University of Rochester **Computation and Formal Systems (CSC173)**

Homework 5

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You will not hand in the answers to this homework assignment. Instead, at the beginning of class on **21 November 2002** you will be asked to solve one of the problems as a closed notes, closed book quiz. The question to be solved will be randomly selected.

1. Remove left recursion from the following grammar:

$$\begin{array}{rcl} \mathit{idList} & \rightarrow & \mathit{idListPrefix}\ ; \\ \mathit{idListPrefix} & \rightarrow & \mathit{idListPrefix}\ ,\ \texttt{id} \\ & \rightarrow & \texttt{id} \end{array}$$

2. Perform left factoring on the following:

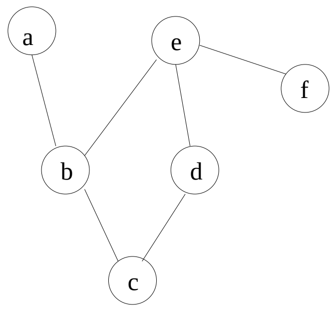
$$\begin{array}{rcl} \mathit{stmt} & \rightarrow & \texttt{id} := \mathit{expr} \\ & \rightarrow & \texttt{id}\ (\ \mathit{argumentList}\ ) \end{array}$$

3. Describe in plain english one language which can be expressed by a CFG, but not by a regular expression (You may NOT use the same one we used in class examples). Write a Grammar which accepts this language. Are there any langugages which cannot be described by a context free grammar? If so, name one. Hint: read the book!

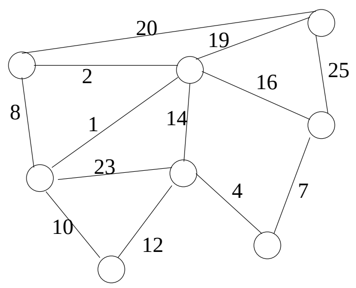
4. Draw the adjacency list and adjacency matrix representations for the graph below.

5. Label the graph below with a postfix numbering. Your traversal should start with the node labeled a. Indicate the graph edges which form the tree that matches your numbering. Indicate the node numbers (which you just assigned) which immediately indicate a cycle exists in this graph, and briefly explain why this implies a cycle.

6. In what order does Kruskal's algorithm add the links of the an MST for the graph below? You may either show this by listing in order the weights of the edges added, or by drawing the MST and indicating the order the edges were added.



(use in question 4 and 5)



(use in question 6)