



function ALPHA-BETA-SEARCH(*game*, *state*) **returns** an action

player \leftarrow *game*.TO-MOVE(*state*)

value, *move* \leftarrow MAX-VALUE(*game*, *state*, $-\infty$, $+\infty$)

return *move*

function MAX-VALUE(*game*, *state*, α , β) **returns** a (*utility*, *move*) pair

if *game*.IS-TERMINAL(*state*) **then return** *game*.UTILITY(*state*, player), null

v $\leftarrow -\infty$

for each *a* **in** *game*.ACTIONS(*state*) **do**

v2, *a2* \leftarrow MIN-VALUE(*game*, *game*.RESULT(*state*, *a*), α , β)

if *v2* > *v* **then**

v, *move* \leftarrow *v2*, *a*

$\alpha \leftarrow$ MAX(α , *v*)

if *v* \geq β **then return** *v*, *move*

return *v*, *move*

function MIN-VALUE(*game*, *state*, α , β) **returns** a (*utility*, *move*) pair

if *game*.IS-TERMINAL(*state*) **then return** *game*.UTILITY(*state*, player), null

v $\leftarrow +\infty$

for each *a* **in** *game*.ACTIONS(*state*) **do**

v2, *a2* \leftarrow MAX-VALUE(*game*, *game*.RESULT(*state*, *a*), α , β)

if *v2* < *v* **then**

v, *move* \leftarrow *v2*, *a*

$\beta \leftarrow$ MIN(β , *v*)

if *v* \leq α **then return** *v*, *move*

return *v*, *move*