Assignment 4

Computer Science 235

Reading. Section 1.4

1) Prove that the following languages are not regular.

a) $\{ 0^n1^m0^n \mid m,n \geq 0 \}$

b) The complement of $\{ 0^n1^n \mid n \geq 0 \}$

c) $\{ w \mid w \in \{0,1\}^* \text{ is not a palindrome} \}$

d) $\{ wtw \mid w,t \in \{0,1\}^+ \}$

2) *a)* Let $B = \{ 1^kg \mid g \in \{0,1\}^* \text{ and } g \text{ contains at least } k \text{ 1s, for } k \geq 1 \}$. Show that B is a regular language.

b) Let $C = \{ 1^kg \mid g \in \{0,1\}^* \text{ and } g \text{ contains at most } k \text{ 1s, for } k \geq 1 \}$. Show that C is not a regular language.

3) Consider the language $F = \{ a^ib^jc^k \mid i, j, k \geq 0 \text{ and if } i = 1 \text{ then } j = k \}$.

a) Show that F is not regular.

b Show that F acts like a regular language in the pumping lemma. In other words, give a pumping length p and demonstrate that F satisfies the three conditions of the pumping length for this variable p.

c) Explain why parts (*a*) and (*b*) do not contradict the pumping lemma.