

Homework Assignment #7
Due: November 16, 4:00 p.m.

1. Problem 3.15(b) on page 161 of the textbook.
2. In this question, we consider Turing machines with a single tape. Suppose we modify the definition of a Turing machine so that it gets two additional powers: it can insert a new, blank square into the middle of the tape (to the right of the current head location) or it can cut one square out of the tape. Such a machine is called a splicing Turing machine (STM).
 - (a) Briefly describe how every STM can be simulated using an ordinary Turing machine.
 - (b) Suppose you had a STM algorithm that took at most $T(n)$ steps on all inputs of length n . Inserting a square into the tape or cutting a square out of the tape counts as a single step of the STM. Give a good upper bound on the number of steps an ordinary Turing machine would take when simulating the STM using the simulation you gave in part (a). If you like, you may use big-O notation to state your bound; you do not have to worry about constant factors. Explain briefly why your answer is correct.