Middle East Technical University — Department of Computer Engineering

CENG 280

Formal Languages and Abstract Machines

Spring 2023-2024

Homework 4 - Part 2

Question 1

For the following languages write the corresponding (unrestricted) grammar.

- $L = \{w2^n3^m \mid w \in \{0,1\}^* \textit{ and number of } 0\textit{s in } w \textit{ is equal to } n \textit{ and number of } 1\textit{s in } w \textit{ is equal to } m\}$
- $L = \{a^{2^n} \mid n \geq 0\}$

Question 2

Prove whether the following languages are undecidable or not.

- $L = \{< M, w > \mid M \textit{ is a } TM \textit{ and } M \textit{ halts on } w\ \}$
- $L = \{< M > \mid M \textit{ is a } TM \textit{ and } L(M) = \emptyset\}$