Problem Set 5 – Due Friday, May 1, 2014

Problem 1. Specify a CFG for the language

$$L = \{x \in \{\texttt{bass}, \texttt{chicken}, \texttt{carp}, \texttt{turkey}\}^* : x \text{ contains as much fish as fowl}\}$$

(meaning that the number of occurrences in x of substrings $\texttt{bass}$ and $\texttt{carp}$ should be at least the number occurrences in x of substrings $\texttt{chicken}$ and $\texttt{turkey}$. Make your CFG as simple to understand as you can.

Problem 2. Prove that every regular language is context free. Do this by showing how to convert a DFA $M = (Q, \Sigma, \delta, q_0, F)$ into a CFG $G = (V, \Sigma, R, S)$ of roughly the same size.

Problem 3. Prove that every regular language is context free. Do this by showing how to convert a regular expression α into a CFG $G = (V, \Sigma, R, S)$ of roughly the same size.