

## Problem 1

Klienberg and Tardos Chp6, problem 6 (Pretty printing)

## Problem 2

Problem 6.26 on p. 333.

## Problem 3

Shuffle: Suppose you are given three strings of characters:  $X = x_1x_2\dots x_n$ ,  $Y = y_1y_2\dots y_m$ , and  $Z = z_1\dots z_{n+m}$ . We want to know whether we can shuffle  $X$  and  $Y$  to produce  $Z$ . A shuffle  $S$  of two strings  $X$  and  $Y$  is valid if the characters of  $X$  appear in order in  $S$  and if we remove those characters from  $S$ , what remains is  $Y$ . For example, if  $X = aabacb$ ,  $Y = caa$ , then  $S = caaabaacb$  is a shuffle (the first, second and 7th characters give us  $Y$ , the rest is  $X$ ), but  $ccaaaabab$  is not (since we can't have two  $c$ 's appear before any  $b$ 's).

- a Give an brute force algorithm that given  $X, Y, Z$  determines whether  $Z$  is a shuffle of  $X$  and  $Y$ . Analyze your algorithms space and time requirements.
- b Give an efficient dynamic programming algorithm that given  $X, Y, Z$  determines whether  $Z$  is a shuffle of  $X$  and  $Y$ . Analyze your algorithms space and time requirements.