BU CLA CS 530: Analysis of Algorithms
Spring 1995

Problem Set 4 (due Thursday 95.02.16)

---

1. Let T and P be two strings of characters: $t_1, \ldots, t_n$ and $p_1, \ldots, p_m$, respectively, with $m \leq n$. We say P is a *substring* of T if there exists a sequence of indices $1 \leq i_1 < i_2 < \ldots < i_m \leq n$ such that $p_1 = t_{i_1}, p_2 = t_{i_2}, \ldots, p_m = t_{i_m}$. Design an $\mathcal{O}(n)$ algorithm to determine whether P is a substring of T. (Hint: Start from first principles, don't try to adapt any of the algorithms in Chapter 34 of [CLR].)

2. Exercise 34.4-5, page 876, in [CLR]. (Hint: Your algorithm should be based on the KMP-MATCHER, which can be taken in the form given in the book or in class.)

3. a. Exercise 18.1-3, page 360, in [CLR].
   b. Exercise 18.2-2, page 363, in [CLR].
   (Hint: Both parts are really about the same thing, and it is easy to do once you understand the 2-3 pages preceding the exercises.)

4. a. Exercise 34.4-4, page 876, in [CLR].
   b. Design an $\mathcal{O}(n)$ algorithm to compute the function π'.
   (Hint: The function π' is basically the function *next* used in the KMP-MATCHER presented in class.)

Created: 95.02.09