CS3133

HW#5

DUE: Monday, September 26

(10 points) Convert to Chomsky Normal Form the grammar:

$$S \to AB \mid BCS$$
$$A \to 0A \mid C$$
$$B \to 11B \mid 1$$
$$C \to 1C \mid \varepsilon$$

CS3133
Solutions to HW#5

Removing ε–productions we obtain

$$S \to AB \mid BCS \mid B \mid BS$$
$$A \to 0A \mid 0 \mid C$$
$$B \to 11B \mid 1$$
$$C \to 1C \mid 1$$

Removing unit productions we obtain

$$S \to AB \mid BCS \mid 11B \mid 1 \mid BS$$
$$A \to 0A \mid 0 \mid 1C \mid 1$$
$$B \to 11B \mid 1$$
$$C \to 1C \mid 1$$

Converting to Chomsky Normal Form we obtain

$$S \to AB \mid BCS \mid X_1X_1B \mid 1 \mid BS$$
$$A \to X_0A \mid 0 \mid X_1C \mid 1$$
$$B \to X_1X_1B \mid 1$$
$$C \to X_1C \mid 1$$
$$X_0 \to 0$$
$$X_1 \to 1$$

and finally

$$S \to AB \mid BY_1 \mid X_1Y_2 \mid 1 \mid BS$$
$$A \to X_0A \mid 0 \mid X_1C \mid 1$$
$$B \to X_1Y_3 \mid 1$$
$$C \to X_1C \mid 1$$
$$Y_1 \to CS$$
$$Y_2 \to X_1B$$
$$Y_3 \to X_1B$$
$$X_0 \to 0$$
$$X_1 \to 1$$