

HOMEWORK 2
DUE FEBRUARY 2 IN CLASS

1. (a) Let $L \subseteq \Sigma^*$ be a regular language. Is

$$L' = \{u \in \Sigma^* : \exists v \in \Sigma^* \text{ such that } uv \in L \text{ and } |u| = |v|\}$$

necessarily regular? Prove your answer.

- (b) Let $L \subseteq \Sigma^*$ be a regular language. Is

$$L'' = \{uv \in \Sigma^* : \exists w \in \Sigma^* \text{ such that } uww \in L \text{ and } |u| = |v| = |w|\}$$

necessarily regular? Prove your answer.

As a hint, we give the yes/no answers to these questions on the next page. Of course, you still have to provide proofs for those answers.

(a) Yes. (b) No.