CPSC 421: Introduction to Theory of Computing **Winter Term 1 2018-19**

Lecture 9: September 24

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9.1 Ambiguity

What does ambiguity mean?

Maybe if a string w has multiple derivations.

Example:

$$G = \begin{cases} S \to AB \\ A \to a \\ B \to b \end{cases}$$

$$L(G) = ab$$

- $S \to AB \to aB \to ab$
- $S \to AB \to Ab \to ab$

This grammar should count as being ambiguous.

We rule out silly ambiguity by focusing only on leftmost derivations.

A sequence $S \to u_1 \to u_2 \to \cdots \to w$, where each step applies to a rule to the leftmost variable. A grammar is ambiguous if it has multiple leftmost derivations for the same string.

- $E \to E \times E \to E + E \times E \to 1 + 2 \times E \to 1 + 2 \times 2$
- $E \to E + E \to 1 + E \to 1 + E \times E \to 1 + 2 \times E \to 1 + 2 \times 2$