KGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCE

Alpha beta Pruning (module-3)

Name :- Rutuja K. Sawant.

Roll no :- 57

Class : BE-IT

Sem :- VII

Sub :- IS Lab

Alpha-beta Pruning Assignment (module 3)

* Minmax algorithm with alpha beta pruning.

→ Alpha-beta pruning :- Alpha beta pruning is modified version of the minimax algorithm It is an optimization technique for the minmax algorithm.

Alpha(α) = The best (highest-value)
= initial value of alpha is $-\infty$

Beta(β) = The best (lowest-value)
= initial value of beta is $+\infty$

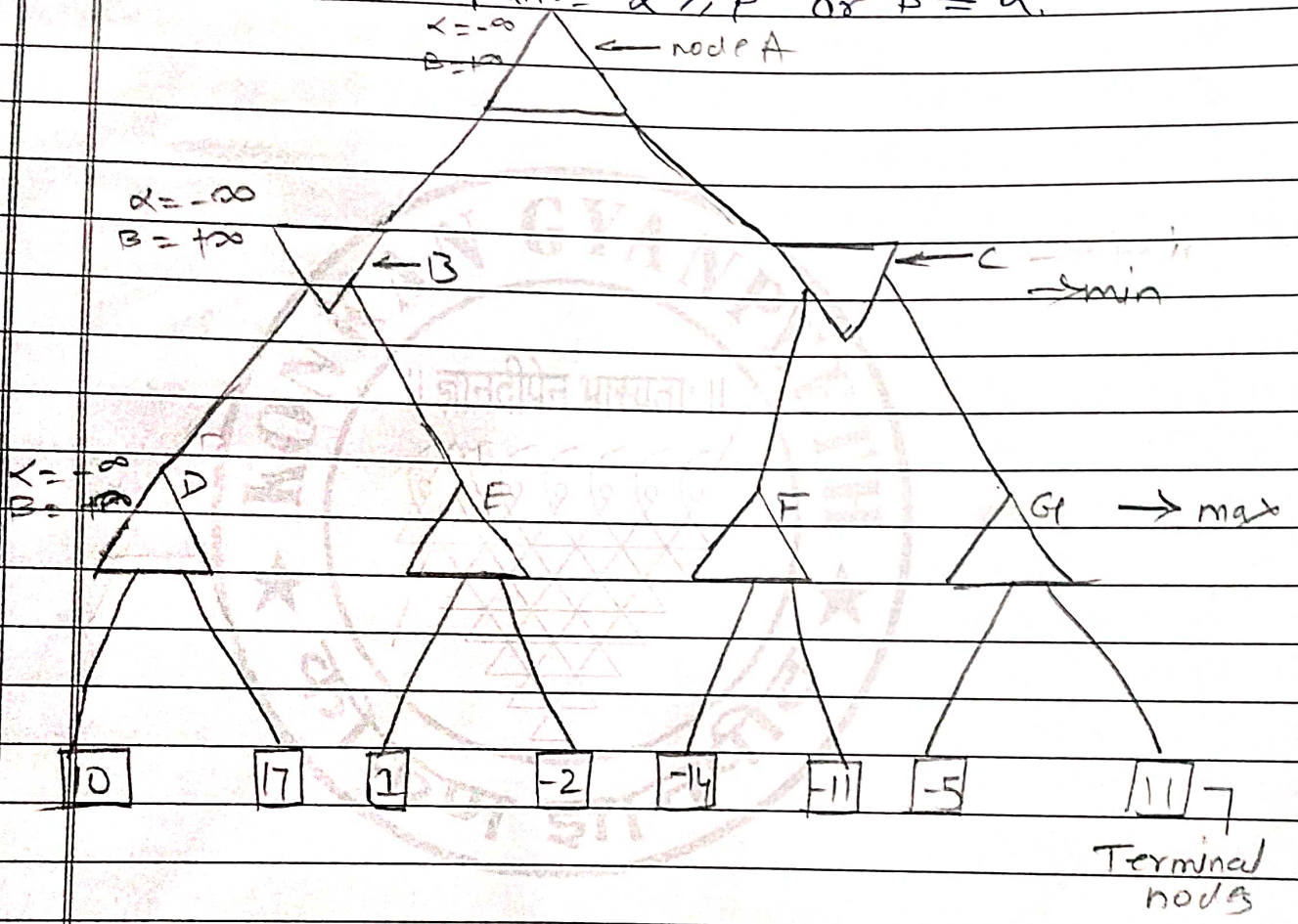
The alpha-beta pruning to a standar minimax algorithm returns the same move as the standard algorithm does, but it removes all the nodes which are not really affecting the final deision but making algorithm slow. Hence by pruning these node, it make the algorithm fast.

