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In a game of Tic-Tac-Toe, each player (X and O) takes turns placing their piece on a 3 x 3 board. In the game, X player will always go first. The winner gets 1 point, and the loser gets -1 point. In case of a draw, both players get 0 points.

1 Formulate this problem into an adversarial search problem: 1. State, 2. Players, 3. Action function, 4. Transition function, 5. Terminal test, 6. Utility function

Initial State : if player = X
state = {X}

player : {x, O}

Action : put player string into empty 3x3 tiles

Transition Function :
```
transition(x,y,player){
  for(let i=0 ; i<map[0].length ; i++){
    for(let j=0 ; j<map[0].length ; j++){
      if(i=y && j=x){
        map[i][j] = player
      }
    }
  }
```

Terminal test : check
if all3tiles are the same
and connect to
each other

Utility function

if (player X win) xpoint += 1, ypoint -=1 ;
(player y win) ypoint += 1, xpoint -=1 ;

2 What is the maximum branching factor? .....8.....

3 What is the maximum depth of the game tree (starting at 0)? .....8.....

4 Assume that you are an O player. After the X player places his/her piece, we will construct a minimax tree to find an optimal move for the O player. Which is the type of the first node? ☐ Max Node / ☐ Min Node

5 Assuming that you are an O player again, please write

(a) a non-terminal state that should have the highest evaluation value

(b) a non-terminal state that should have the lowest evaluation value

Terminal test : check

if all 3 tiles are the same

and connect to

each other

```
for(let j=0; j<
if(i=y && j=x)
map[i][j] = P
}
}
}
```

Utility function

```
if (player X win) xpoint += 1, ypoint -=1 ;
(player y win) ypoint +=1, xpoint -=1 ;
```

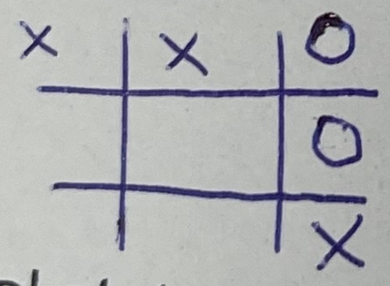
2 What is the maximum branching factor? ..... 8 .....

3 What is the maximum depth of the game tree (starting at 0)? ..... 8 .....

4 Assume that you are an O player. After the X player places his/her piece, we a minimax tree to find an optimal move for the O player. Which is the type of node? ☐ Max Node / ☐ Min Node

5 Assuming that you are an O player again, please write

(a) a non-terminal state that should have the highest evaluation value



(b) a non-terminal state that should have the lowest evaluation value