

Tutorial 9: Range trees

1. Consider the following points being stored in a 2D range tree: $(2, 12)$, $(17, 77)$, $(23, 92)$, $(40, 47)$, $(55, 91)$, $(67, 27)$, $(89, 79)$, $(99, 53)$, $(10, 23)$, $(35, 7)$, $(61, 40)$, $(95, 56)$, $(22, 42)$, $(88, 15)$, $(42, 2)$.
 - a) Draw the x -BST for this range tree.
 - b) Draw the corresponding y -BSTs for the points $(88, 15)$, $(61, 40)$ and $(67, 27)$.
 - c) Perform a range-search with the query rectangle $[35, 90] \times [5, 30]$, indicating the boundary and topmost inside nodes.
2. Show how to find all points greater than or equal to y in a binary heap in $O(1 + s)$ time, where s is the number of reported points.

3. Show how to build a priority search tree in $O(n \log n)$ worst-case time.