2020-10-04 - Handout – Dynamic Programming

Q1. Remove Boxes

Link:: https://leetcode.com/problems/remove-boxes/

Given several boxes with different colors represented by different positive numbers. You may experience several rounds to remove boxes until there is no box left. Each time you can choose some continuous boxes with the same color (composed of k boxes, k >= 1), remove them and get k*k points.
Find the maximum points you can get.

Constraints:

- 1 <= boxes.length <= 100
- 1 <= boxes[i] <= 100

Example:
Input: boxes = [1,3,2,2,2,3,4,3,1]

Output: 23

Explanation:

[1, 3, 2, 2, 2, 3, 4, 3, 1]

----> [1, 3, 3, 4, 3, 1] (3*3=9 points)

----> [1, 3, 3, 3, 1] (1*1=1 points)

----> [1, 1] (3*3=9 points)

----> [] (2*2=4 points)

Q2. Strange Printer

Link: https://leetcode.com/problems/strange-printer/

There is a strange printer with the following two special requirements:

1.The printer can only print a sequence of the same character each time.

2.At each turn, the printer can print new characters starting from and ending at any places, and will cover the original existing characters.

Given a string consists of lower English letters only, your job is to count the minimum number of turns the printer needed in order to print it.

Hint: Length of the given string will not exceed 100.

Example1:
Input: "aaabbb"

Output: 2

Explanation: Print "aaa" first and then print "bbb".

Example2:
Input: "aba"

Output: 2

Explanation: Print "aaa" first and then print "b" from the second place of the string, which will cover the existing character 'a'.

Q3. Burst Balloons

Link: https://leetcode.com/problems/burst-balloons/

Given n balloons, indexed from 0 to n-1. Each balloon is painted with a number on it represented by array nums. You are asked to burst all the balloons. If the you burst balloon i you will get nums[left] * nums[i] * nums[right] coins. Here left and right are adjacent indices of i. After the burst, the left and right then becomes adjacent.

Find the maximum coins you can collect by bursting the balloons wisely.

Note:

You may imagine nums[-1] = nums[n] = 1. They are not real therefore you can not burst them.

$0 \le n \le 500$, $0 \le nums[i] \le 100$

Example:
Input: [3,1,5,8]

Output: 167

Explanation: nums = [3,1,5,8] --> [3,5,8] --> [3,8] --> [8] -- > []

coins = 3*1*5 + 3*5*8 + 1*3*8 + 1*8*1 = 167