

CSCI 341 Workshop 5

Stack Automata

November 5, 2025

Problem 1. Show that the language $L_{AB} = \{a^n b^n \mid n \in \mathbb{N}\}$ is decidable.

Problem 2. We are going to show that the language

$$L_{11?} = \{[\mathcal{T}]^* x \mid x \text{ halts on input } 11 \text{ in the Turing machine } \mathcal{T}\}$$

is undecidable as follows:

- (1) Design a Turing machine \mathcal{C} with a state `rep_11` that clears the tape and then prints 11 to the tape (i.e., $\mathcal{C}_{\text{rep_11}}(w) = 11$ for any $w \in A^*$).
- (2) Design a Turing machine \mathcal{W} with a state y that