding Programming

Instructions: Answer each question below. Try to understand and explain the code. **Do not test the code with an IDE. Do not put an IDE code screenshot.**

1. If **x** is a variable of type int and its value is **5**, then what is its final value after the following sequence of statements has been executed?  
   x += 4; ==> Answer: 5 + 4 = 9  
   x \*= 2; ==> Answer: 9 \* 2 = 18  
   x /= 3; ==> Answer: 18 / 3 = 6  
   x %= 4; ==> Answer: 6 % 4 = 2
2. If **x** is a variable of type boolean and its value is **true**, then what is its final value after the following sequence of statements has been executed?  
   x |= false; ==> Answer: true | = true   
   x &= true; ==> Answer: true & = true   
   x ^= true; ==> Answer: true ^ true = false

## Task 3: Programming Exercises

Instructions: Use any Sublime Text to write and execute the below exercises from the book Chapter 2. Attach Screenshots of your **source code** and **test run** of the code in the console. Put the screenshots right under each question.   
**Do not submit them as separate files.**

1. Try This 2-1 - Page 49 (Do not submit this).

A screen shot of a computer program

Description automatically generated

1. Try This 2-2 - Page 69 (Do not submit this).

A screenshot of a computer program

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1. Write a program that assigns the value **50000** to an integer variable **x**, assigns the value of **x\*x** to an integer variable y, and then prints out the value of y. Did you get a strange answer? If so, explain why.

Answer: because it reached out the max limit of integer and we get the minimum result for the int which Is = -1794967296.A screen shot of a computer

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1. **Math.random()** is a method in the Java library that computes a random **double** value between 0 and 1. For example, the statement **double x = Math.random();** assigns to the variable x a random double between 0 and 1.   
   Write a program that tests how well Math.random() works. More precisely, write a program that calls **Math.random()** 1,000 times to create 1,000 values, keeping track of how many of them are greater than 0.5, and then print out the result. Your program should theoretically print out a number very close to 500.

A screen shot of a computer program

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1. Write a program that creates three random double variables a, b, and c, and assigns them values between 0 and 1 using the Math.random() method mentioned in the preceding exercise. It then does all of the following:
   1. It prints out the three values.
   2. It prints "All are tiny" if all three values are less than 0.5.
   3. It prints out "Exactly one is tiny" if **exactly** one of the three values is less than 0.5.
   4. it prints “None is tiny” if none of the values are less than 0.5.
   5. come up with your own compound logical structure.

**Note: Make sure to use compound boolean statements instead of if-else chains or a count variable.**

A screenshot of a computer

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## Task 4: Programming Application

**Change Calculator:** Write a program that prompts the user to enter a dollar amount as double. Then, calculate how many quarters, dimes, nickels, and pennies are in the dollar amount.   
**Example:** $2.68 = 10 quarters, 1 dime, 1 nickel, and 3 cents. Print all of the values.   
**Hint:** Use the Modulus operator (%) and integer division (/) w hen necessary.

A screen shot of a computer program

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