Fakultät
Elektrotechnik, Medientechnik
und Informatik

TECHNISCHE
HOCHSCHULE THD
DEGGENDORF

Master Programme of Applied Computer Science

Sample Problems for Preparation of the Admission Test

Revision Status: June 1st, 2018

The following collection of problems and test questions shall give applicants the opportunity to make themselves familiar with the content and level of the admission test for the Master of Applied Computer Science programme at the Deggendorf Institute of Technology. The problems also represent the range of basic subjects which are considered elementary, prerequisite knowledge to participate successfully in the master programme.

Please be advised that we do not provide the solutions for this sample test.

1.   Mathematics

1.1.   Calculate the integral $\int_{-\infty}^{\infty} e^{-2|x|} dx$

1.2.   Let $\alpha > 1$. Calculate the integral $\int_{1}^{\infty} \frac{1}{-x^{\alpha}} dx$

1.3.   Expansion into partial fractions

Let $x \in \Re$ (real numbers). Determine the real coefficients a, b, c, d such that

$$\frac{9x - 2}{x^2 - x - 6} = \frac{a}{(x - c)} + \frac{b}{(x - d)}$$

2.   Mathematical Logic

2.1.   Calculate the conjunctive normal form of the following logic expression.

(A $\wedge$ B $\vee$ C) $\wedge$ (B $\vee \neg$ C)

($\vee$ stands for "logic or", $\neg$ stands for "logic not", $\wedge$ stands for "logic and")

3. Networks

3.1. Give an example of synchronous communication in telecommunication networks.

3.2. In a layered communication protocol the lower layer adds information (e.g. addresses, check sums) to the data provided by the higher layer. Is this statement true or is it the other way round? Give a reason for your answer.

4. C-/C++-Programming

4.1. The following recursive function has a return value of type unsigned int and two parameters of the same type.

```
unsigned int f1(unsigned int a, unsigned int b)
{
  if (a == 0)
   return b;
 else if (b == 0)
   return a;
 else return f1(a, b-1) + b;
}
```

4.1.1. What is the return value of f1 called with values 3 for parameter a and 6 for parameter b?

4.1.2. What mathematical function is calculated by f1?

4.2. Write a C-Function that calculates the maximum of the elements of a vector of type int. The vector and the length of the vector shall be passed as arguments to the function. Assume that arguments passed to the function are correct, errors handling is not necessary.