BKA
Sheet 1

Due date: 10 pm, 04 May

Exercise 1.

(a) Describe a TM with multiple tapes for computing the sum of two binary numbers. As example, for the input $1110 + 111$ it should return 10101.

(b) Describe a TM with one tape which computes the sum of two binary numbers. As example, for the input $1110 + 111$ it should return 10101.

(c) Compare the run time of two presented TMs.

Exercise 2.

Give a formal definition for a (multi-tape) TM computing the function $f : \mathbb{N}^2 \to \mathbb{N}$, $f(a, b) = a \cdot b$. (You may need to change a and b to unary format at first.)

Exercise 3.

Give formal definitions of (multi-tape) TMs for the following languages:

(a) $L_{palindrome} = \{w \in \{0, 1\}^* | w \text{ is a palindrome}\}$

(b) $L_2 = \{w \in \{0, 1, 2\}^*, w = 0^n 1^n 2^n | n \in \mathbb{N}\}$

Exercise 4.

Describe the run time of your presented TMs in exercise 2 and 3.

If you have any question regarding the problems, please do not hesitate to contact us.