

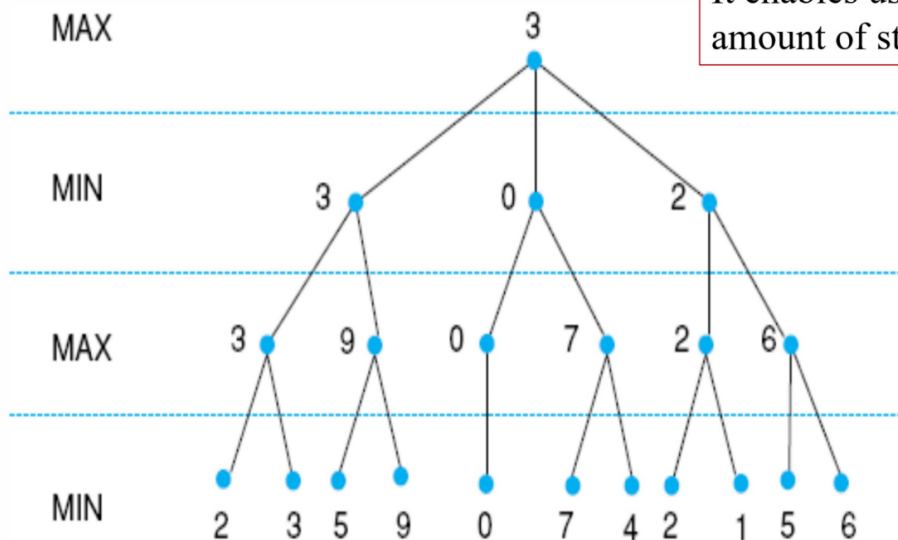
## 3.5.4 $\alpha$ $\beta$ Algorithm

### The *Alpha-Beta* Algorithm

“Advanced minimax” by pruning

The *ALPHA-BETA* Algorithm - Reach the **same conclusion** as the MINIMAX algorithm does, but by evaluating **fewer nodes**.

Example minimax  $h$ =reward/fitness :



It enables us to **prune** out a certain amount of states in search space.

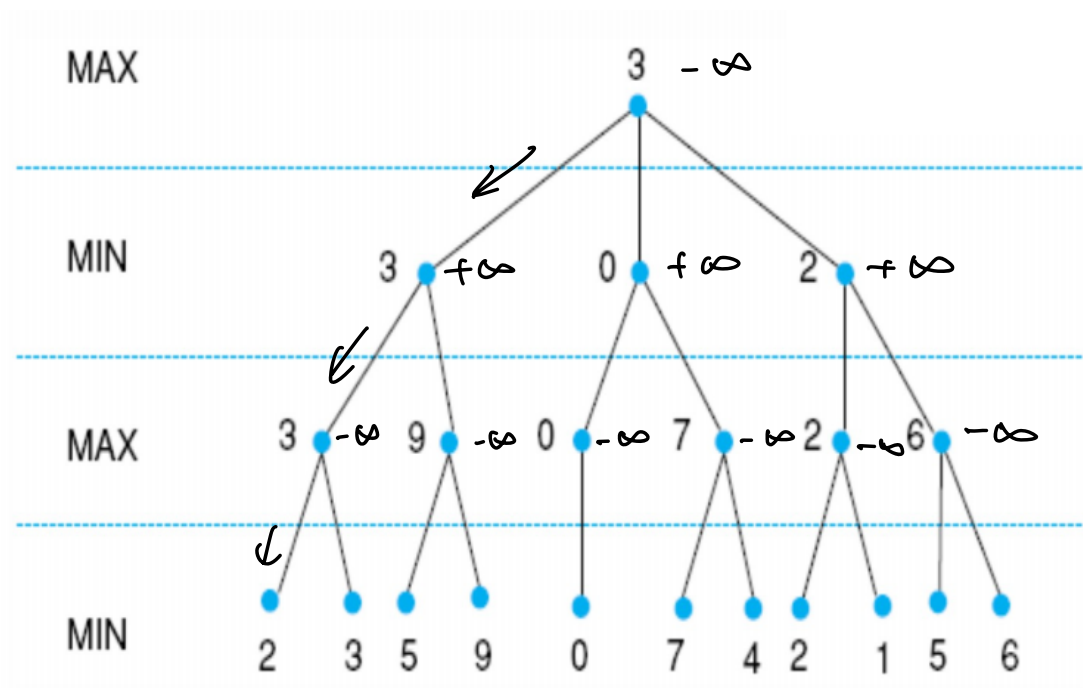
Fig 4.15 Minimax to a hypothetical state space. Leaf states show heuristic values; internal states show backed-up values.

