

Homework 5

Due: 20 March 2002

Problem 1: [Undecidability via counting argument] Problem 4.21

Problem 2: [Undecidability via reduction] Problem 5.12

Problem 3: [Undecidability via reduction] Consider a new model of a Turing machine which allows, in addition to the standard operations, a new operation: “explode.” When the Turing machine executes this operation it literally explodes, creating a huge mess.

It would certainly be desirable to be able to test a Turing machine to see whether or not it would explode. Formulate this problem as a language, and show that it is undecidable. (Note: this is exactly the same as Problem 5.16, where “explode” is substituted for “writes on the second tape.”)

Problem 4: [Post correspondence problem I] Problem 5.17. (Hint: for each tile, consider the difference between the number of characters on the top and the number of characters on the bottom.)

Problem 5: [Post correspondence problem II] Problem 5.18