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Programming in C++

Sheet 1

Submission date: 13.04.2021 at 8:00 am

1.1 Error Messages (5 Points)

C++

This task is about dealing with a wide variety of error messages that you will encounter when programming with C/C++.
First create a C++ file *main.cpp* with the following content fill:

```
#include <iostream>

using namespace std;

int main()
{
  int someNumber;
  cout << "Enter a number: ";
  cin >> someNumber;
  cout << (someNumber/2);
}
```

Listing 1: main.cpp

```
    Linux compile command:
        g++ -o main.o main.cpp
    Linux execute file:
        ./main.o

    Windows Visual Studio Community Edition:
        1. Create a console application project.
        2. Copy the content between { and } into the created main function.
        3. Press the play button.
```

Note in each case which error messages you received during the subtask. Error messages are highlighted in red in the console and have the format `<filename>:<row>:<column>`. Correct your program back to the original form after each subtask.

a) Remove the semicolon after `int somenumber`.

b) Remove the closing quotation mark from `Enter a number:`.

c) Comment out the line `using namespace std;`.

d) Add the modifier `const` before `int someNumber` (and thus declare a constant).

e) Change `iostream` to `iostream.h`.

Based on your observations, decide which error to look at first if there are multiple errors!

1.2 Type conversion (7 Points)

a) Consider the following variable assignments under C++.

```
int i;
short s;
```

```
float f;
char a;
double d;
long l;
char b;
```

Where do you see a possible risk?

```
l = i;
i = l + 90;
d = f;
f = s;
b = d;
a = i;
i = d;
```

1.3 Solving quadratic equations (10 Points)

From your previous educational career, you should be familiar with the so-called *midnight equation* for solving quadratic equations:

$$ax^2 + bx + c = 0 \implies x_{1/2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

In the following you will implement this functionality in C/C++. For this you need the header `cmath`, include it by `#include <cmath>`. Now you can calculate the root of a number x using `std::sqrt(x)`. First, prompt the user for values a, b, c. What happens if the user sets $a = 0$? Consider what you might do in this case.

1.4 Running through an algorithm (10 Points)

The goal of this task is to "play processor" and run an algorithm. Calculate the ggT (greatest common divisor) of the values $a = 65$ and $b = 25$, ggT(65,25) using the following mathematical description. Specify all intermediate steps and partial results!

$$ggT(a,b) = \begin{cases} a, & a = b \\ ggT(a-b,b), & a > b \\ ggT(a,b-a), & a < b \end{cases}$$