75

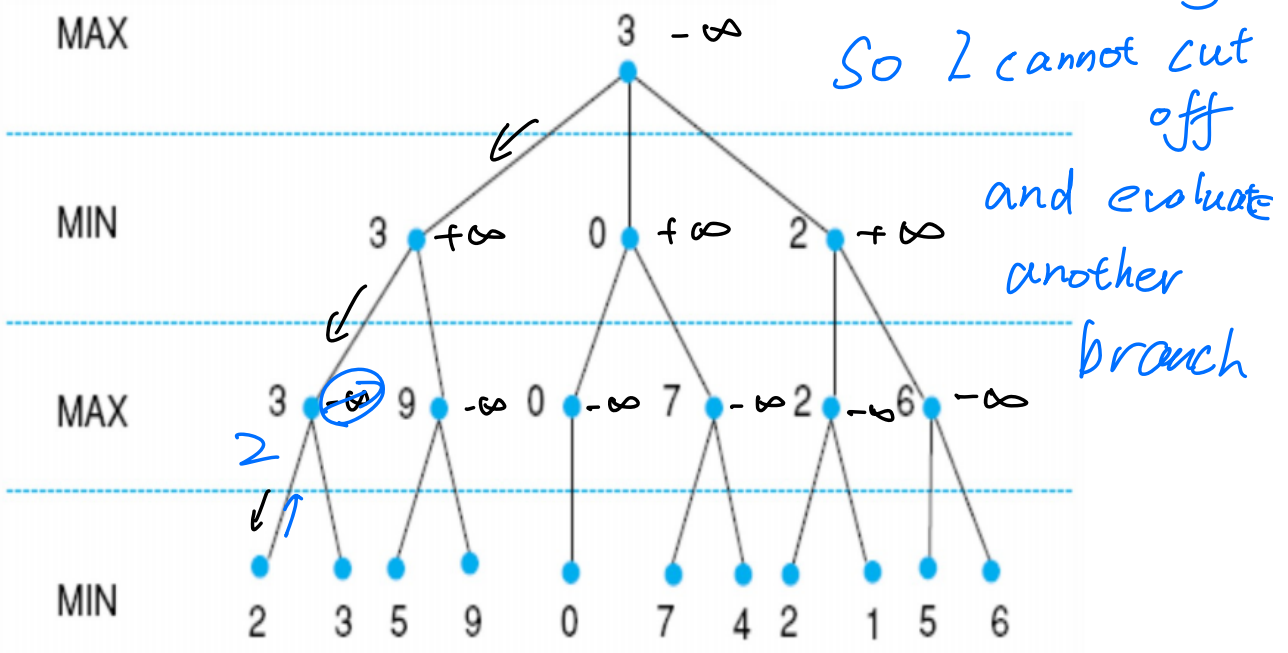
Solution ① initiative.

