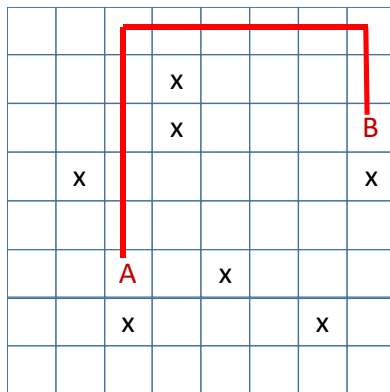


- For each of the following tasks, list two suitable performance measures:
  - Driving in a car racing event.
  - Filtering spam mails.
  - Online product recommendation system
- Using the Romanian map in the textbook, search for the path to Bucharest from Lugoj using graph-search BFS. For equally preferred nodes, generate and expand them in alphabetical order. Show the frontier after each step, the order of expanded nodes, and the solution found.
- Same as problem #2, but use A\* search with the straight-line distance heuristic. When showing the frontier, include the  $f$ ,  $g$ , and  $h$  score for each node.
- In chess, a rook can move on a chessboard any number of squares in a straight line, vertically or horizontally, but cannot jump over other pieces. The problem is to move a rook from square A to square B in the smallest number of moves. For example, in the figure below, the red line is a 3-step solution (the X's mark other pieces).
  - What is the maximum branching factor from any square? Assume an 8x8 board, as the example below.
  - Design an admissible heuristic for this problem. You need to provide your rationale (what constraint is removed) and also explain why it is admissible. Is it consistent?
  - Assume that graph-search is used, count the number of squares reachable from A at each different step count using BFS. How many nodes have to be generated at step counts below 3, the solution depth?
  - Repeat (c) using IDS instead of BFS.
  - Assume that graph-search is used, run A\* using your heuristic. How many nodes are expanded (A and B included) during the search from A and B?



## Notes:

- Late submission penalty: 10% per day for up to 3 days.
- Please submit the assignment through the E3 system.