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Universität Konstanz
Fachbereich Mathematik und Statistik

Encoding II, Algorithms and Data Structures

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Exercise 1: IEE 754 Number format

a) first bit: $1 \to$ negative
following 8 bits: $10000001 = 0111\,1111_2 + 10_2 \to$ Exponent is 10_2
other bits: $10100000000000000000000 \to$ Mantissa is 1.101_2
$\implies 11000000110100000000000000000000 = -1.101_2 \times 10_2^{10_2} = -1101.1_2 = -13.5_{10}$

b) positive: first bit $= 0$
$20.5_{10} = 1\,0100.1_2 \to$ mantissa: 01001000000000000000000, exponent: $0111\,1111_2 + 100_2 = 1000\,0011_2$
$\implies 01000001101001000000000000000000$

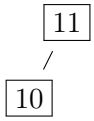
Exercise 2: ASCII

a) S $= 53_{16}$, k $= 6B_{16}$, I $= 49_{16}$: "SkI" $= 536B49_{16} = 101\,0011\,0110\,1011\,0100\,1001_2$

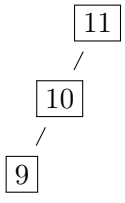
Exercise 3: Binary Search Trees

a) insert(11)
empty tree: 11 becomes root

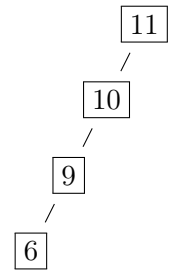
insert(10)
$10 < 11$



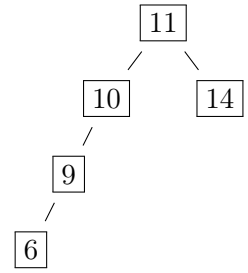
insert(9)
$9 < 11 \to 9 < 10$



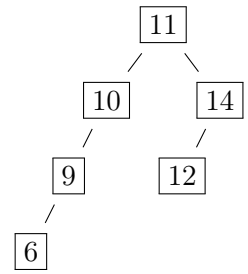
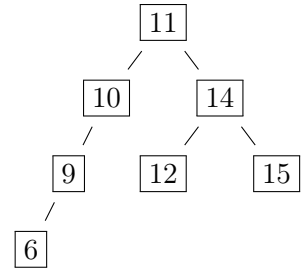
insert(6)
$6 < 11 \rightarrow 6 < 10 \rightarrow 6 < 9$



insert(14)
$14 > 11$



insert(12)
$12 > 11 \rightarrow 12 < 14$



insert(15)
$15 > 11 \rightarrow 15 > 14$