

Assignment 9

Automata & Theory of Computation

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1. Determine whether or not the following languages are regular and explain why:

(1) $L = \{a^n b^k c^n : n \geq 0, k \geq n\}$.

$$L = a^n \underline{b^n} c^n \text{ (m by pumping lemma)}$$

$$L_1 = a^n b^{n-k} c^n \rightarrow \text{non regular (n-k} \leq n)$$

(2) $L = \{a^n b^l a^k : k \leq n + l\}$.

$$L = a^n \underline{b^n} a^{2n} \text{ (m by pumping lemma)}$$

$$L_1 = a^n b^{n-k} a^{2n} \rightarrow \text{non-regular (2n-k} \leq 2n)$$

(3) $L = \{ww : w \in \{a, b\}^*\}$.

$$= a^n b^m \text{ (n} \neq m) \rightarrow ww = a^n \underline{b^n} a^n b^m$$

$$L_1 = a^{n-k} b^m a^n b^m \rightarrow w'w \text{ (w' } \neq w)$$

\rightarrow non-regular