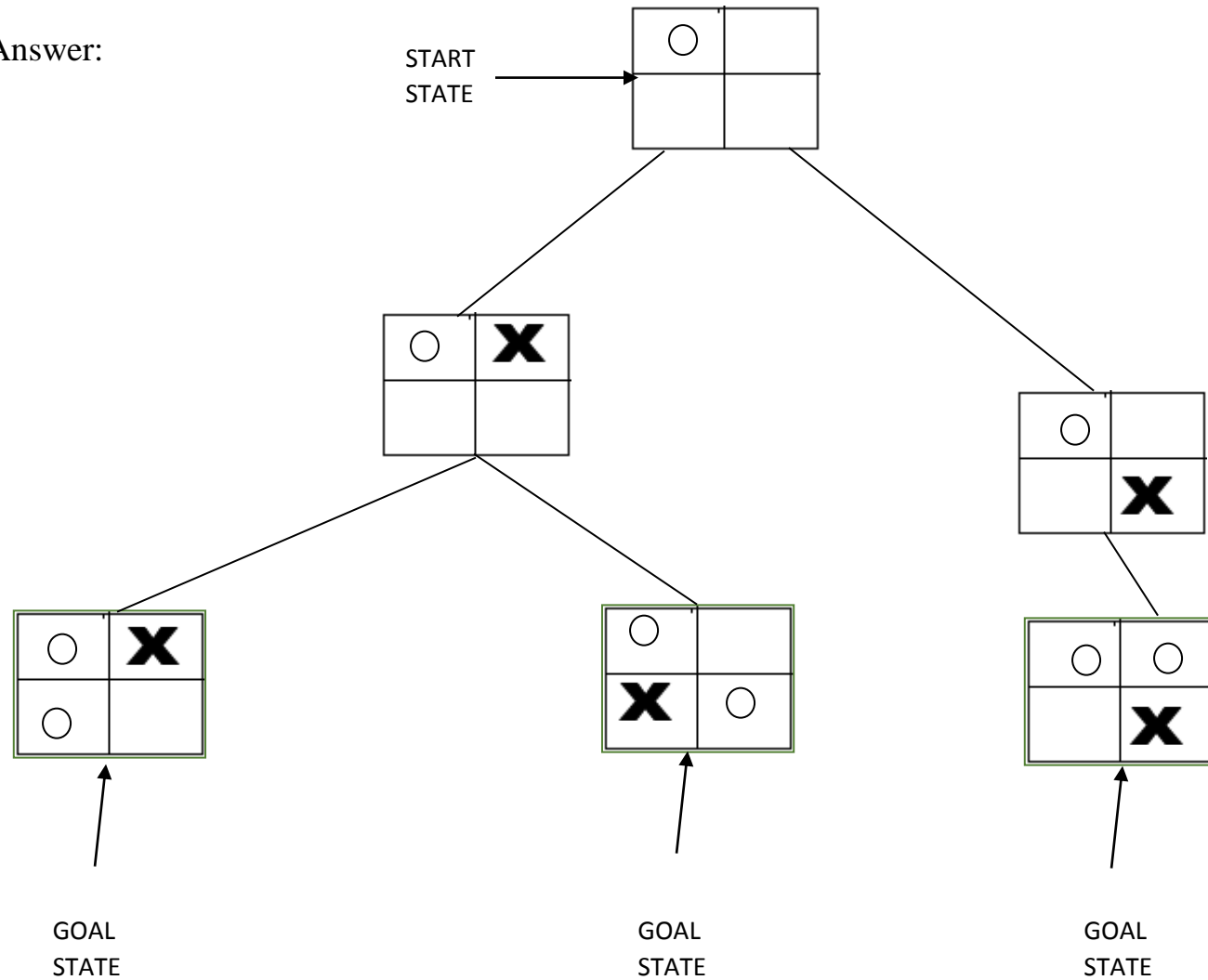


Question 1 : Consider a particularly unusual variant of tic-tac-toe, wherein the first player to complete a row, column, or diagonal loses the game. Draw the state graph of this game for a 2 x 2 board.

Answer:



Question 2: Consider the heuristic function for the 8-puzzle given by: $h(s) = \text{sum of permutation inversions}$: For example, $h(N) = 4+6+3+1+0+2+0+0 = 16$ (there are 4 numbers smaller than 5 that come after 5, 6 numbers smaller than 6 that come after 5, 6 numbers smaller than 6 that come after 6, and so on) for the following board configuration N :

5		8
4	2	1
7	3	6

State (N)

Is h admissible? Prove your answer:

Answer: Consider the following state configuration N:

1	2	3
4	5	
7	8	6



START NODE

1	2	3
4	5	
7	8	6



GOAL NODE

In order to reach the goal state configuration from N the cost involved is 1. However, by using permutation inversion the cost involved is $1+2=3$. Hence, by proof of contradiction, for heuristic functions involving permutation inversions, h is not admissible.