CSCI 538 Computability

Assignment 2 (10 marks)

Question 1 (2 marks)

Let $T = \{ < M > | M$ is a TM that accepts $w^6$ whenever it accepts $w \}$. Show that $T$ is undecidable. (You cannot use Rice’s theorem before proving it first.)

Question 2 (2 marks)

Show that $A$ is Turing-recognizable if and only if $A \leq_m A_{TM}$.

Question 3 (2 marks)

In the following instance of the Post Correspondence Problem, is there a match? Why?

![PCP instance]

Question 4 (2 marks)

Let $EQ_{DFA} = \{ < G, H > | G, H$ are DFA’s and $L(G) = L(H) \}$. Show that $EQ_{DFA}$ is in $P$.

Question 5 (2 marks)

Define UNARY-SSUM as the problem where you are given a set of positive integers $S = \{ a_i | a_i$ has a single decimal digit for $i = 1, \ldots, n \}$ and another positive integer $C$, and you need to decide whether there exists a subset of integers in $S$ which sum to $C$. Show that UNARY-SSUM is in $P$.

Date Due: before the end of class on Tuesday, Oct 3, 2017. No late assignment will be accepted.