

# Theory of Computation

## Homework 1

Due: 2012/10/02

**Problem 1** Read Examples 2.1, 2.2, and 2.3 in the textbook. No answers required.

**Problem 2** Recall that if  $L$  is decided by some Turing machine, then  $L$  is called recursive. Show that any finite set  $S$  of natural numbers is recursive.

**Ans:**

Let  $L = \{n_0, n_1, \dots, n_k\}$ . We can write an algorithm to decide  $L$ . To check whether the input number  $x$  is in  $L$ , check: Is  $x = n_0$ ? Is  $x = n_1$ ? ... Is  $x = n_k$ ? Note that  $n_0, \dots, n_k$  are part of the program, not inputs. If one of the checks is true, answer “yes”; otherwise, answer “no”. ■