Objectives:

1- Student should learn how to program using selection statements with combined conditions.

2- Student should learn how to combine conditions using logical operators (**!**, **&&**, and **||**)

3- Student should learn how to write expressions using the conditional expression

Exercise 1

1) What is the output of the code in (a) and (b) if number is 30? What if number is 35?

```java
if (number % 2 == 0)
    System.out.println(number + " is even.");

System.out.println(number + " is odd.");
```

(a)

```java
if (number % 2 == 0)
    System.out.println(number + " is even.");
else
    System.out.println(number + " is odd.");
```

(b)

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

```java
// program A
import java.util.Scanner;
public 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!");
    }
}
```

```java
// program B
import java.util.Scanner;
public 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!");
    }
}
```

```java
// program C
import java.util.Scanner;
public 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!");
    }
}
```

3) Suppose **x = 3** and **y = 2**; show the output, if any, of the following code. What is the output if **x = 3** and **y = 4**? What is the output if **x = 2** and **y = 2**?

```java
if (x > 2) {
    if (y > 2) {
        z = x + y;
        System.out.println("z is " + z);
    }
}
else
    System.out.println("x is " + x);
```

4) Assuming that **x** is **1**, show the result of the following Boolean expressions.
   a) (true) && (3 > 4)
   b) !(x > 0) && (x > 0)
   c) (x > 0) || (x < 0)
   d) (x != 0) || (x == 0)
   e) (x >= 0) || (x < 0)
   f) (x != 1) == !(x == 1)

5) Assume that **x** and **y** are **int** type. Which of the following are legal Java expressions?
   a) x > y > 0
   b) x = y && y
   c) x /= y
   d) x or y
   e) x and y
   f) (x != 0) || (x = 0)

Solution

1)

a)

if number is 30 output is

```
30 is even.
30 is odd.
```

This is wrong output and caused by not using else.

if number is 35 output is

```
35 is odd.
```

b)

if number is 30 output is

```
30 is even.
```

if number is 35 output is

```
35 is odd.
```

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

3)

x = 3 and **y = 2** ➜ no output

x = 3 and **y = 4**

```
z is 7
```

x = 2 and **y = 2**

```
x is 2
```

4)
  a) false
  b) false
  c) true
  d) true
  e) true
  f) true

5)
  a) illegal
  b) illegal
  c) legal
  d) illegal
  e) illegal
  f) legal

Exercise 2

Write a program that prompts the user to enter a three-digit integer and determines whether it is a palindrome number. A number is palindrome if it reads the same from right to left and from left to right.
Here are two sample runs:

```
Enter a three-digit integer: 242 ↵
242 is a palindrome
```

```
Enter a three-digit integer: 123 ↵
123 is not a palindrome
```

Solution

```java
import java.util.Scanner;
public class Palindrome {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);

    System.out.print("Enter a three-digit integer: ");
    int number = input.nextInt();

    if (number / 100 == number % 10)
      System.out.println(number + " is a palindrome");
    else
      System.out.println(number + " is not a palindrome");
  }
}
```

Done...