CSC 320 - Tutorial 4

1. Pumping lemma for regular languages

Pumping Lemma

If L is a regular language there exists some natural number p (the pumping length) where for <u>any string</u> s in L with a length of at least p (ie. $s \in L$ and $|s| \geq p$) s can be divided into substrings xyz satisfying the following conditions:

1. $|xy| \leq p$
2. $|y| > 0$
3. $xy^i z \in L$ for $i \geq 0$

Questions

1. Prove that the following languages are not regular using the pumping lemma
    a. $L_1 = \{0^n 1^n 2^n \mid n \geq 0\}$

b. $L_2 = \{w^r w \mid w \in \{0, 1\}^* \}$

2. Is the string $s = 0^p 0^p$ a good choice to devise a contradiction to prove L_2 is not regular? Why or why not?

Practice questions:

1. Show that L = $\{0^i 1^j \mid i > j\}$ is not regular
2. Show that L = $\{0^i 1^j \mid i < j\}$ is not regular
3. Show that L = $\{0^i 1^j \mid i \leq j\}$ is not regular
4. Argue that L = $\{0^i 1^j \mid i \leq j < 121\}$ is regular