* Rules & Conditions.

- The max player will only update the value of alpha.
- The min player will only update the value of beta.
- We will only pass the alpha, beta values to the child nodes.

-node value will be passed to upper nodes instead of values of alpha and beta.

condition to Prune :- $\alpha \geq \beta$ or $\beta \leq \alpha$.



Step 1 - At the first step the, max player will start first move from node A where $\alpha = -\infty$ and $\beta = +\infty$ then value of alpha, beta passed down to node B where again $\alpha = -\beta$ and $\beta = +\infty$ and node B passes some value to its child D.

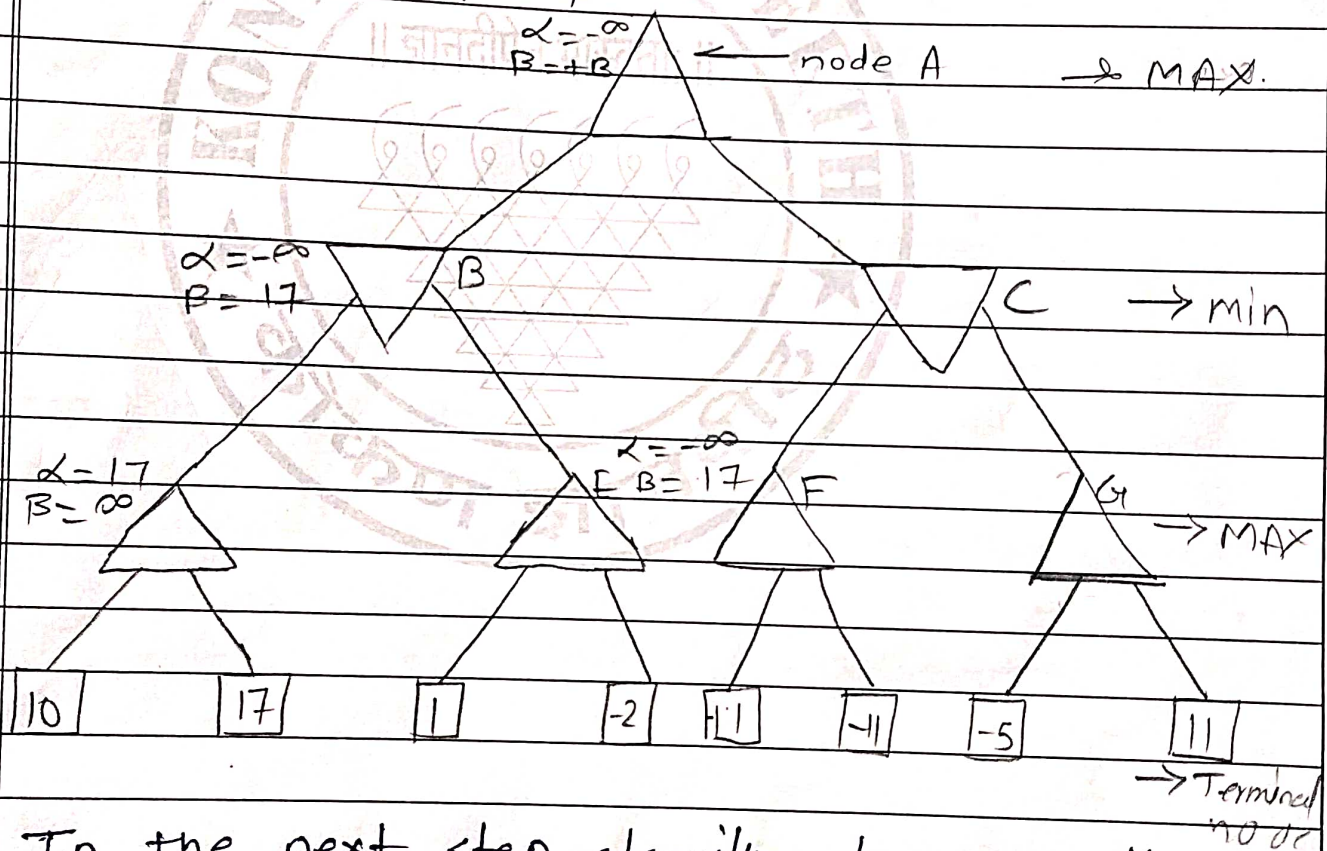
step 2 :- At node D, the value of α will be calculated as its turn for max. The value

Page No. :
Date :

α is compared with firstly 10 and then 17 and the max(10, 17) = 17 will be the value of α at node D and node value will 17.

