

### Homework 3

CS 450  
Spring 2004  
Craig A. Rich

$\text{co-}\mathcal{RE}$  is the class of languages  $L \subseteq \Sigma^*$  whose complements are recursively enumerable; i.e.,

$$\text{co-}\mathcal{RE} = \{L \subseteq \Sigma^* \mid \bar{L} \in \mathcal{RE}\}.$$

Prove the following theorems.

- 1 **Theorem.**  $L \in \mathcal{RE} \implies$   $L$  is accepted by a DTM in which every accepting configuration is a halting configuration and every halting configuration is an accepting configuration.
- 2 **Theorem.**  $\mathcal{REC} = \mathcal{RE} \cap \text{co-}\mathcal{RE}$ .
- 3 **Theorem.**  $L_{\text{PCP}} \in \mathcal{RE}$ , where  $L_{\text{PCP}}$  is a language representing Post's Correspondence Problem.