Ma2201/CS2022
Quiz 0111

Foundations of C.S.

Spring, 2021

PRINT NAME: _____
$\mathcal{SIGN}$: _____

1. (**4 pts**) Consider the grammar

$$\begin{array}{rcl} G:S & \rightarrow & AAE \\ A & \rightarrow & aa \mid abAba \\ B & \rightarrow & ABa \mid CDa \\ C & \rightarrow & Aa \mid bE \mid ACE \\ D & \rightarrow & BCb \mid DEb \\ E & \rightarrow & bbEbb \mid baAab \end{array} .$$

Compute Reach and Term and to create an equivalent grammar with no useless symbols.

2. (**3 pts**) Consider the grammar given by

$$\begin{array}{rcl} G:S & \rightarrow & a \mid AB \mid BBCCDDEEbb \\ A & \rightarrow & b \mid \lambda \mid DD \\ B & \rightarrow & a \mid CB \mid AB \\ C & \rightarrow & b \mid BC \mid DC \\ D & \rightarrow & a \mid AE \mid a \\ E & \rightarrow & b \mid AA \mid b \end{array} .$$

Compute NULL and use it to find a grammar which has no λ rules.

3. (**3 pts**) Consider the grammar given by

$$\begin{array}{rcl} G:S & \rightarrow & a \mid b \mid aaa \mid ABCDE \\ A & \rightarrow & b \mid B \mid aab \\ B & \rightarrow & a \mid D \mid aba \\ C & \rightarrow & b \mid a \mid abb \\ D & \rightarrow & a \mid C \mid baa \\ E & \rightarrow & b \mid C \mid bab \end{array} .$$

Use CHAIN to find an equivalent grammar which has no chain rules.