You are strongly encouraged to do all of the problems. However, only the ones marked with (*) will be graded.

(*) **Question 1:** Use the pumping lemma to prove that this language over alphabet $\Sigma$ is *not* regular. $L = \{x \mid x = yy \text{ for some } y \in \Sigma^*\}$

**Question 2:** The strings over alphabet $\Sigma = \{(', ')\}$ where the string contains balanced parenthesis. For example, (()) is in the language, but ((( is not.