

Turing Machines

Exercise 1 *Turing Machines*

Design Turing machines for the following language:

- $\{a^n b^n c^n \mid n \geq 1\}$

Start by giving a state diagram for your Turing machine and define the complete Turing machine afterwards.

Show the execution of your Turing machine on the following inputs:

- aaabbbccc
- aaabbbcca

Exercise 2 *Turing Machines*

Design Turing machines for the following language:

- $\{ww^R \mid w \text{ is any string of 0's and 1's}\}$.

Here w^R is the reverse of w , e.g. if $w = 11001$ then $w^R = 10011$.

Start by giving a state diagram for your Turing machine and define the complete Turing machine afterwards.

Show the execution of your Turing machine on the following inputs:

- 1100110011
- 1100111011

Exercise 3 *Turing Machines and Computers*

Read and work through Chapter 8.6 (Turing Machine and Computers) in Hopcroft, Motwani, Ullmann. The part is using Turing machines with multiple tapes. Look up the corresponding concepts around Turing machines with multiple tapes in Chapter 8.4 (Extensions to the Basic Turing Machine) of Hopcroft, Motwani, Ullmann.