King Saud University
College of Computer & Information Science
CSC111 – Tutorial 06

Conditional statement: *if-then, if-else, switch*

Objectives:
After completing the following exercises, students will be able to:

- Trace programs that use *if-then* , *if-else* and *switch* statement
- Analyze programs with nested conditional statement
- rewrite *switch* statements as *if-else* statements or *if-then* statements

Exercise 1:

What is the output of each of the following code fragments?
(given the declaration int a=1, b=2, c=3;):

1.
```
if (6 < 2 * 5)
System.out.print("Hello");
System.out.print(" There");
```

2.
```
if(a>b)
if(a>c)
System.out.println("1111");
else
System.out.println("2222");
```

3.
```
if (a < c)
System.out.println("*");
else if (a == b)
System.out.println("&");
else
System.out.println("$");
```

4.
```
if(a<b)
System.out.println("####");
else
System.out.println("&&&&");
System.out.println("****");
```

5.
```
if(a>b)
System.out.println("####");
else
{System.out.println("&&&&");
System.out.println("****");}
```

6.
```
int x = 100; int y = 200;
if (x > 100 && y <=200)
System.out.print(x+" "+y+" "+(x+y));
else
System.out.print(x+" "+y+" "+(2*x-y));
```

7.
```
if (a < c)
System.out.println("*");
else if (a == c)
System.out.println("&");
else
System.out.println("$");
```

8.
```
if(++a > b++ || a-- > 0)
c++;
else
c--;
System.out.println(a+" "+b+" "+c);
```

9.
```
if(a<b){
System.out.println("####");
System.out.println("****");
}
else
System.out.println("&&&&");
```

10.
```
if ('a' > 'b' || 66 > (int)('A'))
System.out.println("#*#");
```

Answers:

1. **Hello There**
2. **No output**
3. *****
4. **####**
   ****
5. **&&&&**
   ****
6. **100 200 0**
7. *****
8. **1 3 4**
9. **####**
   ****
10. **#*#**

Exercise 2:

1. Write the java statement that assigns 1 to x if y is greater than 0
2. Suppose that score is a variable of type double. Write the java statement that increases the score by 5 marks if score is between 80 and 90
3. Rewrite in Java the following statement without using the NOT (!) operator:
   `item = !( (i<10) | | (v>=50) )`
4. Write a java statement that prints *true* if x is an odd number and positive
5. Write a java statement that prints *true* if both x and y are positive numbers
6. Write a java statement that prints *true* if x and y have the same sign (-/+)

Answer:

1. `if (y > 0) x = 1;`
2. `if (score >= 80 && score <=90) score += 5;`
3. `item = i >= 10 && i < 50`
4. `if (x % 2 != 0 && x > 0) System.out.println(true);`
   or
   `System.out.println(x%2 !=0 && x>0);` // This prints *false* otherwise
5. `if (x > 0 && y > 0) System.out.println(true);`
   or
   `System.out.println(x > 0 && y > 0);` // This prints *false* otherwise
6. `if (x * y > 0) System.out.println(true);`
   or
   `System.out.println(x * y > 0);` // This prints *false* otherwise

Exercise 3:

Two programs are equivalent if given the same input they produce the same output. Which of the following programs are equivalent? Why?

```
// Program A
import java.util.Scanner;
class TestPositive {
  public static void main(String [] args) {
    Scanner S = new Scanner(System.in);
    System.out.print("Enter a value: ");
    int x = S.nextInt();
    if (x > 0) {
      System.out.println("The value is positive:");
    }
    else {
      if (x < 0) {
        System.out.println("The value is negative:");
      } else {
        System.out.println("The value is zero:");
      }
    }
    System.out.println("Good Bye!");
  }
}
```

```
// Program B
import java.util.Scanner;
class TestPositive {
  public static void main(String [] args) {
    Scanner S = new Scanner(System.in);
    System.out.print("Enter a value: ");
    int x = S.nextInt();
    if (x > 0) {
      System.out.println("The value is positive:");
    }
    if (x < 0) {
      System.out.println("The value is negative:");
    } else {
      System.out.println("The value is zero:");
    }
    System.out.println("Good Bye!");
  }
}
```

```
// Program C
import java.util.Scanner;
class TestPositive {
  public static void main(String [] args) {
    Scanner S = new Scanner(System.in);
    System.out.print("Enter a value: ");
    int x = S.nextInt();
    if (x > 0) {
      System.out.println("The value is positive:");
    }
    if (x < 0) {
        System.out.println("The value is negative:");
    }
    if (x ==0) {
        System.out.println("The value is zero:");
    }
    System.out.println("Good Bye!");
  }
}
```

Answer:

Programs A and C are equivalent. Program B is different since it gives different output if input is a positive number greater than zero. For example, 3

Exercise 4:

Convert the following switch statement into if-else statements then into if-then statements:

```
String dayString1, dayString2, dayString3;
int day = KB.nextInt();
switch (day) {
  case 1: dayString1 = "Saturday";
  case 2: dayString2 = "Sunday";
          break;
  case 3: dayString3 = "Monday";
          break;
  case 4: dayString1 = "Tuesday";
  case 5: dayString2 = "Wednesday";
          break;
  default: dayString3 = "Invalid day";
           break;
}
```

Answer:

if-else:

```
String dayString1, dayString2, dayString3;
int day = KB.nextInt();
if (day == 1) {
  dayString1 = "Saturday";
  dayString2 = "Sunday";
}
else
  if (day == 2)
    dayString2 = "Sunday";
  else
    if (day == 3)
      dayString3 = "Monday";
    else
      if (day == 4) {
        dayString1 = "Tuesday";
        dayString2 = "Wednesday";
      }
      else
        if (day == 5)
          dayString2 = "Wednesday";
        else
          dayString3 = "Invalid day";
```

if-then:

```
String dayString1, dayString2, dayString3;
int day = KB.nextInt();
if (day == 1) {
  dayString1 = "Saturday";
  dayString2 = "Sunday";
}
if (day == 2)
  dayString2 = "Sunday";
if (day == 3)
  dayString3 = "Monday";
if (day == 4) {
  dayString1 = "Tuesday";
  dayString2 = "Wednesday";
}
if (day == 5)
  dayString2 = "Wednesday";
if (day < 1 || day > 5)
  dayString3 = "Invalid day";
```