

# 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