Problem Set 6

Problem 1. Prove that

$$L = \{x \neq y : \ x \text{ and } y \text{ are binary strings and } x \neq y$$

is context free by describing a PDA for it. You needn't specify your PDA in full; an English-language description is fine.

Problem 2. A *regular grammar* is a context-free grammar $G = (V, \Sigma, R, S)$ in which every rule is of the form $A \to \varepsilon$ or $A \to aB$, where a is a terminal and A and B are variables. Show that L is regular iff L is generated by a regular grammar.

Problem 3. Consider the grammar G defined by $S \to AA$, $A \to AAA \mid bA \mid Ab \mid a$.

(a) Carefully and precisely describe the $L(G)$ in an easy-to-recognize form.

(b) Is $L(G)$ regular? Prove your answer either way.

(c) Is G ambiguous? Prove your answer either way.

(d) Is $L(G)$ inherently ambiguous? Give a convincing argument either way.