Range query in treaps

Treap-Range-Search( $T, 28, 47, 36$) : \( [x_1, x_2] = [28, 47], [y_1, y_2] = [36, \infty) \)

- BST-Range-search($x_1, x_2$) to get boundary and allocation nodes.
- Boundary-nodes: Explicitly test whether in $x$-range and $y$-range.
- Allocation-nodes: If $y \geq y_1$, report and recurse in children.
Priority search trees

- Root stores:
  - Point $\bar{p}$ that maximizes $y$-coordinate
  - Median $\hat{x}$ of the remaining points.
- Items in left and right subtrees split by $\hat{x}$
- Range-search is very similar to treaps, use $\hat{x}$ to find path
- Height is $O(\log n)$