Informatik für Mathematiker und Physiker   HS15

Exercise Sheet 2

Submission deadline: 15:15 - Tuesday 29th September, 2015

Assignment 1 - Skript-Aufgaben 2,3 & 4 (4 points)

(i)   `a=(b=5)`   (ii)   `1=a`
(iii)   `(a=5)*(b=7)`   (iv)   `(a=b)*(b=5)`

a) Which of the above character sequences are not $C++$ expressions, and why not? Here, `a` and `b` are variables of type `int`.

b) For all of the expressions that you have identified, decide whether these are lvalues or rvalues, and explain your decisions.

c) Determine the values of the expressions that you have identified and explain how these values are obtained. Which of these values are unspecified and can therefore not be determined uniquely?

Assignment 2 - Skript-Aufgabe 22 (4 points)

Write a program `celsius.cpp` that converts temperatures from degrees Fahrenheit into degrees Celsius. The formula is

$$°C = (°F - 32) \cdot \frac{5}{9}$$

You may for this exercise assume that the integer division rounds towards zero for all operands: for example, $-5/2$ then rounds the exact result -2.5 to -2.

The program should output the *correct* result in degrees Celsius as a mixed rational number of the form `x  y/9` (meaning $x + y/9$), where $x, y \in \mathbb{Z}$ and $|y| \leq 8$. For example, $13\frac{4}{9}$ could be output simply as `13  4/9`. We also allow for example the output `-1  -1/9` (meaning $-1 - 1/9 = -10/9$).

Judge Examples   (Explanation: http://lec.inf.ethz.ch/ifmp/2015/judge_boxes.html)

```
Temperature in degrees Fahrenheit =?  0
0 degrees Fahrenheit are  -17 -7/9  degrees Celsius.
```

```
Temperature in degrees Fahrenheit =?  -100
-100 degrees Fahrenheit are  -73 -3/9  degrees Celsius.
```
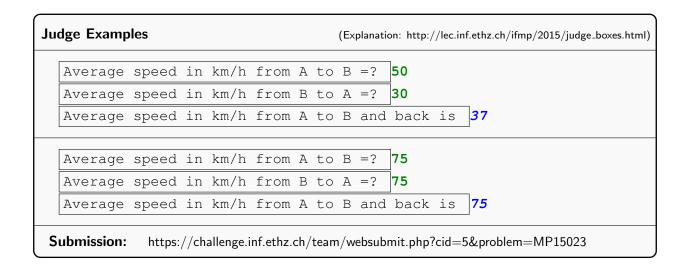
```
Temperature in degrees Fahrenheit =?  32
32 degrees Fahrenheit are  0 0/9  degrees Celsius.
```

Submission: https://challenge.inf.ethz.ch/team/websubmit.php?cid=5&problem=MP15022

Assignment 3 - Skript-Aufgabe 21 (4 points)

Suppose that someone drives from A to B at an average speed of 50 km/h. On the way back from B to A, there is a traffic jam, and the average speed is only 30 km/h. What is the average speed over the whole roundtrip?

   When confronted with this question, many people would answer "40 km/h," but this is wrong. Write a program that lets the user enter two average speeds in km/h ($A \to B$ and $B \to A$) and computes from this the average speed over the whole roundtrip ($A \to B \to A$). Both inputs should be positive integers, and the output should be *rounded down* to the next smaller integer.

Judge Examples   (Explanation: http://lec.inf.ethz.ch/ifmp/2015/judge_boxes.html)

```
Average speed in km/h from A to B =?  50
Average speed in km/h from B to A =?  30
Average speed in km/h from A to B and back is  37
```

```
Average speed in km/h from A to B =?  75
Average speed in km/h from B to A =?  75
Average speed in km/h from A to B and back is  75
```

Submission: https://challenge.inf.ethz.ch/team/websubmit.php?cid=5&problem=MP15023

Challenge - Skript-Aufgabe 12 (8 points)

Note: On some weeks we will add Challenge Exercises to the exercise sheet. Challenge Exercises are typically slightly more difficult than the normal exercises. If you have solved all of the regular exercises or if they are too easy for you, try the Challenges!