Max :  $-\infty$

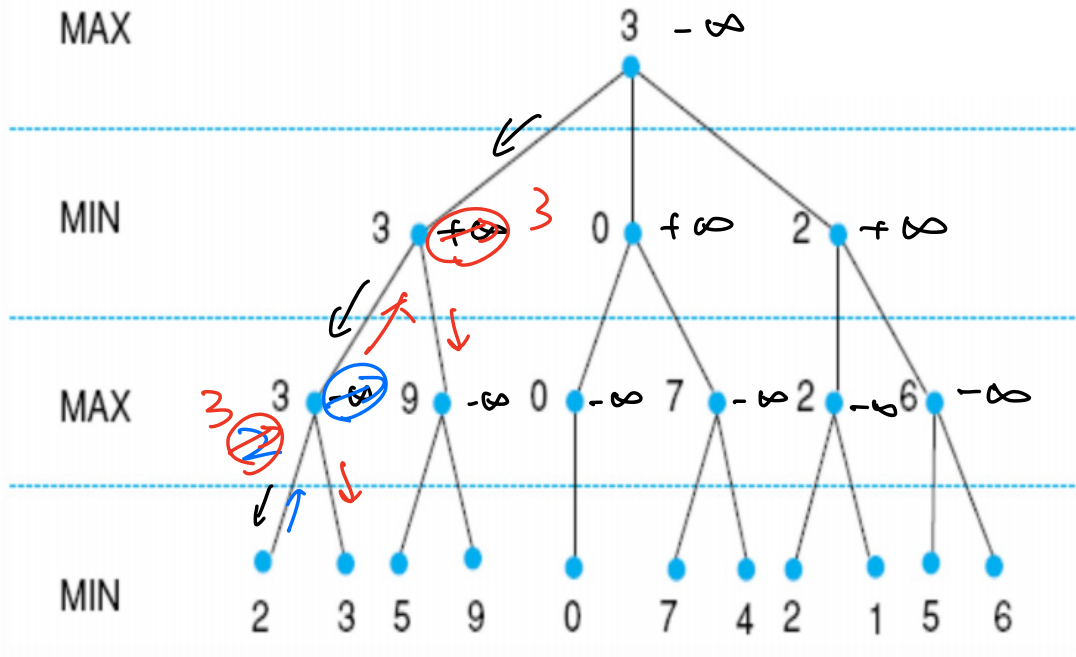
Min :  $+\infty$



② DFS  $\beta$  prune ? 2 compare to parent +  $\infty$   
2 isn't too big

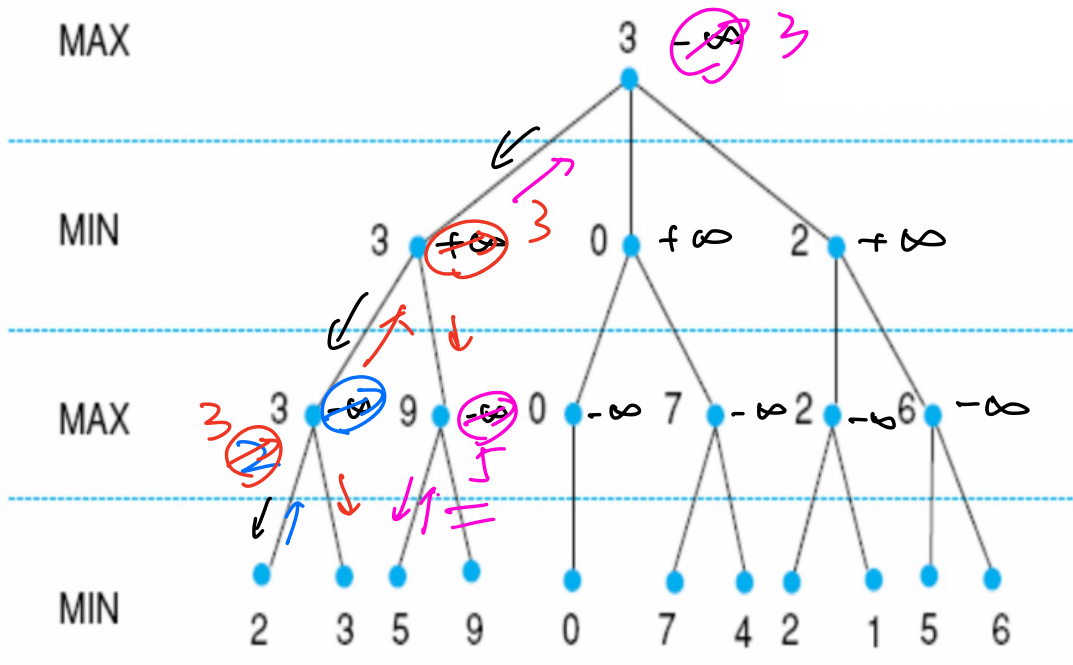


③



3 not too small

④



5 is bigger than 3

Due to parent want

to choose min, I want

to choose max, So I

definitely choose from  $[5, +\infty)$

and  $3 < 5$ , So parent

will not choose me, So

I should cut off

Due Meaningless to pick from

$[5, +\infty)$

MAX

MIN

MAX

MIN

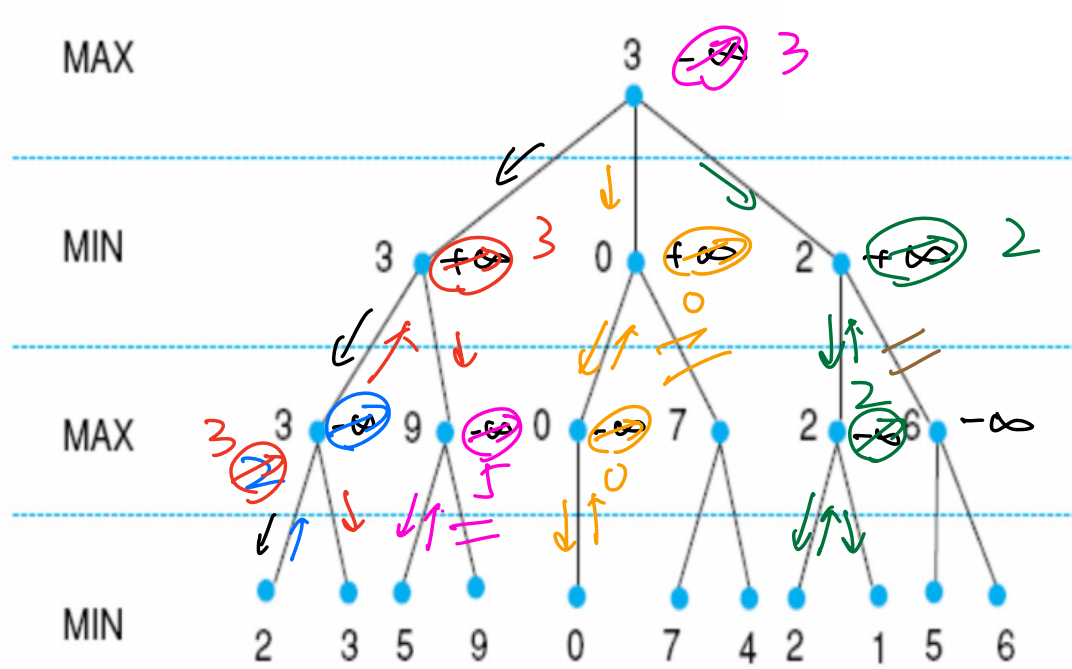
2 3 5 9 0 7 4 2 1 5 6

N<sub>2</sub>

Yes

cut off

⑥



$$2 > +\infty \quad X$$

$$2 < 3 \quad \text{Yes}$$

cut off