Lab Session #7

**If you have not finished a previous lab, you should complete those before starting this lab. This is because the labs are cumulative and build on each other. If you are not able to finish a previous lab, please ask your teacher or a classmate for help on it.**

Part 1: Theory (on paper)

1. For each of the following expressions, determine the *best* type of variable to store the result into. (Write that in the blank)  
     
   \_\_\_\_ w = 2;  
     
   \_\_\_\_ x = 3.0 \* 4.0;  
     
   \_\_\_\_ y = 2 + 3.0;  
     
   \_\_\_\_\_z = “Hi”;  
     
   \_\_\_\_\_ a = 3.5 \* 2;  
     
   \_\_\_\_\_ b = 2 + 3 \* 4.0;  
     
   \_\_\_\_\_c = (1 / 2) + (1 / 2);  
     
   \_\_\_\_\_ d = (1 / 2.0) + .5;  
     
   \_\_\_\_\_\_ e = ((1 / 2) + (1 / 2)) \* 1.0;
2. For each of the above, what value would the variable have after the variable assignment?
3. What is the value of each of the following involving % operator?  
     
   5 % 2   
     
   10 % 3  
     
   12 % 10  
     
   8 % 10  
     
   -3 % 10 (Hint: Recall the analogy with a clock. Pretend the clock has 10 hours on it total and it is 3 hours before midnight on that clock. What time would it be?)

**Part 2: Application**

1. In class, we wrote an algorithm for making change. Now you will implement that as well. Write a program that accepts a number, in cents, from the user. For now, assume this number is less than 500 (i.e. you can give the change back without using bills, since it’s less than $5) Figure out how many twoonies (200 cents), loonies (100 cents), quarters (25 cents), dimes (10 cents), nickels (5 cents), and pennies (1 cent—assume they still exist) they should be given back in change.
2. Open one of your existing programs (such as HelloWorld). Add as a command into your main method the following 3 commands:  
     
   double x = 3;  
   double y = 3.0;  
   int z = 3;  
     
   You’ll notice that in the first command, we have an int (3) on the right side and a double variable (x) on the left side. This compiles in Java even though doing the opposite (for example, int a = 3.5) would not compile. Why do you think this is the case?  
     
   Now print the values of all 3 variables by using the System.out.println() command. For example:  
     
   System.out.println(x);  
     
   will print the value of the variable x.  
     
   What is the difference between the different print outs? Do they all print exactly the same value? Why do you think this is?