Einführung in die Programmierung für Physiker
WS 2019/2020 – Marc Wagner

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Exercise sheet 11
To be corrected in tutorials in the week from 20.01 to 24.01.2020

Exercise 1 [Bug hunting]
In the following you are provided with a not working code, which you have to correct. Try to do it without PC, since a similar assignment might be part of the final exam. Pay attention because you may encounter different types of errors:

- **Syntax errors** that you will be able to detect at compile-time;
- **Logic errors** that you might only be able to detected at run-time.

There are 9 bugs in the following code, which is supposed to evaluate the expressions tasks (i) and (ii) here below. Find and correct them all.

\[
(i) \sum_{k=1}^{N} k^2 \quad (ii) \prod_{k=0}^{\left\lfloor \frac{N}{2} \right\rfloor -1} (N - 2k) = N(N-2)(N-4) \cdots
\]

```c
int main(){
    unsigned int number;
    printf("\n Please, insert an integer positive number: ");
    scanf("%u", &number);
    unsigned int sum;
    for(unsigned int k=1; k<=number; k++)
        sum += k*k
    unsigned int product = (number == 0 ? 1 : number);
    unsigned int index = number - 2;
    while(index >1)
        Product *= index;
        index -= 2;
    printf("\nThe sum of the first N=%u squares is %u\n", number, sum);
    printf("The double factorial of %u is: %u!! = %u\n", number, product);
}
```

Exercise 2 [Very basic exam-like questions]

(i) Which is the difference between an **int** variable and an **unsigned int** one?

(ii) Which is the difference between a **float** variable and a **double** one?

(iii) What is a **cast**? Give an example.

(iv) Given the assignment **double x = 1/4;**, which value is stored into **x**? How would you modify the code in order to have 0.25 stored into **x**?