(1) Problem 3.11 of [Sip].

(2) Consider

$$L = \text{PALINDROME}_{0,1} = \{ w \in \{0,1\}^* \mid w = w^{\text{rev}} \},$$

where if $w = \sigma_1 \ldots \sigma_k \in \{0,1\}^k$, then $w^{\text{rev}} = \sigma_k \ldots \sigma_1$. Give a formal description (i.e., specify $\delta$) of a 2-tape Turing machine (1) that recognizes this language, and (2) that on input $w$ takes time $O(|w|)$ (i.e., halts in $O(|w|)$ steps). Make sure that you explain how your machine works.