Step 3: Now algorithm backtracks to node B where the value of B will change as this is a turn on min, now B = +∞ will compare with the available subsequent nodes value i.e min(∞, 17) = 17 hence at node B.

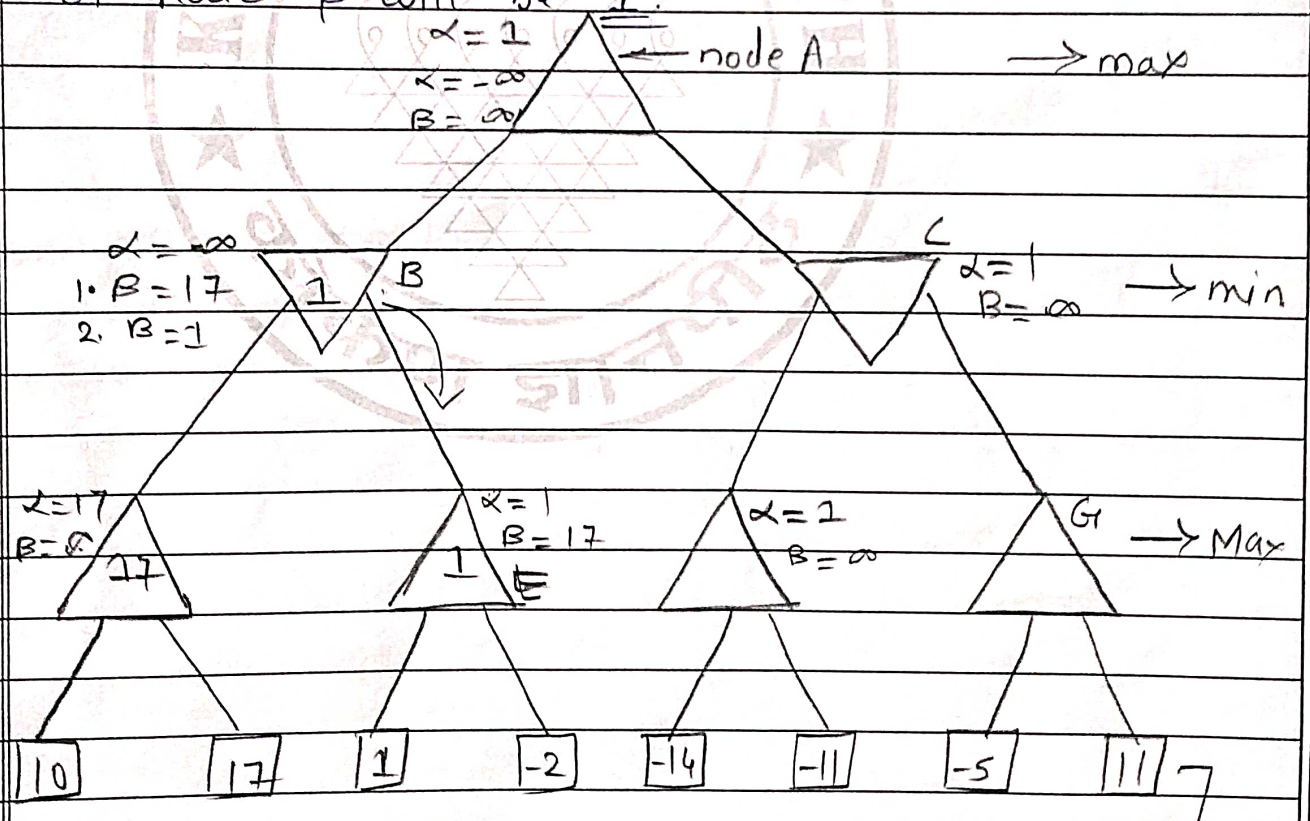
now α = -∞ B = 17



In the next step algorithm transverses the next sucesses of node B which is node E and the values of α = -∞ and B = 17 will also be passed.

