UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

COS 210 Worksheet 10

- This worksheet consists of **3 questions** for a total of **9 marks**.

Question 1 ..... (4 marks)

Make yourself familiar with the Turing machine simulator **alistat**: https://alistat.eu/online/turingmachinesimulator
Use **alistat** to construct a Turing machine $M = (Q, \Sigma, \Gamma, \delta, q, q_{accept}, q_{reject})$ that accepts the language

$$L = \{(10)^n \in \{0,1\}^* : n \geq 0\}.$$

Provide your solution as a file containing the **alistat** code of your Turing machine.

Question 2 ..... (3 marks)

Make yourself familiar with the Turing machine simulator **alistat**: https://alistat.eu/online/turingmachinesimulator
Use **alistat** to construct a Turing machine $M = (Q, \Sigma, \Gamma, \delta, q, q_{accept}, q_{reject})$ that accepts the language

$$\text{L} = \{w \in \{0,1\}^* \text{: } w \text{ contains twice as many 0's as 1's}\}.$$

Provide your solution as a file containing the **alistat** code of your Turing machine.

Question 3 ..... (2 marks)

Consider the Turing machine $M = (Q, \Sigma, \Gamma, \delta, q_0, q_{accept}, q_{reject})$ with

- $Q = \{q_0, q_1, q_2, q_L, q_{accept}, q_{reject}\}$
- $\Sigma = \{a, b, c\}$
- $\Gamma = \{a, b, c, d, \square\}$
- δ : $q_0 a\square \to q_0 daRR$
  $q_0 b\square \to q_0 b\square RN$
  $q_0 c\square \to q_0 c\square RN$
  $q_0\square\square \to q_1\square\square LN$
  $q_1 d\square \to q_1 d\square LN$
  $q_1 b\square \to q_1 dbLR$
  $q_1 c\square \to q_1 c\square LN$
  $q_1\square\square \to q_2\square\square RN$
  $q_2 d\square \to q_2 d\square RN$
  $q_2 c\square \to q_2 dcRR$
  $q_2\square\square \to q_L\square\square LL$
  $q_L da \to q_L a\square LL$
  $q_L db \to q_L b\square LL$
  $q_L dc \to q_L c\square LL$
  $q_L\square\square \to q_{accept}$

What kind of algorithm does M implement? Answer this question in one sentence.