Tutorial 07

Repetitive Statements: while | do-while | for

Exercise 1:

A. Analyze the following code. Is count < 100 always true, always false, or sometimes true or sometimes false at Point A, Point B, and Point C?

```
int count = 0;
while (count < 100) {
  // Point A
  System.out.println("Welcome to Java!");
  count++;
  //Point B
}
// Point C
```

B. How many times are the following loop bodies repeated? What is the output of each loop?

1.
```
int i = 1;
while (i<10)
  if (i % 2 == 0)
    System.out.println(i);
```

2.
```
int i = 1;
while (i<10)
  if (i % 2 == 0)
    System.out.println(i++);
```

3.
```
int i = 1;
while (i<10)
  if (i++ % 2 == 0)
    System.out.println(i);
```

C. Suppose the input is 2 3 5 4 0. What is the output of the following code? Explain what it does.

```
import java.util.Scanner;
public class Test {
  public static void main(String[] args){
    Scanner input = new Scanner(System.in);
    int number, max;
    number = input.nextInt();
    max = number;
    while (number != 0) {
      number = input.nextInt();
      if (number > max)
        max = number;
    }
    System.out.println("max is " + max);
    System.out.println("number is " + number);
  }
}
```

D. Convert the following while loop into a do-while loop.

```
Scanner input = new Scanner(System.in);
int sum = 0;
System.out.println("Enter an integer (input ends if it is 0)");
int number = input.nextInt();
while (number != 0) {
  sum += number;
  System.out.println("Enter an integer (input ends if it is 0)");
  number = input.nextInt();
}
```

E. Suppose the input is 2 3 4 5 0. What is the output of the following code?

```
import java.util.Scanner;
public class Test {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);
    int number, sum = 0, count;
    for (count = 0; count < 5; count++) {
      number = input.nextInt();
      sum += number;
    }
    System.out.println("sum is " + sum);
    System.out.println("count is " + count);
  }
}
```

F. How many times is the println statement executed in the following code?

```
for (int i = 0; i < 10; i++)
  for (int j = 0; j < i; j++)
    System.out.println(i * j);
```

Exercise 2:

Show the output of the following programs?

A.

```
public class Test {
  public static void main(String[] args) {
    for (int i = 1; i < 5; i++) {
      int j = 0;
      while (j < i) {
        System.out.print(j + " ");
        j++;
      }
    }
  }
}
```

B.

```
public class Test {
  public static void main(String[] args) {
    int i = 0;
    while (i < 5) {
      for (int j = i; j > 1; j--)
```

```
          System.out.print(j + " ");
        System.out.print("****");
        i++;
      }
    }
  }
```

C.

```
public class Test {
  public static void main(String[] args) {
    int i = 5;
    while (i >= 1) {
      int num = 1;
      for (int j = 1; j <= i; j++) {
        System.out.print(num + "xxx");
        num *= 2;
      }
      System.out.println();
      i--;
    }
  }
}
```

D.

```
public class Test {
  public static void main(String[] args) {
    int i = 1;
    do {
      int num = 1;
      for (int j = 1; j <= i; j++) {
        System.out.print(num + "G");
        num += 2;
      }
      System.out.println();
      i++;
    } while (i <= 5);
  }
}
```

Exercise 3:

Write a program using for loop that prompts the user to enter two integers x and y. The program prints numbers between x and y (excluding x and y) that are either divisible by x or divide y in reverse (from largest to smallest).

Here are two sample runs:

```
Enter two integers: 10 50 ↲
40 30 25 20
```

```
Enter two integers: 5 1 ↲
```

Exercise 4

Solve exercise 2 using while loop and without using logical operators `||` and `&&`. (Note: there is no relation between while and `||`, `&&`. This is just to train you on different equivalent ways of writing loops and conditional statements)

Exercise 5

Write a program that reads a character then displays the following pattern using the input character (assuming input character is 'A' and height is 6):

```
     A
    A A
   A A A
  A A A A
 A A A A A
A A A A A A
```

Height of pattern and character are input by user.
(Hint: assuming name of your Scanner object is input, use `input.next().charAt(0);` to read a character from user.)

Tutorial 07 Solutions

Exercise 1:

A. Point A: `count < 100` is always `true`
Point B: `count < 100` is sometimes `true` and sometimes `false` (when is it `false`?)
Point C: `count < 100` is always `false`

B. (1) will repeat forever (infinite number of iterations)
(2) will repeat forever (infinite number of iterations)
(3) will repeat 9 times

C.

```
max is 5
number is 0
```

This program finds maximum number among input numbers.

D.

```
import java.util.Scanner;
public class WhileToDoWhile {
  public static void main(String[] args){
    Scanner input = new Scanner(System.in);
    int number, sum = 0;
    do {
      System.out.print("Enter an integer (input ends if it is
0)");
      number = input.nextInt();
      sum += number;
    } while (number != 0);
  }
}
```

E.

```
sum is 14
count is 5
```

F. 45 times

Exercise 2:

A.

```
0 0 1 0 1 2 0 1 2 3
```

B.

```
****
****
2 ****
3 2 ****
4 3 2 ****
```

C.

```
1xxx2xxx4xxx8xxx16xxx
1xxx2xxx4xxx8xxx
1xxx2xxx4xxx
1xxx2xxx
1xxx
```

D.

```
0 0 1 0 1 2 0 1 2 3
```

Exercise 3:

```
import java.util.Scanner;
public class Reverse {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);
    System.out.print("Enter two integers: ");
    int x = input.nextInt();
    int y = input.nextInt();
    for (int i = y -1; i > x; i--)
      if (i % x == 0 || y % i == 0)
        System.out.println(i + " ");
  }
}
```

Exercise 4:

```
import java.util.Scanner;
public class Reverse2 {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);
    System.out.print("Enter two integers: ");
    int x = input.nextInt();
    int y = input.nextInt();
    int i = y - 1;
    while (i > x) {
      if (i % x == 0)
        System.out.println(i + " ");
      else if (y % i == 0)
        System.out.println(i + " ");
      i--;
    }
  }
}
```

Exercise 5:

```
import java.util.Scanner;
public class Triangle {
  public static void main(String[] args) {
```

```
    Scanner input = new Scanner(System.in);
    System.out.print("Enter character: ");
    char c = input.next().charAt(0);
    System.out.print("Enter height: ");
    int height = input.nextInt();
    for (int i = height; i <= height; i++) {
      for (int j = height - i; j >= 1; j--)
        System.out.print(" ");
      for (int j = i; j >= 1; j--)
        System.out.print(c + " ");
      System.out.println();
    }
  }
}
```