

CSC 320 Spring 2024

Assignment 4

This assignment has 3 written questions and is out of a total of 22 marks. Submit one PDF file containing your solutions on Brightspace.

Questions

1. [7 marks] Prove that the language $L = \{ a^n b^{2n} c^{3n} \mid n \geq 0 \}$ is not a context-free language using the pumping lemma for context-free languages.
2. [7 marks] Consider the language $L = \{ 0^n 1^n 0^m 1^m \mid n < m \}$. Prove that L is not a context-free language using the pumping lemma for context-free languages.
3. [8 marks] Consider the language $L = \{ 0^{3n} \mid n \geq 0 \}$ over $\Sigma = \{0\}$. In other words, L contains strings which have a multiple of 3 number of 0's. (e.g. ε , 000, 000000, 000000000, ...)
 - (a) Give a high-level description of a Turing machine which recognizes L .
 - (b) Give the formal description (i.e. a state machine and 7-tuple definition) of a Turing machine which recognizes L .