

CMSC 330, Fall 2017 Quiz 3

Name (as it appears on Gradescope) _____

Discussion Time (circle one) 10am 11am 12pm 1pm 2pm 3pm

Discussion TA (circle one) Joseph Greg Justin Michael P. BT Daniel David Derek
~ Cameron Eric Kesha Shriraj Pei-Jo Michael S. Bryan Kameron

Instructions

- Do not start this quiz until you are told to do so.
- You have 15 minutes for this quiz.
- This is a closed book quiz. No notes or other aids are allowed.
- For partial credit, show all your work and clearly indicate your answers.

1. (6 points) Write a context free grammar that generates strings of the form a^*b^+ .

$$\begin{aligned} S &\rightarrow aS \mid bT \\ T &\rightarrow bT \mid \varepsilon \end{aligned}$$

or

$$\begin{aligned} S &\rightarrow aS \mid T \\ T &\rightarrow bR \\ R &\rightarrow bR \mid \varepsilon \end{aligned}$$

or

$$\begin{aligned} S &\rightarrow aS \mid T \\ T &\rightarrow bT \mid b \end{aligned}$$

2. (7 points) Give the *rightmost* derivation of the string "ababcd" for the given CFG.

$$\begin{aligned} S &\rightarrow SS \mid T \\ T &\rightarrow ab \mid TR \\ R &\rightarrow cd \end{aligned}$$

$S \Rightarrow SS \Rightarrow ST \Rightarrow STR \Rightarrow STcd \Rightarrow Sabcd \Rightarrow Tabcd \Rightarrow ababcd$

3. (7 points) Show that the following CFG is ambiguous.

$S \rightarrow S \text{ xor } S \mid S \text{ nand } S \mid \text{true} \mid \text{false}$

Students can draw two parse trees for the same string or show two leftmost derivations.

$S \Rightarrow \mathbf{S} \text{ xor } S \Rightarrow \mathbf{S} \text{ nand } S \text{ xor } S \Rightarrow \text{true nand } S \text{ xor } S$

$S \Rightarrow \mathbf{S} \text{ nand } S \Rightarrow \text{true nand } \mathbf{S} \Rightarrow \text{true nand } S \text{ xor } S$