(1) (5 Points) Consider Knapsack problem with repetition with n items with values v_i and weight w_i. We have following defined sub-problems:

$$K[v] = \text{weight of the lightest collection with total value at least } v, \text{ repetitions allowed}$$

Is it possible to define a recurrence relation to solve above sub-problems? If possible, give the recurrence formula; otherwise provide the reason why it is not possible.

(2) (10 Points) You are given some identical eggs and a building. You need to figure out the maximum floor l that you can drop them from without breaking them. Each egg will break if dropped from a floor greater than or equal to l, and will never break when dropped from a floor less then l. Note that once an egg breaks, you cannot use it any more.

- (4 Points) If you are given only one egg and a 100-story building, what is the strategy to figure out what l is, no matter what value l is? What is the maximum number of drops in the strategy?
- (3 Points) If you are given two eggs and a 10-story building, what is the strategy to figure out what l is, which has the minimum number of drops in worst cases?
- (3 Points) If you are given k eggs and a n-story building, give the algorithm to figure out the method that figures out what l is with minimum number of drops in worst cases and the minimum number of drops in worst cases using dynamic programming.