Exercise Sheet 2
Issue Date: October 31st, 2023
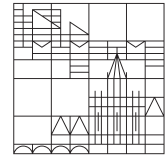Due Date: November 6th, 2023 – 10:00 a.m.
$\sum$ 10 Points

Konzepte der Informatik INF-11700
Winter 2023/2024

Encoding II, Algorithms & Data Structures

Exercise 1: IEEE 754 Number format (*2 points*)

a) (1 point) Given the single-precision IEEE 754 number 11000000110100000000000000000000. Convert to floating-point decimal value.

b) (1 point) Given the floating-point decimal value 20.5. Convert to a single-precision IEEE 754 number.

Exercise 2: ASCII (*1 points*)

a) (1 point) Using the 8-bit ASCII table from the lecture slides, binary encode: *SkI*

Exercise 3: Binary Search Trees (*2 points*)

a) (2 points) Execute the following operations on an initially empty binary search tree and display the tree after each operation.

insert(11), insert(10), insert(9), insert(6), insert(14), insert(12), insert(15), remove(12), remove(11)

Exercise 4: Hashing (*5 points*)

Hash the keys

$$[20,19,5,21,7,40,23,31,12,16,27,34]$$

into a hash table of size 13 using the division-remainder method.

a) (1 point) Give a suitable value for m.

b) (2 points) Handle collisions using linked lists and visualize the result in a table similar to the one below.

0	→
1	→
2	→
3	→
4	→
5	→
6	→
7	→
8	→
9	→
10	→
11	→
12	→

c) (2 points) Handle collision with linear probing using the sequence $s(j) = j$ and illustrate the development in a table similar to the one below, by starting a new column for every insert (don't forget to copy the cells already filled to the right) and by using downwards arrows to show the probing steps in case of collisions.

newly inserted key	20	19	5	21	7	40	23	31	12	16	27	34
0												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												