CSC 280 Quiz 3 Regular Expressions and Context Free Grammars (make-up)

Name:

The purpose of this quiz is to demonstrate that you understand how to prove properties of regular and context-free languages.

Take care with each problem to make sure that you match the requirements of the question exactly.

Determine whether the following language is regular. If it is, give an automaton that recognizes it. If not, prove that it's not using the pumping lemma.

$L = \{w | w \in \{0,1\}, w, \text{when interpreted as a binary number, is divisible by 3.}\}$

Show that $0^i 1^{i+j} 0^j$ is not a regular language using the pumping lemma. Give a context-free grammar that produces it.

In class we showed that $\{0^i 1^j | i \neq j\}$ is not a regular language. Give a context-free grammar for $\{0^i 1^j | i \neq j\}$.

Show that the strings with an equal number of the substrings 011 and 110 form a regular language.