CMPE 350 - Spring 2019

PS 8 - 08.04.19

3.5 Examine the formal definition of a Turing machine to answer the following questions, and explain your reasoning.

a) Can a Turing machine ever write the blank symbol on its tape?

b) Can the tape alphabet Γ be the same as the input alphabet Σ?

c) Can a Turing machine's head ever be in the same location in two successive steps?

d) Can a Turing machine contain just a single state?

3.7 Explain why the following is not a description of a legitimate Turing machine.

M_{bad} ="On input $\langle p \rangle$, a polynomial over variables $x_1, \ldots, x_k$:

1. Try all possible settings of $x_1, \ldots, x_k$ to integer values.
2. Evaluate p on all of these settings.
3. If any of these settings evaluates to 0, accept ; otherwise, reject."

• Design a context-free grammar whose language contains a string which has infinitely many derivations.

• Prove that a PDA that has the ability to reverse the contents of its stack is more powerful than the ordinary PDA.

• Some questions from old exams.