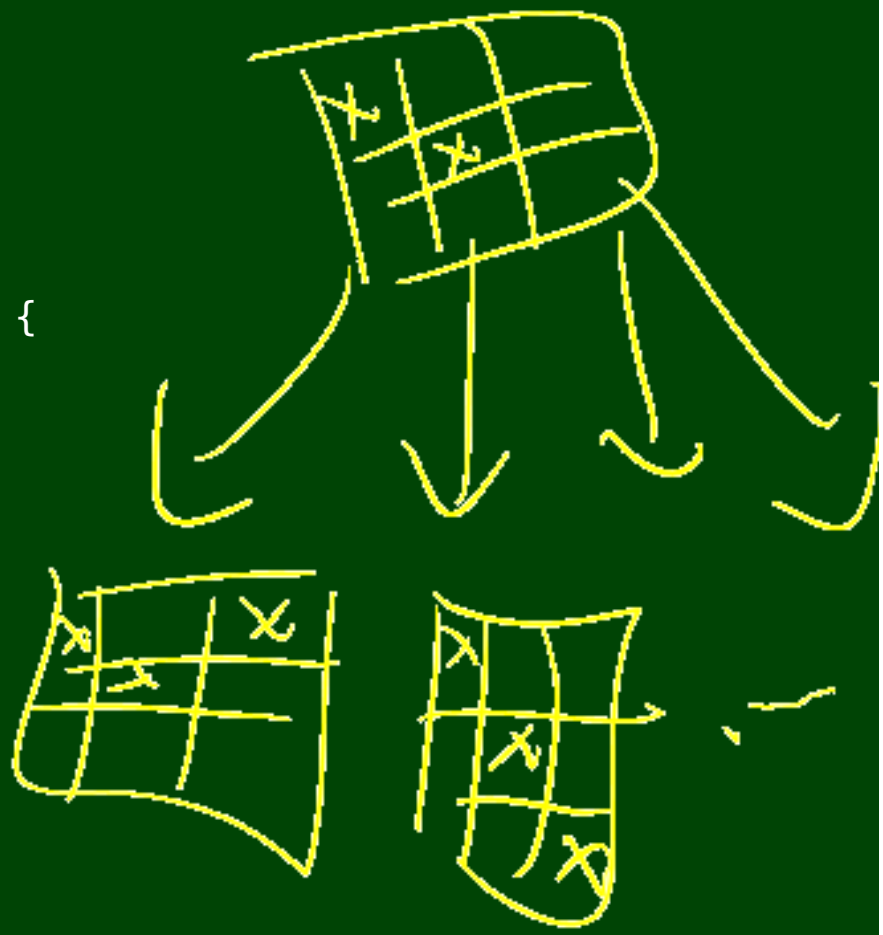
P3

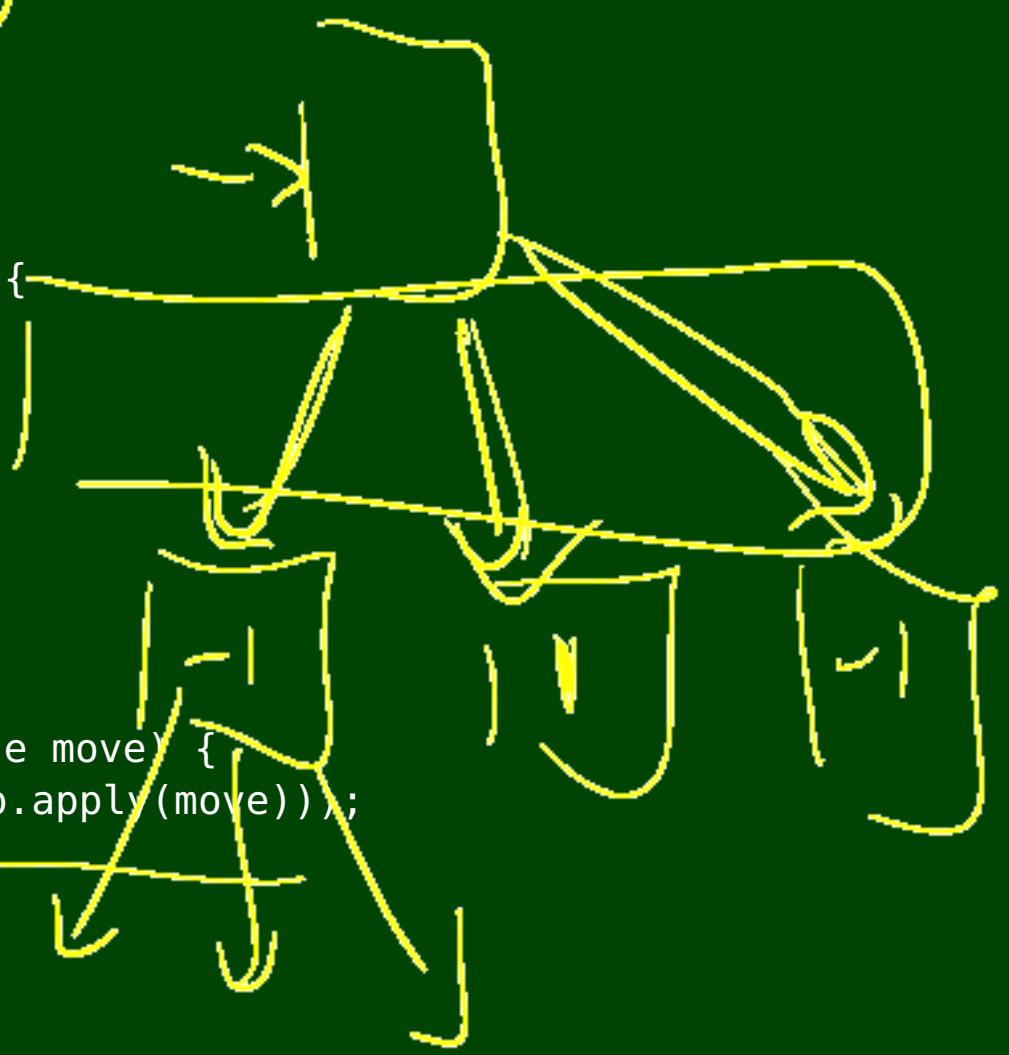
Recursion To The Rescue

```
1  boolean win(Board b) {
2     if (b.threeXs()) {
3        return true;
4     }
5     else {
6        for (Move m : every possible move) {
7           if (win(b.do(move))) {
8              return true;
9           }
10       }
11       return false;
12    }
```

