

Problem Set 7

CS172 Spring 2005

Out: March 16, 2005

Due: March 30, 2005 by 5 PM to CS172 Drop Box

1. (*Sipser 6.16*) Show that the set of incompressible strings is undecidable.
2. (*Sipser 6.20*) Show that PCP is decidable relative to A_{TM} . (PCP is the language for the Post Correspondence Problem in Section 5.2).
3. (*Sipser 6.22*) Let

$$Z = \{\langle M, w \rangle \mid M \text{ is an oracle TM and } M^{A_{TM}} \text{ accepts } w\}.$$

Use a proof by diagonalization to show that an oracle TM with an oracle for A_{TM} can't decide Z .

4. (*Sipser 7.13*) Show that P is closed under the star operation. (Hint: On input $y = y_1 \cdots y_n$ for $y_i \in \Sigma$, build a table indicating for each $i \leq j$ whether the substring $y_i \cdots y_j \in A^*$ for any $A \in P$.)