

## GROUP HOMEWORK 6, CPSC 421/501, FALL 2020

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Please note:

- (1) You must justify all answers; no credit is given for a correct answer without justification.
- (2) Proofs should be written out formally.
- (3) Homework that is difficult to read may not be graded.
- (4) You may work together on homework in groups of up to four, **but you must submit a single homework as a group submission under Gradescope.**

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(1) Problem 3.11 of [Sip].

(2) Consider

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

where if  $w = \sigma_1 \dots \sigma_k \in \{0,1\}^k$ , then  $w^{\text{rev}} = \sigma_k \dots \sigma_1$ . 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.

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