

Computability and Logic Homework 7

Due: Thursday, November 3, 2005

Practice Problems (Don't hand in)

Exercises 13.1.4a on p. 773 and 13.2.2a on p. 788 of the text.

Problems to Hand In

1. Exercise 13.1.6 on p. 773.
2. Construct a Turing machine to decide the language $\{ww \mid w \in \{a, b\}^*\}$. If you wish, you may construct a multitape machine. Describe your machine informally but carefully.
3. Exercise 13.2.2b on p. 788.
4. Let $f : \mathbb{N}^m + 1 \rightarrow \mathbb{N}$ be a recursive function. Show that the function h defined by

$$h(\bar{x}, y) = \begin{cases} 0 & \text{if for some } i \leq y, f(\bar{x}, i) = 0 \\ 1 & \text{otherwise} \end{cases}$$

is also recursive, and that f is primitive recursive then h is primitive recursive. Be careful: do not assume that any functions are recursive other than the initial functions and those shown to be recursive in Section 13.2.3 (or earlier in this problem set). When you obtain a function by composition or primitive recursion, make sure it is clear from what functions it is obtained.