## Handin 5

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# 1 Skyline

We wish to make an algorithm that produces the silhouette of a city. Each building in the city is represented by a tripple (l,h,r) where l (r) is the coordinate on the horizontal line where the building begins (ends) and h is the height of the building.

The sihouette of the city is a vector  $(x_0, h_1, x_1, \dots, x_{i-1}, h_i, x_i, \dots, h_n, x_n)$  where  $x_j < x_{j+1}$  and  $h_j$  represents the height between point  $x_{j-1}$  and  $x_j$ .

#### 1.1 a)

Given a silhouette

$$(x_0, h_1, x_1, \dots, x_{i-1}, h_i, x_i, \dots, h_n, x_n)$$
 (1.1)

We wish to add a building (l, h, r) we use zhe following algorithm.

Time | Line pr | Pseudocode

Time	Line nr	Pseudocode
1	0	Build-Radix-Tree(S)
1	1	T.root.key = false
m	2	for $s_j \in S$
$n_j + 1$	3	InsertRT $(s_j, T, T.root)$

### 1.2 b)

Given 2 silhouettes

$$X = (x_0, h_1, x_1, \dots, x_{i-1}, h_i, x_i, \dots, h_n, x_n)$$
(1.2)

$$Y = (y_0, h'_1, y_1, \dots, y_{i-1}, h'_i, y_i, \dots, h'_m, y_m)$$
(1.3)

We wish to combine them into one. Assume without loss of generality that  $m \leq n$ 

Time	Line nr	Pseudocode
		CombineSilhouette(X,Y)
$\mathbf{m}$	1	for $k = 1$ to $k=m$
n	2	$addBuilding(X,(y_{k-1},h'_k,y_k)))$

If addBuilding works, so does CombineSilhouette.

#### 1.3 c)

We wish to write the divide and conquer algorithm to take care of this problem.