Fifth Quiz

You have 15 minutes from the start of class to complete this quiz. Give partial answers if you can’t give complete ones. Read the questions with care; work with deliberate speed. Don’t give us more than we ask for. The usual instructions apply. Good luck!

Problem 1 (8 points)

Below is a grammar in which terminal symbols are indicated by this typewriter typeface. PhoneNumber is the starting symbol.

\[
\begin{align*}
\text{PhoneNumber} & \rightarrow \text{Local} \mid \text{AreaCode Local} \\
\text{AreaCode} & \rightarrow 1 (\text{SpecialDigit Digit Digit}) \\
\text{Local} & \rightarrow \text{Exchange - Number} \\
\text{Exchange} & \rightarrow \text{SpecialDigit Digit Digit} \\
\text{Number} & \rightarrow \text{Digit Digit Digit Digit} \\
\text{Digit} & \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9 \\
\text{SpecialDigit} & \rightarrow 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9
\end{align*}
\]

(a) (6 points) Mark each of the following six sentences “legal” or “illegal” according to this grammar:

1-824-5072 No! 1(123)456-7890 No! 1(310)173-4344 No!
1(949)824-5072 (800)386-2103 No! 800-2345 No!

(b) (2 points) Draw the parse tree for one of the legal sentences above.
Problem 2 (12 points)

(a) (6 points) Draw a state transition diagram for an FSA that accepts valid Java package names. A Java package name is one or more “words” separated by periods; a “word” starts with a letter and continues with zero or more letters or digits. You may omit drawing the error state. Below are some examples:

Valid: java java.util java.awt.image.renderable org.omg.CORBA23
Invalid: <empty> java jive 55java.io java.what--now? this.year.is.2006

(b) (6 points) Draw the state transition table for your FSA above. You may leave blank any unspecified transitions; you may omit the error state. We have supplied horizontal lines; you will supply the vertical lines and everything else. You might not need all the rows.

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