Programming Exercises - PRO1 - Session 06

Exercise 6.01

Write a program that reads an age (int) from the keyboard and then prints a message. The message should depend on the typed value in the following way:

- If the age is less than 0 display the message: "Error in age value".
- If the age is between 0 and 12 (both included) display the message: "Child".
- If the age is between 13 and 19 (both included) display the message: "Teenager".
- If the age is between 20 and 65 (both included) display the message: "Adult".
- If the age is larger than 65 display the message: "Senior citizen".

Test the program by running it at least 5 times to be sure that it will print out the correct message for each age group.

Exercise 6.02

Write a program that reads a gender (char 'M' or 'F') and an age (int) from the keyboard and then prints a message (Hint: for some reason there is no nextChar() method when using a Scanner object, so first read a String with the nextLine() method and then use charAt(0) on the String to extract the first char).

The message should depend on the typed values, in the following way:

- If gender is not either 'M' or 'F' or age is less than 0 display the message: "Error in typed values".
- If gender is 'M' and age is less than 18 display the message: "Boy".
- If gender is 'M' and age is greater than or equal to 18 display the message: "Man".
- If gender is 'F' and age is less than 18, display the message: "Girl".
- If gender is 'F' and age is greater than or equal to 18 display the message: "Woman".

As in the first exercise, test the program by running it multiple times and entering different values.

Exercise 6.03

Write a program that reads a grade from the Danish 7-scale from keyboard (as an int) and prints the equivalent grade from the international grade scale.

The Danish 7-scale grades are the following: {12, 10, 7, 4, 2, 0, -3} and the international grades are: {A, B, C, D, E, Fx, F}.

The grades are converted as: 12=A, 10=B, 7=C, 4=D, 2=E, 0=Fx and -3=F

Exercise 6.04

Sort numbers:

a) Write a program that asks the user to enter two numbers and prints the smallest of the numbers.
b) Write a program that asks the user to enter two numbers and prints the numbers in sorted order (smallest number first).
c) Write a program that asks the user to enter three numbers and prints the numbers in sorted order (smallest number first).
d) (Optional) Write a program that asks the user to enter four numbers and prints the numbers in sorted order (largest number first).

Exercise 6.05

MyDate class revisited:

We have a leap year when the year can be divided by 4 (1996, 2008, 2012, etc.), except for the years that can also be divided by 100, unless they can also be divided by 400 (i.e. 1600, 2000 and 2400 are leap years, while 1800, 1900, and 2100 are not).

Extend the MyDate class that you made in an earlier exercise with a new method called `isLeapYear()`, that will return `true` if the year stored is a leap year, and `false` if it is not. Hint: the following boolean expression will be `true` if year is dividable by four: `year%4==0`

Exercise 6.06

In math a quadratic equation is given as: $ax^2 + bx + c = 0$

For such an equation the discriminant (D) is defined as $D = b^2 - 4ac$ and the solution to the equation can then be calculated as:

- If `D<0`, there is no solution
- If `D=0`, there is one solution: $x = -\frac{b}{2a}$
- If `D>0`, there are two solutions: $x_1 = \frac{-b + \sqrt{D}}{2a}$ and $x_2 = \frac{-b - \sqrt{D}}{2a}$

Create a program that asks the user to input values for a, b and c, then calculates the solutions (if any) to a quadratic equation defined by those values, and prints them out. Remember that in Java the square root of a number is found by: Math.sqrt(number).