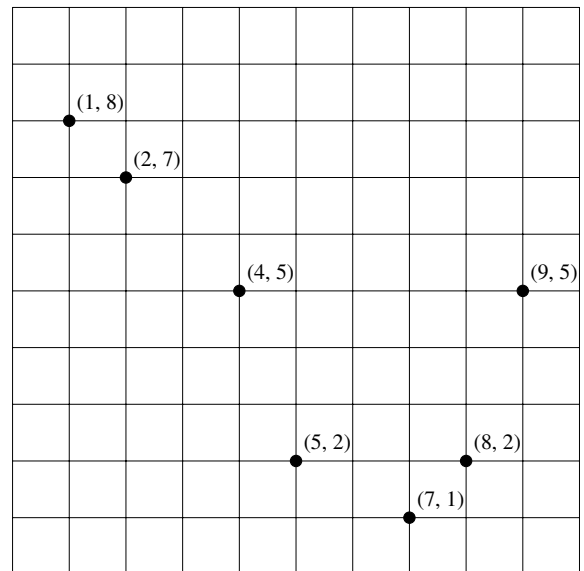


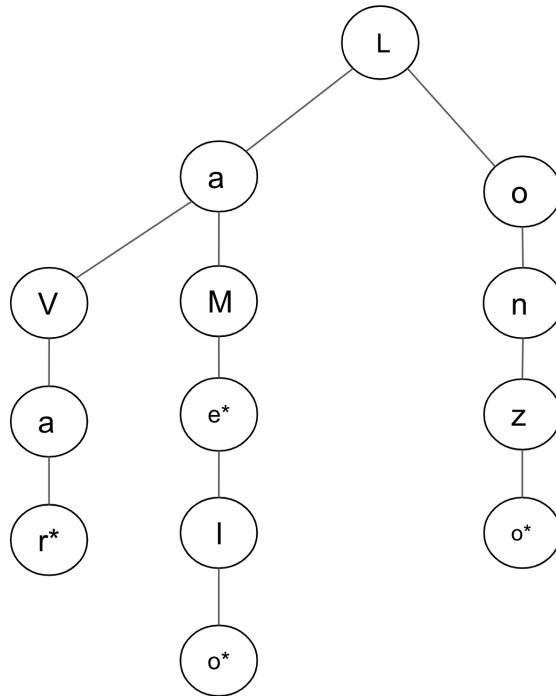
### 1 KD Trees

Given the points shown in the grid to the right, draw a perfectly balanced  $k$ -d tree in the box below. For this tree, first split on the  $x$  dimension. The resulting tree should be complete with height 2. Then, draw the corresponding splitting planes on the grid.



## 2 Trie Me

The Big Baller Brand has decided to use a trie to have fast lookup of their Big Ballers. Currently, the state of the trie is as follows:



1. The Biggest Baller of them all, CEO LaVar Ball, enjoys being reminded of who is a Big Baller. Remind him of who the Big Ballers are by finding all the words in the trie. Note: The nodes with an asterisk denote the end of a word.
2. Not again! LaVar Ball has forgotten about his son LiAngelo once again. Help LaVar by inserting "LiAngelo" and "Love" into the trie above so that no Big Baller is forgotten.
3. How long does it take to add  $n$  words, each of max length  $L$ ?
4. What's the best and worst case runtime to check whether a word of length  $L$  is in the trie?