

## Exercise 03-Conditions and loops

1. Write a program that read x, y and z and checks if:
  - a. x, y and z contain different values
  - b. x, y and x do not contain equal values
  - c. at least two of them are the same

```
public class Compare {
    public static void main(String[] args) {

        int x = 3;
        int y = 1;
        int z = 2;

        //Test it also with 3,3,2 so that you see the difference within the first
        and the second if!

        System.out.println(x + ", " + y + ", " + z + ":");
        if (x != y || y != z)
            System.out.println("Not all values are equal.");
        if (x != y && x != z && y != z)
            System.out.println("All values differ from each other.");
        if (x == y || x == z || y == z)
            System.out.println("At least two values are equal.");
    }
}
```

2. Write a program that read in the values a, b, and c and sorts them (asc or desc).

```
public class Sorting {
    public static void main(String[] args) {

        int a = 1;
        int b = 2;
        int c = 3;

        // print a, b and c in ascending order
        if (a < b) { // a < b
            if (b < c) { // a < b && b < c
                System.out.println(a + ", " + b + ", " + c);
            } else { // a < b && c <= b
                if (a < c) { // a < c && c <= b
                    System.out.println(a + ", " + c + ", " + b);
                } else { // c <= a && a < b
                    System.out.println(c + ", " + a + ", " + b);
                }
            }
        } else { // b <= a
            if (a < c) { // b <= a && a < c
                System.out.println(b + ", " + a + ", " + c);
            } else { // b <= a && c <= a
                if (b < c) { // b < c && c <= a
                    System.out.println(b + ", " + c + ", " + a);
                }
            }
        }
    }
}
```

```

        } else { // c <= b && b <= a
            System.out.println(c + ", " + b + ", " + a);
        }
    }
}
}
}

```

3. Read in the endpoints of two horizontal or vertical lines using their x and y end coordinates. Check then if the two lines intersect.

```

4. public class IntersectLines {
    public static void main(String[] args) {

        int ax1 = 2; // line a: [(ax1,ay1), (ax2,ay2)]
        int ay1 = 0;
        int ax2 = 2;
        int ay2 = 3;
        int bx1 = 1; // line b: [(bx1,by1), (bx2,by2)]
        int by1 = 1;
        int bx2 = 4;
        int by2 = 1;

        // check for valid input data
        if (ax1 != ax2 && ay1 != ay2) System.out.println("a
has to be vertical or horizontal");
        else if (bx1 != bx2 && by1 != by2)
System.out.println("b has to be horizontal or vertical sein");
        else {

            // normalize so that x1 <= x2 and y1 <= y2
            int h;
            if (ax1 > ax2) {h = ax1; ax1 = ax2; ax2 = h;}
            if (ay1 > ay2) {h = ay1; ay1 = ay2; ay2 = h;}

            // ay1 == ay2
            // ax1 == ay1

            // check if a and b intersect

            System.out.print("[("+ax1+","+ay1+"),("+ax2+","+ay2+")] intersect ");

            System.out.print("[("+bx1+","+by1+"),("+bx2+","+by2+")] ");
            if (bx1 > ax2 || bx2 < ax1 || by1 > ay2 || by2 <
ay1)
                System.out.println("not");
            else
                System.out.println();

        }
    }
}

/*
Sample inputs:
2 0 2 3 1 1 4 1
2 0 2 3 2 2 5 2
2 0 2 3 2 -1 4 -1
2 0 2 3 2 -1 4 0
*/

```

4. Write a program that reads a positive integer and determines how many digits it contains. For example 12 -> 2 numerals.

```
public class NumOfDigits {
    public static void main(String[] args) {

        int x = 50000;
        int n = 1;

        while (x > 9) {
            x = x / 10;
            n++;
        }

        System.out.println("Number of digits = " + n);
    }
}
```

5. Write a program that reads a positive integer value and prime decomposition. The integer 100 for example consists of the prime factors 2,2,5,5 and the integer 252 of the prime factors 2,2,3,3,7

```
public class PrimeDecomp {
    public static void main(String[] args) {

        int x = 252;

        System.out.print("Prime factors of " + x + ": ");
        // try 2 and all odd numbers for prime factors
        int i = 2;
        while (x > 1) {
            while (x % i == 0) {
                System.out.print(i + " ");
                x = x / i;
            }
            if (i == 2) i++;
            else i = i + 2;
        }
        System.out.println();
    }
}
```