COMP3711: Design and Analysis of Algorithms

Tutorial 9

Question 1

Suppose you want to make change for n (HK) dollars using the fewest number of coins. Assume that each coin's value is an integer.

Give an $O(nk)$-time dynamic programming algorithm that makes change for any set of k different coin denominations, assuming there is always the 1-dollar coin.

Question 2

KFCC is considering opening a series of restaurants along the Highway. The n possible locations are along a straight line, and the distances of these locations from the start of the Highway are, in miles and in increasing order: $m_1, m_2, \ldots, m_n$. The constraints are as follows:

1. At each location, KFCC may open at most one restaurant. The expected profit from opening a restaurant at location i is p_i, where $p_i > 0$ and $i = 1, 2, \ldots, n$.
2. Any two restaurants should be at least k miles apart, where k is a positive integer.

Give a dynamic programming algorithm that determines the locations to open restaurants which maximizes the total expected profit.