

Homework 10, Due Friday, December 7, 2012

Problem 1:

Prove that the set of all binary strings with more 0's than 1's is not recognized by any DFA.

Problem 2:

Use the method given in class to design a linear-time algorithm to determine all occurrences of the string 01011010101 in strings over the alphabet $\{0, 1\}$.

Problem 3:

Let B be the set of all infinite binary sequences. Show that B is uncountable using a proof by diagonalization. (Note that infinite binary sequences are not strings since any string has finite length.)

Problem 4:

Let $T = \{(i, j, k) \mid i, j, k \in \mathbb{N}\}$. Show that T is countable.

Problem 5:

[This problem will not be graded.] Show that the following problem is undecidable using the fact that the halting problem is undecidable: Given the code $\langle P \rangle$ of a Java program P and an input x to P , determine whether or not P ever prints out a 1 on input x .