CS-200-1: Programming I
Fall 2014
Northeastern Illinois University
In-Class Exercise: Numeric Variables & Operations

1. Determine the result of the following remainder operations:

(a) 56 % 6, Solution: $56 = 6 \times 9 + 2$, Remainder: 2

(b) 78 % 4, Solution: $78 = 4 \times 19 + 2$, Remainder: 2

(c) -34 % 5, Solution: $-34 = 5 \times -6 - 4$, Remainder: -4

(d) 34 % -5, Solution: $34 = -5 \times -6 + 4$, Remainder: 4

(e) 5 % 1, Solution: $5 = 1 \times 5 + 0$, Remainder: 0

(f) 1 % 5 Solution: $1 = 5 \times 0 + 1$, Remainder: 1

2. Determine the result of the following mathematical expressions:

(a) $3 + 6 \times (5 + 4) \div 3 - 7$
$= 3 + 6 \times 9 \div 3 - 7$
$= 3 + 54 \div 3 - 7$
$= 3 + 18 - 7$
$= 21 - 7$
$= 14$

(b) $9 - 5 \div (8 - 3) \times 2 + 6$
$= 9 - 5 \div 5 \times 2 + 6$
$= 9 - 1 \times 2 + 6$
$= 9 - 2 + 6$
$= 13$

(c) $150 \div (6 + 3 \times 8) - 5$
$= 150 \div (6 + 24) - 5$
$= 150 \div 30 - 5$
$= 5 - 5$
$= 0$

3. Trace through the following code and determine the output that is printed to the console. (Hint: It may help to create a memory window to keep track of the changes to the variables.)

```
public class TracingProblem
{
    public static void main(String[] args)
    {
        int a = 6;
        int b = a + 1;
        System.out.println(a);
        System.out.println(b);
        a -= 2;
        b = a++;
        b--;
        System.out.println(a);
        System.out.println(b);
    }
}
```

Output Window

6
7
4
4

4. Write a program that takes a number (an integer) in cents and returns the minimum number of coins (quarters, dimes, nickels, pennies) that is needed to make up the total value.

Sample Output

```
Enter an integer value in cents: 84
You need: 3 quarters, 0 dimes, 1 nickels and 4
pennies
```

```
Enter an integer value in cents: 68
You need: 2 quarters, 1 dimes, 1 nickels and 3
pennies
```

```
import java.util.Scanner;

public class ComputeChange
{
    public static void main(String[] args)
    {
        Scanner keyboard = new Scanner(System.in);

        int cents;
        System.out.print("Enter an integer value in cents: ");
        cents = keyboard.nextInt();

        int remainingAmount;
        int quarters = cents/25;
        remainingAmount = cents % 25;

        int dimes = remainingAmount/10;
        remainingAmount = remainingAmount % 10;

        int nickels = remainingAmount/5;
        remainingAmount = remainingAmount % 5;

        int pennies = remainingAmount;

        System.out.println("You need: " + quarters + " quarters, " +
            dimes + " dimes, " + nickels + " nickels, and " + pennies +
            " pennies");
    }
}
```