ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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Informatik für Mathematiker und Physiker HS12

Exercise Sheet 3

Submission deadline: 3.15pm - Tuesday 9th October, 2012

Course URL: http://www.ti.inf.ethz.ch/ew/Lehre/Info1_12/

Assignment 1 - Skript-Aufgabe 28 (4 points)

Prove or disprove that for all $x, y, z \in \mathcal{B}$

c) $(x \vee y) \wedge z = (x \wedge z) \vee (y \wedge z)$. (i.e., $(\mathrm{OR}, \mathrm{AND})$ is distributive)

d) $(x \uparrow y) \uparrow z = x \uparrow (y \uparrow z)$. (i.e., NAND is associative)

Assignment 2 - Skript-Aufgabe 35 (4 points)

Find the logical parentheses in lines 9 and 12 of the following program. What can you say about the output of the following program? Characterize it depending on the input and explain your reasoning.

```
1  #include <iostream>
2
3  int main ()
4  {
5    unsigned int a;
6    std::cin >> a;
7
8    unsigned int b = a;
9    b /= 2 + b / 2;
10   std::cout << b << "\n";
11
12   const bool c = a < 1 || b != 0 && 2 * a / (a - 1) > 2;
13   std::cout << c << "\n";
14
15   return 0;
16 }
```

Assignment 3 - (5 points)

Write a program `reverseDigits.cpp` that takes as an input an arbitrary non-negative integer n computes and outputs an integer m such that m has the same digits as n but in the reversed order; e.g if $n = 123$, then $m = 321$ and if $n = 10$ then $m = 1$ (as the leading zero is implicit), and output m.

Assignment 4 - Skript-Aufgabe 46 (3 points)

Write a program `fak-1.cpp` to compute the factorial $n!$ of a given input number n.

Hint: Use `ifm::integer` to get the exact evaluation of $n!$.

Challenge - Skript-Aufgabe 36 (8 points)

The exercise can be found on the page 77 of the lecture notes.