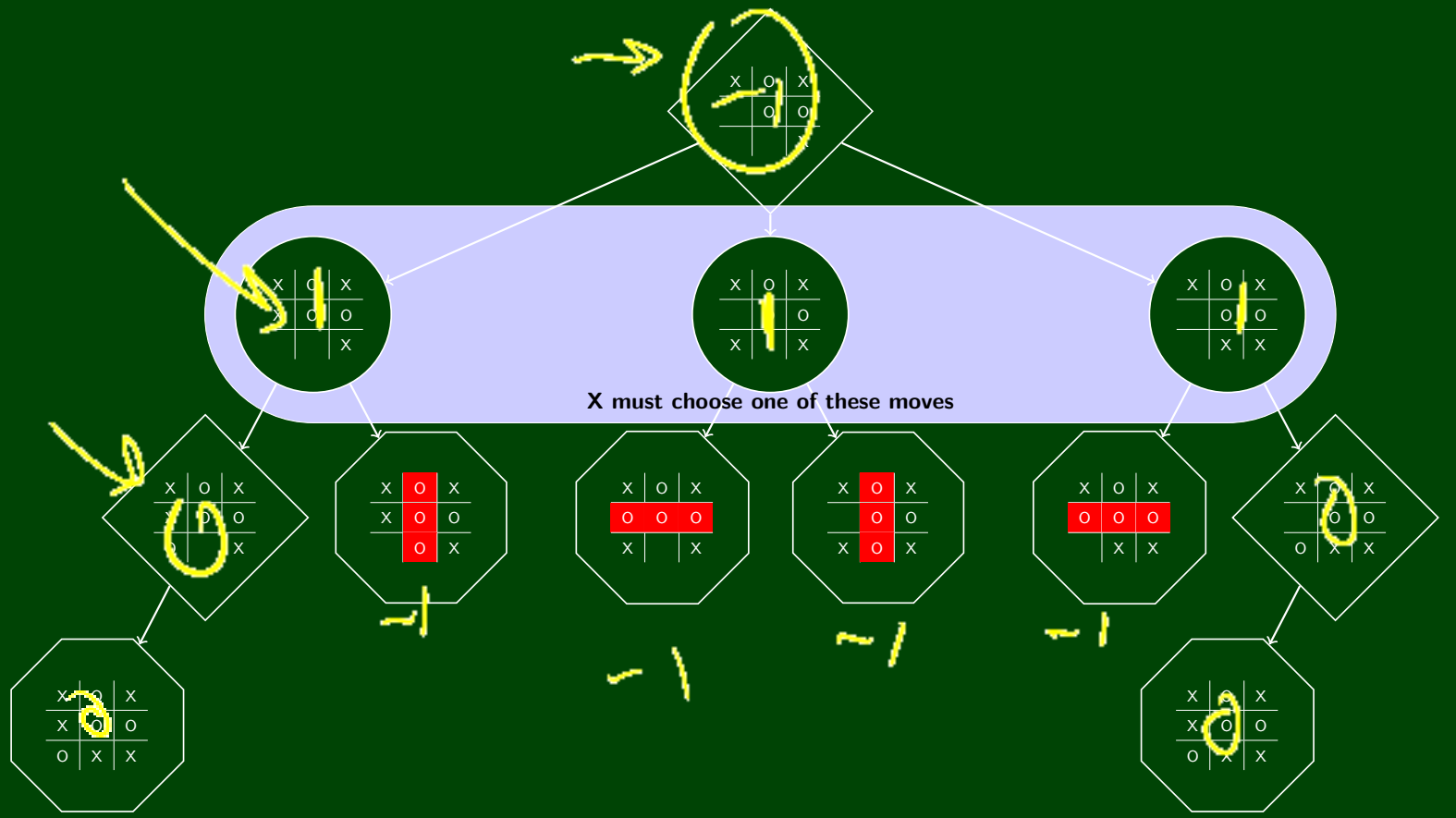


I win <-> opp loses

```
1  // +1 is a win; +0 is a draw; -1 is a loss
2  int eval(Board b) {
3     if (b.gameOver()) {
4        if (b.hasThree(me)) {
5           return 1;
6        }
7        else if (b.hasThree(them)) {
8           return -1;
9        }
10       else {
11          return 0;
12       }
13    }
14    else {
15       int best = -1;
16       for (Move m : every possible move) {
17          best = max(best, -eval(b.apply(move)));
18       }
19       return best;
20    }
```



