CSE548 Quiz 2017-10-18   Name: ______________________________

DP for Longest Increasing Subsequence (LIS) problem:
Given sequence such that all elements of the subsequence are sorted in increasing order, find the length of the longest subsequence.
For example, the length of LIS for S={10, 22, 9, 33, 21, 50, 41, 60, 80} is 6 and LIS is {10, 22, 33, 50, 60, 80}.
Devise a DP algorithm:
Let L(i) be the length of the LIS ending at index i such that i^{th} element s_i is the last element of the LIS.
1. What is the length of the longest increasing subsequence of the given problem? Write in terms of variable L.

2. Recurrence relation of the optimal variable.

DP for 0-1 Knapsack problem:
Given a set of items, I, indexed from 1 to n, where item I has weight $w_i > 0$ and profit p_i and a knapsack capacity of M, find the subset of I that maximized the total profit subject that the sum of weights of selected items are smaller or equal to M.
Let R_l^i be maximum profit possible using a subset of elements indexed {1,…, *i*} and yield weight exactly *l*. *($i \le n$, $0 \le l \le M$)*

1. What is the maximum profit of the given problem? Write in terms of variable R.

2. Devise the recurrence relationship of R_l^i and its sub-problems.