

# Programing for computer technology

## Hand-in Assignment Exercises

### Week 01: Programming, problem solving and reasoning

Please make sure to submit your solutions by next **Monday** (01-09-2025).

At the beginning of each question, it is described what kind of answer you are expected to submit. If **Text answer** AND **Code answer** is stated, then you need to submit BOTH some argumentation/description and some code; if just **Text answer** OR **Code answer**, then just some argumentation/description OR code. The final document should be one pdf document with one answer for each question (or text and code question).

*Note:* the **Challenge** exercises are *optional*, the others mandatory (i.e. you **have** to hand them in).

### Exercises

1)

**Text answer** Consider the following program:

```
1  #include <stdio.h>
2
3  int main (void) {
4      int x, y;
5
6      printf ("Input two numbers:\n");
7      scanf ("%d%d", &x, &y);
8
9      printf ("Input = (%d,%d)\n", x, y);
10
11     x = x + y;
12     y = x - y;
13     x = x - y;
14
15     printf ("output = (%d,%d)\n", x, y);
16
17     return 0;
18 }
```

Listing 1: A C program

What is the program doing? Make at least four test runs of the program with different inputs. In your answer, note the input and output of the four test runs. Calculate the different values of x and y when the program executes and use that in the argumentation of why it is working (try also to make a general mathematical argument)?

2)

**Text answer** What is wrong with the following program:

### Tip

Remember that there are different kind of errors: syntax error, semantic error, readability error, ...

```
1 #include <stdio.h>
2 #define d3 1.609
3 int main(void){double d1,d2;printf("Enter the distance in miles> ");scanf("%lf",
4 &d1);d2=d3*d1;printf("That equals %f kilometers.\n", d2);return (0);
}
```

3)

**Code answer** During lectures, we saw a program that could find the maximum of two integers. Another type in C is char, representing a character. I asked ChatGPT the following: *how can I compare two characters in C?* and got the following answer: *You can directly compare two characters using relational operators like ==, !=, <, >, <=, and >=*. Change the program maxvalue.c so that it reads in two chars and prints out the largest. What does *largest* of two characters mean? Did it work as expected? Did you notice issues with scanf?

4)

**Code answer** Write a program that reads in and adds two numbers; write a program that reads in and adds three numbers; write a program that reads in and adds four numbers.

5)

**Old exam question** solve it **without** running it, you will not be able to do so at the exam.

Let q, w and t be integer variables declared by:

```
1 int q;
2 int w;
3 int t;
```

Which assignment (a), (b), (c) or (d) inserted for the question mark (i.e. line 3) in the program fragment below makes the following program fragment print out 4:

```
1 q = 2;
2 w = 3;
3 ?
4 t = q + w;
5 printf("%d", t);
```

Answer:

- (a) `w = q * w;` ☐
- (b) `q = q * w;` ☐
- (c) `w = q / w;` ☐

(d) `q = w / q;` ☐

Tick the box on the right of the assignment to indicate by which assignment to replace the question mark in the program fragment. More than one expression may be correct.

Not part of the normal exam: Argue for why a given answer is correct or incorrect

6)

A program must solve the problem, but it should also be understandable for other programmers.

Modify the program above (Listing 1) so that it uses an extra variable (`t`) to store the `x` value temporarily instead of the addition and subtraction.

In your answer, include a completed table using the input from the table below:

first number	second number	output
2	3	
3	2	
22	22, [ ]	-2147483648
-2147483648		-2147483648
2147483647		2147483647
2147483647		

## Challenge

Write a program that computes the maximum number that can be produced by adding at most three given (possibly negative) integer numbers. Before starting, make a more precise definition of the program you are going to make.