# AI HW 2

| | |
|---|---|
| Course | Artificial Intelligence |
| Due Date | @September 27, 2021 |
| Status | Completed ✔️ |

# Questions

## 1. [3 pts.] Assuming the root player is max, using variables as shown in class, write out the minimax solution for this tree; e.g. b1=max(6, -9, 15); b = min(b1, b2, b3); etc.

$b1 = \max(9, 0, -13)$
$b2 = \max(13, -15, 16)$
$b3 = \max(-3, 10, -8)$
$b = \min(b1, b2, b3)$
$c1 = \max(0, 4, -17)$
$c2 = \max(-12, -2, 11)$
$c3 = \max(18, -14, 2)$
$c = \min(c1, c2, c3)$
$d1 = \max(-5, -14, -2)$
$d2 = \max(9, -5, 12)$
$d3 = \max(16, -14, 18)$
$d = \min(d1, d2, d3)$
$root = \max(b, c, d)$

## 2. [2 pts.] Which branch should the max player take from root?

If the root player is max, the path $b \rightarrow b1 \rightarrow b1a$ would be taken with a final score of $9$.

## 3. [2 pts.] Which branch should the min player take from root?

If the root player is min, the path $c \to c2 \to c2a$ would be taken with a final score of $-12$.

## 4. [3 pts.] Assuming the root player is max, using alpha-beta pruning which nodes will be pruned. This includes nodes partially visited but then pruned. Just a list, order does not matter.

```
@b1 -> 9: a =  9
@b -> b1: b =  9
@b2 -> 13: a =  13
❌ Beta prune at b2 -> 13: val = 13, b = 9 => val > b
❌ Alpha prune at b -> b2: val = 9, a = 13 => val < a
@c -> c1: b =  4
❌ Alpha prune at c -> c1: val = 4, a = 13 => val < a
❌ Beta prune at root -> c: val = 9, b = 4 => val > b
minimax_prune:  9
```

Prune List: `b2, b, c, root`