

Name: _____

CS 421 — Ambiguous Grammars / First and Follow Sets

Mattox Beckman

Part 1 — Ambiguous Grammars

These grammars are ambiguous. Prove that they are ambiguous by giving an input with two parse trees. Give an equivalent grammar that is unambiguous.

Example 1)

$$\begin{array}{l} E \rightarrow E + E \\ \quad | E * E \\ \quad | - E \\ \quad | i \end{array}$$

Let $*$ and $+$ have their usual precedences, and associate to the left. Unary minus binds most tightly.

Problem 1)

$$\begin{array}{l} E \rightarrow E a E \\ \quad | E b E \\ \quad | E x E \\ \quad | E y E \\ \quad | i \end{array}$$

Let a have highest precedence, associating to the left. Next is b , associating to the left. Then we have y associating to the right. Let x have the lowest precedence, and associate to the right.

Part 2 — First and Follow Sets

Calculate the first and follow sets for these grammars.

Example 2)

$$\begin{array}{l} S \rightarrow a E b \\ \quad | x \\ E \rightarrow x y \\ \quad | \epsilon \end{array}$$

Example 3)

$$\begin{array}{l} S \rightarrow a E F b \\ \quad | x E F \\ E \rightarrow x y \\ \quad | \epsilon \\ F \rightarrow E z q \\ \quad | w S \end{array}$$

Problem 2)

$$\begin{array}{l} S \rightarrow a F E b \\ \quad | x F E \\ E \rightarrow x y \\ \quad | \epsilon \\ F \rightarrow E z q \\ \quad | w S \end{array}$$