Exercise 2

2.1 Input output

$$ax + b = 0$$

This is the general formula for a linear equation. Write a program which asks the user for a and b, and then solves the equation and print the value of x.

- First think about how you actually solve the problem in maths.
- Then write a program that does this for you

2.2 A physics example

Write a program that asks the user how high a stone should be dropped from. Then calculate how long it takes for the stone to hit ground, neglecting air resistance.

2.3 Banking Account

In order to show you the importance of your choice of datatype for a variable, we have implemented two versions of a banking account program:

- bank_account_integer.c
- bank_account_float.c

Have a look at the programs, compile and run them. The first program implements your account balance in Swiss centimes with integers (32bit/4bytes). The second program implements the balance with floats in francs.

- Some questions in advance: Why are we using centimes in the integer version and francs in the float version?

Now try both programs. Keep in mind that this program is intended for a bank, which has customers with a few francs on their account, but also customers with multi-billion accounts, e.g.

- M. Aspel has an initial balance of 2.1 Billion (Billion = Milliarde), and gets an additional 200 Million on his account.
- N. Dario has an inital balance of 10 Swiss francs but wins in lotto and gets 200 Million swiss francs.

Find the problems of the two programs. Change one of the programs so that it works more reliable.

2.4 Sinus Function from math library

Write a program that reads a number and calculates the sine value of it, with the help of math.h and sin() function.

- Which "version" of sin does C use? Degrees or radians? (try out with different values: 90°, π, etc).

Write a program that calculates

- $\diamond$ $\cos(x)$
- $\diamond$ $1 - x^2/2 + x^4/24$

- compare the results for different values of x. Are they similar?