

1998 Paper 2 Question 7

Regular Languages and Finite Automata

Explain how the Pumping Lemma is used in proofs that languages are not regular.
[3 marks]

State, with justification, whether each of the following statements is true or false.

- (a) $\{a^m b^{2n} \mid m \geq 0 \text{ and } n \geq 0\}$ is regular.
- (b) $\{a^p b^{2q} \mid p, q \text{ prime}\}$ is regular.
- (c) No infinite subset of $\{a^n b^n \mid n \geq 0\}$ is regular.
- (d) No infinite subset of $\{ww \mid w \in \{a, b\}^*\}$ is regular.
- (e) Every finite subset of $\{ww \mid w \in \{a, b\}^*\}$ is regular.

[17 marks]