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Informatik für Mathematiker und Physiker Serie 9 HS 09

URL: http://www.ti.inf.ethz.ch/ew/courses/Info1_09/

Skript-Aufgabe 92 (4 Punkte)

What are the problems (if any) with the following functions? Fix them and find appropriate pre- and postconditions.

a)
```
bool is_even (const int i)
{
  if (i % 2 == 0) return true;
}
```

b)
```
double inverse (const double x)
{
  double result;
  if (x != 0.0)
    result = 1.0 / x;
  return result;
}
```

Skript-Aufgabe 99 (4 Punkte)

Write a program swap.cpp that defines and calls a function for interchanging the values of two int objects. The program should have the following structure.

```
#include<iostream>

// your function definition goes here

int main() {
  // input
  std::cout << "i =? ";
  int i; std::cin >> i;

  std::cout << "j =? ";
  int j; std::cin >> j;

  // your function call goes here

  // output
  std::cout << "Values after swapping: i = " << i
            << ", j = " << j << ".\n";

  return 0;
}
```

Here is an example run of the completed program:

```
i =? 5
j =? 8
Values after swapping: i = 8, j = 5.
```

Skript-Aufgabe 104 (8 Punkte)

A *perpetual calendar* can be used to determine the weekday (Monday, ..., Sunday) of any given date. You may for example know that the Berlin wall came down on November 9, 1989, but what was the weekday? (It was a Thursday.) Or what is the weekday of the 1000th anniversary of the Swiss confederation, to be celebrated on August 1, 2291? (Quite adequately, it will be a Saturday.)

a) The task is to write a program that outputs the weekday (Monday, ..., Sunday) of a given input date.

   Identify a set of subtasks to which you can reduce this task. Such a set is not unique, of course, but all individual subtasks should be small (so small that they could be realized with few lines of code). It is of course possible for a subtask in your set to reduce to other subtasks. (Without giving away anything, one subtask that you certainly need is to determine whether a given year is a leap year).

b) Write a program `perpetual_calendar.cpp` that reads a date from the input and outputs the corresponding weekday. The range of dates that the program can process should start no later than January 1, 1900 (Monday). The program should check whether the input is a legal date, and if not, reject it. An example run of the program might look like this.

```
day =? 13
month =? 11
year =? 2007
Tuesday
```

   To structure your program, implement the subtasks from a) as functions, and put the program together from these functions.

Die **Aufgaben 108** und **109** aus den Vorlesungsunterlagen sind die **Challenge Aufgaben** und geben jeweils 8 Punkte, wenn sie vollständig gelöst werden.

Abgabe: Bis 24. November 2009, 15.15 Uhr.