2020-05-09 - Handout – Priority Queues / Heaps

Q1. Kth Smallest Element in a Sorted Matrix

Link: https://leetcode.com/problems/kth-smallest-element-in-a-sorted-matrix/

Given a n x n matrix where each of the rows and columns are sorted in ascending order, find the kth smallest element in the matrix.

Note that it is the kth smallest element in the sorted order, not the kth distinct element.

Example:

matrix = [

[1, 5, 9],

[10, 11, 13],

[12, 13, 15]

],

k = 8,

return 13.

Note:

You may assume k is always valid, 1 ≤ k ≤ n2.

Q2. Top K Frequent Words

Link: https://leetcode.com/problems/top-k-frequent-words/

Given a non-empty list of words, return the k most frequent elements.

Your answer should be sorted by frequency from highest to lowest. If two words have the same frequency, then the word with the lower alphabetical order comes first.

Example 1:

Input: ["i", "love", "leetcode", "i", "love", "coding"], k = 2

Output: ["i", "love"]

Explanation: "i" and "love" are the two most frequent words.

Note that "i" comes before "love" due to a lower alphabetical order.

Note:

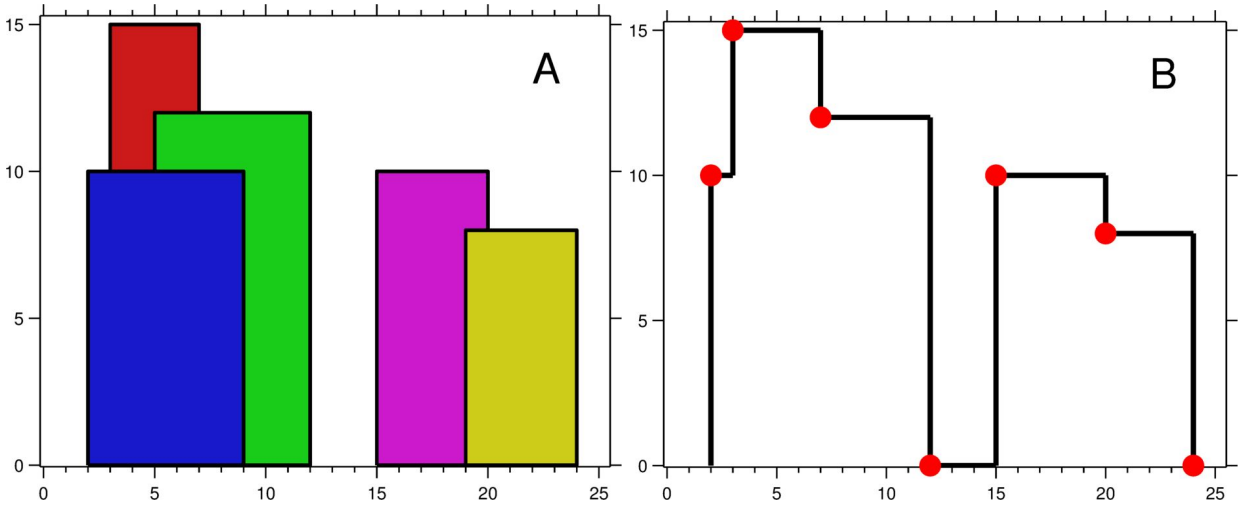
You may assume k is always valid, 1 ≤ k ≤ number of unique elements.

Input words contain only lowercase letters.

Q3. The Skyline Problem

Link: https://leetcode.com/problems/the-skyline-problem/

A city's skyline is the outer contour of the silhouette formed by all the buildings in that city when viewed from a distance. Now suppose you are given the locations and height of all the buildings as shown on a cityscape photo (Figure A), write a program to output the skyline formed by these buildings collectively (Figure B).



The geometric information of each building is represented by a triplet of integers [Li, Ri, Hi], where Li and Ri are the x coordinates of the left and right edge of the ith building, respectively, and Hi is its height. It is guaranteed that 0 ≤ Li, Ri ≤ INT_MAX, 0 < Hi ≤ INT_MAX, and Ri - Li > 0. You may assume all buildings are perfect rectangles grounded on an absolutely flat surface at height 0.

For instance, the dimensions of all buildings in Figure A are recorded as: [[2 9 10], [3 7 15], [5 12 12], [15 20 10], [19 24 8]] .

The output is a list of "key points" (red dots in Figure B) in the format of [[x1,y1], [x2, y2], [x3, y3], ...] that uniquely defines a skyline. A key point is the left endpoint of a horizontal line segment. Note that the last key point, where the rightmost building ends, is merely used to mark the termination of the skyline, and always has zero height. Also, the ground in between any two adjacent buildings should be considered part of the skyline contour.

For instance, the skyline in Figure B should be represented as:[[2 10], [3 15], [7 12], [12 0], [15 10], [20 8], [24, 0]].