Homework #2

1. 1. Denote n is the length of input x in L, n’ is the length of input x’ in L’.

We decide a Deterministic Turing Machine M:

* + 1. If x didn’t belong in x’ at the beginning, return False.
    2. Cut the string at length of x, if the rest of bits have 1, return False.
    3. If the length of rest of 0’s not equal to 100 time |x|, return False.
    4. Return True.
  1. Now we proof M is run in .

The relation of size between L’ and L can be showed as the equation

(1.1)

By equation (2.1), we get

(1.2)

We measure the computation time in M, we get

(1.3)

Substitute n’ into n in (2.3), we get

(1.4)

Formula (2.4) bounded by . Thus, we show that .

1. 1. By definition, the configuration of NTM M is , and a DTM A, outputs a set such that

. The truth tells us that occupy space, where c is a finite constant. We now use DTM M’

* + 1. Use depth-first-search parse all possible computing path, if there is a `Yes’, than return True.
    2. If no path is `Yes’, than return False.

to simulated NTM M. Because the size of is polynomial, the DTM M’ decide L within a polynomial time. Thus, .