CSC-349 Design and Analysis of Algorithms
Programming Assignment 1

The Skyline Problem

Leetcode problem 218

A city's skyline is the outer contour of the silhouette formed by all the buildings in that city when viewed from a distance. Given the locations and heights of all the buildings, return the skyline formed by these buildings collectively. **You should submit a code in Python. Your code will be tested using the input format shown in the examples below. Your code must compile and run to receive any credit.**

The geometric information of each building is given in the array buildings where $buildings[i] = [left_i,\ right_i,\ height_i]$:

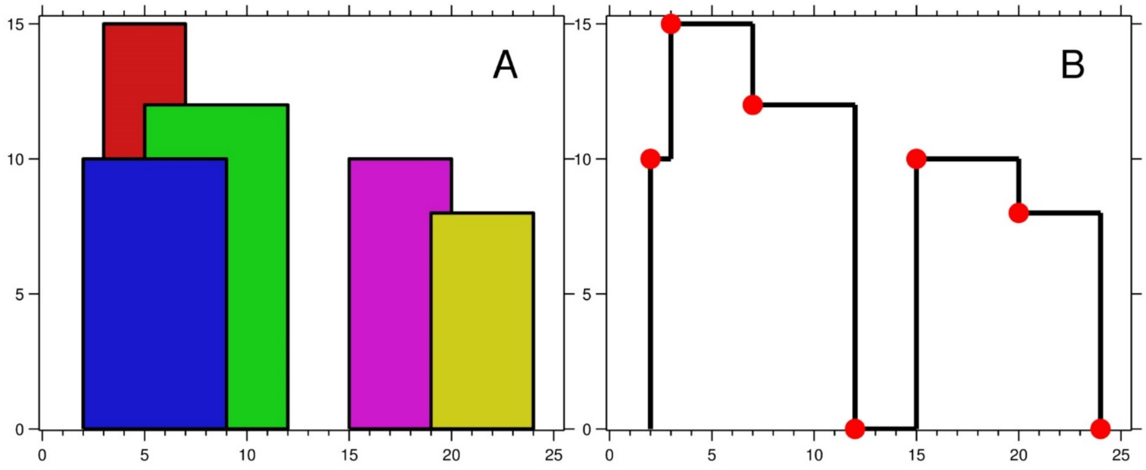
$left_i$ is the x coordinate of the left edge of the ith building.
$right_i$ is the x coordinate of the right edge of the ith building.
$height_i$ is the height of the ith building.
You may assume all buildings are perfect rectangles grounded on an absolutely flat surface at height 0.

The skyline should be represented as a list of "key points" sorted by their x-coordinate in the form $[[x1, y1], [x2, y2], \ldots]$. Each key point is the left endpoint of some horizontal segment in the skyline except the last point in the list, which always has a y-coordinate 0 and is used to mark the skyline's termination where the rightmost building ends. Any ground between the leftmost and rightmost buildings should be part of the skyline's contour.

Note: There must be no consecutive horizontal lines of equal height in the output skyline. For instance, [...,[2 3],[4 5],[7 5],[11 5],[12 7],...] is not acceptable; the three lines of height 5 should be merged into one in the final output as such: [...,[2 3],[4 5],[12 7],...].

Example 1:
Input: buildings = [[2,9,10],[3,7,15],[5,12,12],[15,20,10],[19,24,8]]
Output: [[2,10],[3,15],[7,12],[12,0],[15,10],[20,8],[24,0]]

Explanation:
Figure A shows the buildings of the input.
Figure B shows the skyline formed by those buildings. The red points in figure B represent the key points in the output list.



Example 2:
Input: buildings = [[0,2,3],[2,5,3]]
Output: [[0,3],[5,0]]

Constraints:

1. $1 \leq buildings.length \leq 10^4$
2. $0 \leq lefti < righti \leq 2^{31} - 1$
3. $1 \leq heighti \leq 2^{31} - 1$
4. buildings are sorted by $left_i$ in non-decreasing order.

The grading criteria for this lab are:

The implementation **correctly** solves the task for all test cases. The algorithm uses **divide and conquer strategy** and follows the best coding practices.	**100%**
The implementation **correctly** solves the task for all test cases but does not use divide and conquer strategy.	**60%**
The implementation solves the task but has several failing edge cases.	**50%**
The implementation attempts to solve the task but fails in many cases.	**30%**
The implementation does not correctly solve the task.	**15%**
No attempt was made, or code does not compile/run.	**0%**