4200 - Formal Languages: Homework #7

Due on Dec 7, 2021 at 10:00pm

Instructor: Dr. Anh Nguyen

Problem 1

40 points

Draw the state-transition diagram for a Turing Machine M that *decides* each of the following languages. That is, M is supposed to accept all strings in the language and reject all strings not in the language (it cannot loop forever on any input).

Assume that the input alphabet is $\Sigma = \{0, 1\}$ and tape alphabet is $\Gamma = \Sigma \cup \{\square\}$. Feel free to define more tape symbols if necessary.

1. $A = \emptyset$
2. $B = \{\epsilon\}$
3. $C = \{0\}$
4. $D = \{1\}^*$

Problem 2

30 points

Show a Turing Machine M that decides the following language.

$$E = \{\ yy \mid y \in \{0, 1\}^*\ \}$$

Please

1. Describe in English the idea how it works. **15 points**
2. Show all the transitions. **15 points**