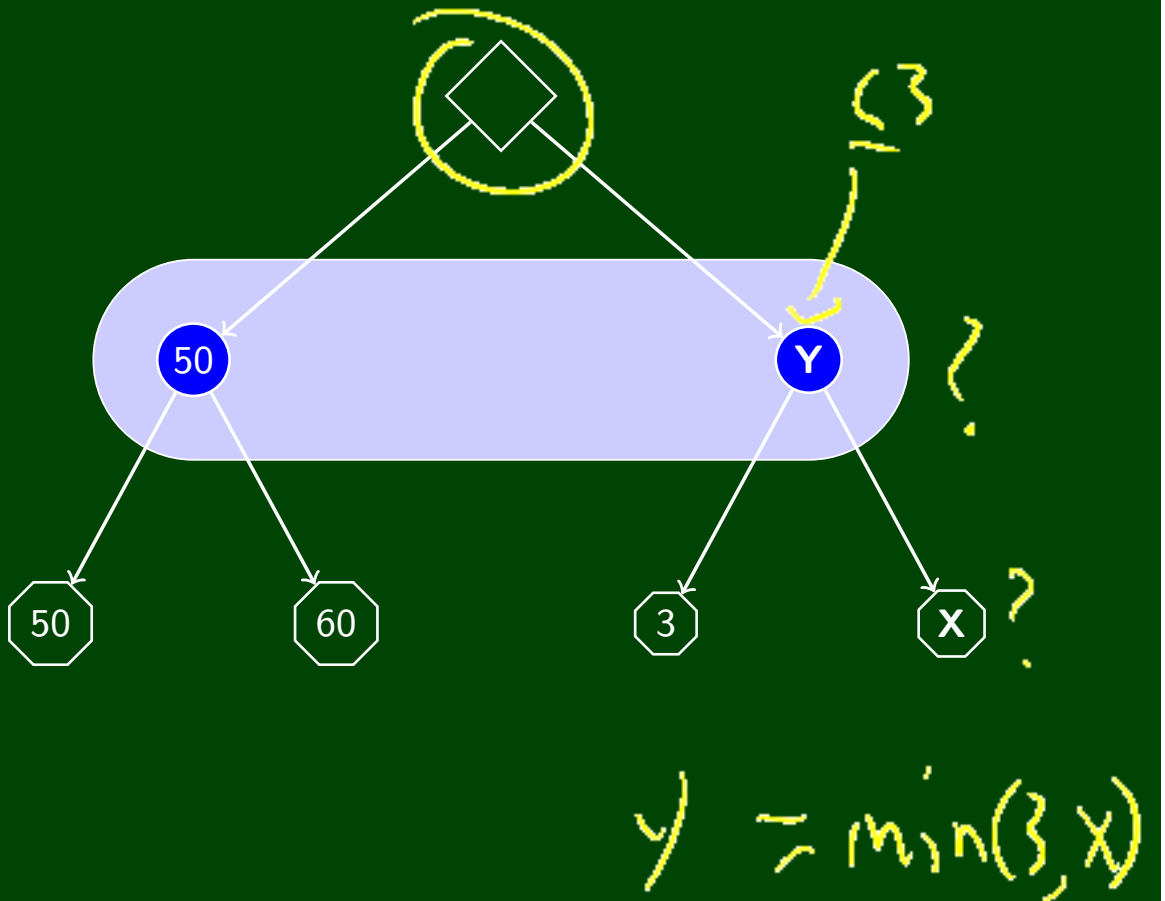
A Game of Tic-Tac-Toe



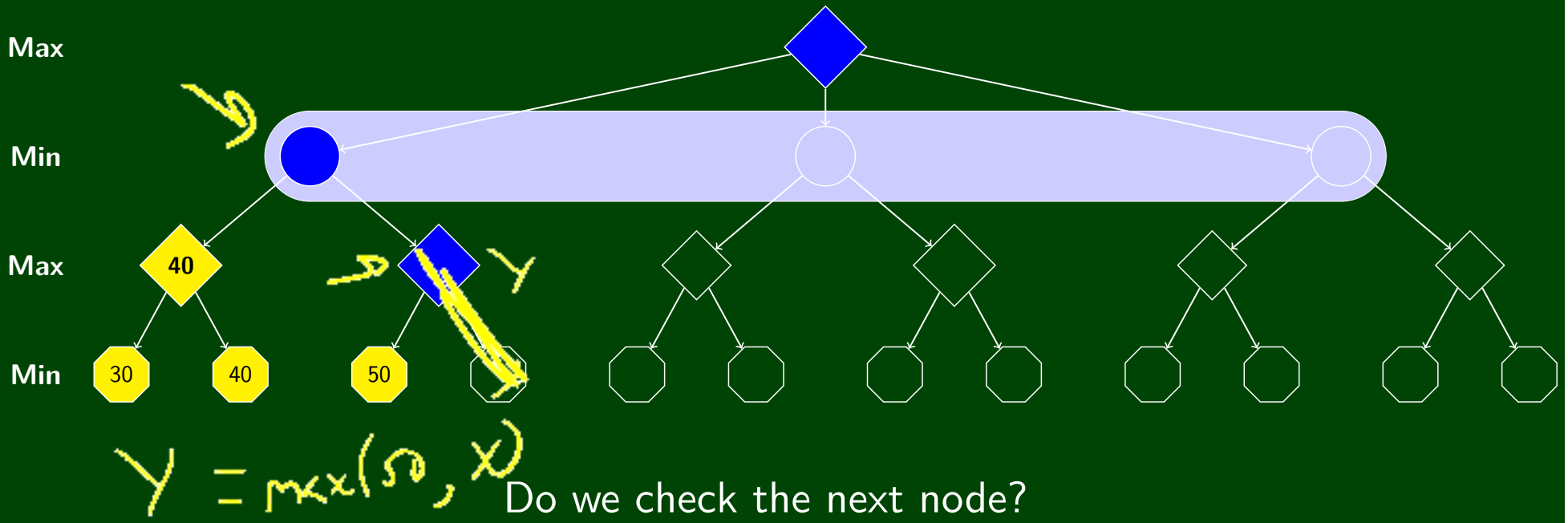
Max's Turn

Min's Turn

Max's Turn



Pruning

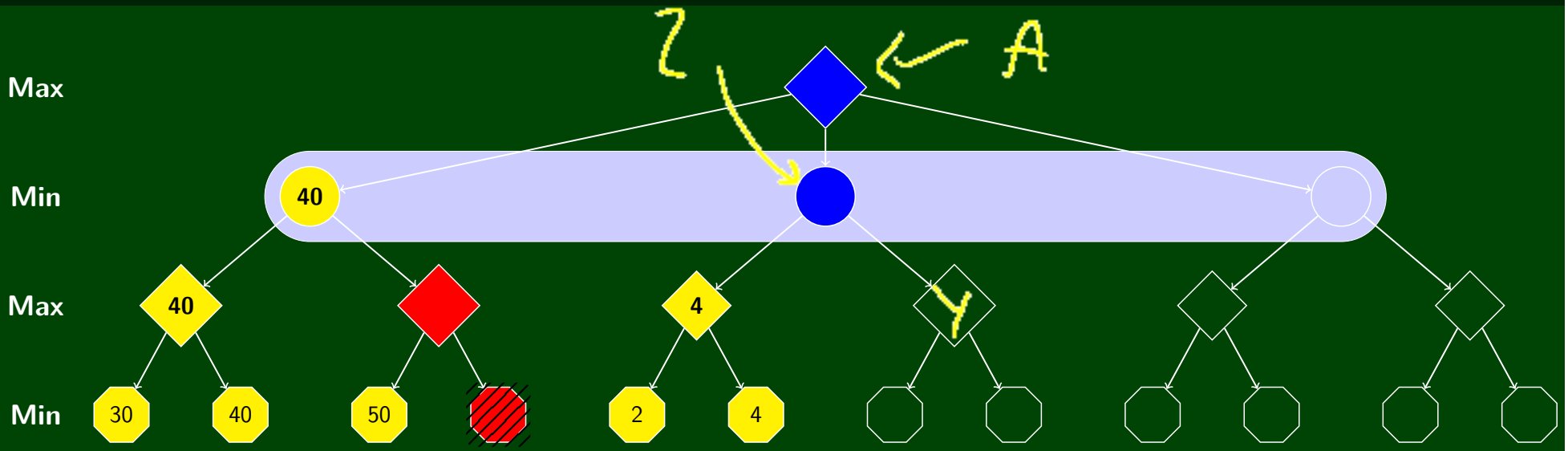


Do we check the next node?

Max will choose $x \geq 50$ which is already worse than the 40.

The current bounds are $[50, 40]$. Don't bother.

Pruning



$A = \max(40, Z)$

$Z = \min(4, Y)$

$Z \leq 4$

$40 \leq A$

Y