



Digitale Systeme Wintersemester 2017/2018

Serie 2

Assignment Date: Monday, 06.11.2017

Submission Date: Monday, 20.11.2017, 8 a.m. in the delivery cupboard in HRS 3

Presentation Tasks

Note: Please provide all calculations or other elaborations for all the tasks.

Task 1

- Determine the floating point representation of the numbers $(15)_{10}$ and $(6,5)_{10}$ in the IEEE 32-bit format.
- Add the two floating point numbers from a) and give the result as an IEEE floating point number.
- Multiply the two floating point numbers and give the result as an IEEE floating point number.

Task 2

Prove by full induction that the following equation is valid for all $n \in \mathbb{N}$:

$$\sum_{i=0}^n 2^i = 2^{n+1} - 1.$$

Homework

Note: Please provide all calculations or other elaborations for all the tasks.

Task 1

Convert the number $(399,56)_{10}$ into a fixed point representation to the base of 2 with 10 pre-decimal and 6 post-decimal places.

10 points

Task 2

- Determine the floating point representation of the numbers $(42)_{10}$ and $(7,125)_{10}$ in the IEEE 32-bit format.
- Add the two floating point numbers from a) and give the result as an IEEE floating point number.
- Multiply the two floating point numbers and give the result as an IEEE floating point number.

30 points, 10 points each

Task 3

Determine the following rational floating point numbers in the IEEE 32-bit format (please give their representation and the decimal value, from which the accuracy can be approximated):

- (a) closest to the value $(0,3)_{10}$;
- (b) the smallest negative number that can be represented.

20 points

Task 4

Give reasons for the correctness of the statement below: The amount of different Boolean functions with 4 input variables and one output variable equals

$$2^{(2^4)}$$

20 points

Task 5

Prove by full induction that the following equation is valid for all $n \in \mathbb{N} : n^3 - n$ is divisible by 3.

20 points