

## Exercise 2

- Write a program which asks the user two numbers,  $x$  ja  $y$ , and calculates their *arithmetic mean*

$$\frac{x + y}{2},$$

*geometric mean*

$$\sqrt{xy}$$

and *harmonic mean*

$$\frac{2}{\frac{1}{x} + \frac{1}{y}}.$$

Display the results in the form

```

                x      xxx
                y      xxx
arithmetic mean  xxx
geometric mean  xxx
harmonic mean   xxx

```

*Hint: The square root is calculated with the function `sqrt` which is found in the header file `math.h`. To format the table for the results, use the code `%Ns`, where `N` is a number specifying the width of the field where the string is printed.*

- Write a program which asks the user a character and prints out the corresponding number. Do consecutive alphabet correspond to consecutive numbers? What about the letters å, ä and ö?
- Since character variables are stored in the computer memory as integers, it is possible to do calculations with them.
  - Which character is 'b' / 2?
  - Calculate the “average” of the letters a...e.
  - Calculate how many cents (c) is one dollar (\$). *Hint: Divide the numbers corresponding to these characters by each other. In order for the division to give proper results, you must to a type cast, i.e.*

```

char a='c';
double b=(double)a;

```
- Open the source file `h02t04.c`.
  - Comment each line of the file.
  - Think what values the variables have after each line. It's probably best to go through the file with pen and paper! Check your reasoning by executing the program line by line in debug mode.

- c) Expand all complicated substitution statements. For example, the command

```
c += (a++);
```

would become

```
c = c+a;
```

```
a = a+1;
```

Note the difference between `a++` and `++a`!

5. Open the source file `h02t05.c`.

- a) Comment each line of the file.
- b) Think what the program would print out. Check your guess by executing the program. Use also the debug mode to get a look at how tables appear in that mode.
- c) If  $(x_1, x_2, x_3)$  and  $(y_1, y_2, y_3)$  are vectors, their dot product is calculated as

$$x_1y_1 + x_2y_2 + x_3y_3.$$

Add to the opened file commands to calculate the dot product of the vectors `a` and `b`.