King Saud University
College of Computer & Information Science
CSC111 – Tutorial06
Loops
All Sections

Objectives:

Student should learn how to:

1- Follow the loop design strategy to develop loops.

2- Control a loop with a sentinel value.

3- Write loops using for statements

Exercise 1

1) 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
```

2) How many times are the following loop bodies repeated? What is the output of each loop?

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

(a)

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

(b)

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

(c)

3) 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 " + number);
  }
}
```

4) 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 " +
  "(the input ends if it is 0)");
int number = input.nextInt();
while (number != 0) {
  sum += number;
  System.out.println("Enter an integer " +
    "(the input ends if it is 0)");
  number = input.nextInt();
}
```

5)
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);
  }
}
```

Solution

1)

Count < 100 is:
Always true at Point A
Sometimes true sometimes false at Point B (when is it false?)
Always false at Point C

2)

a will repeat forever (infinite number of times)
b will repeat forever (infinite number of times)
c will repeat 9 times

3)

```
max is 5
number 0
```

This program finds maximum number among input numbers.

4)

```
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.println("Enter an integer " +
                    "(the input ends if it is 0)");
            number = input.nextInt();
            sum += number;
        } while (number != 0);

    }
}
```

5)

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

Exercise 2

Write a program using `for loop` that prompts the user to enter two integers x and y. Then 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 is a sample run:

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

```
Enter two integers: 5 1 ↵
```

Solution

```
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.print(i + " ");
        }
    }
}
```

Exercise 3

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)

```
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.print(i + " ");
            else if (y % i == 0)
                System.out.print(i + " ");
            i--;
        }
    }
}
```

Done…