Step 6:- At node E, max will take its turn and the value of alpha will change the current value of α will be compared with? So max (-∞, 1) = 1 hence at node E α = 1 β = 17 the α will be compared with -2 so max (1, -2) = 1 so the value of α = 1 and β = 17 so at node E value will be 1.

For Node B its min turn so the value of β will be changed so early value of B was 17 now β = min (17, 1) = 1 so the value of node B will be 1.



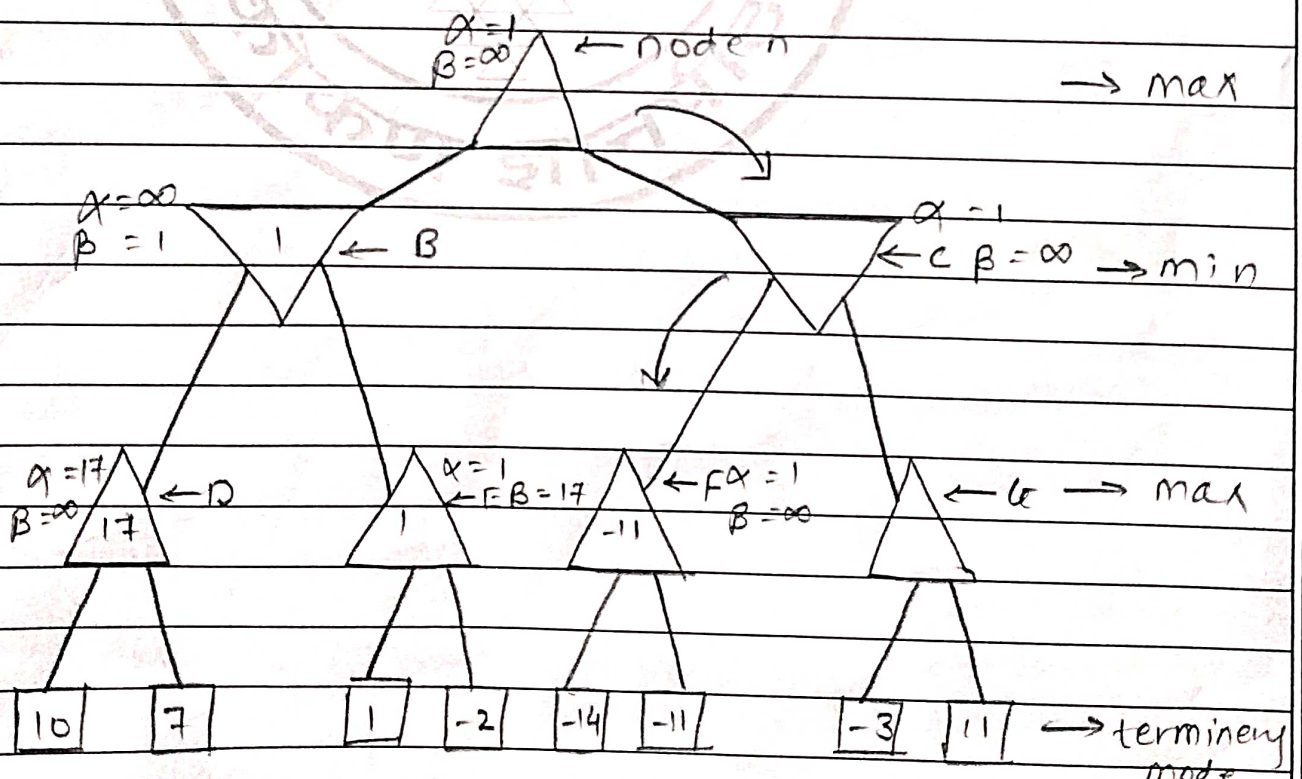
Page No. :
Date :

Step 5 :- At next step algorithm again backtract the tree from Node B to mode A.
The value of α will be charged the max value will be

$$\alpha = \max(-\infty, 1) = 1$$
$$\beta = \infty$$

these two value now pass down to the right successor which is node C at nod C $\alpha = 1$ and $\beta = \infty$ the same value will be passed on to node F.

Step 6 :- At node F again the value of α will be compare with left child which -14 and $\max(-11, -14) = -11$ so the node node value will become -11

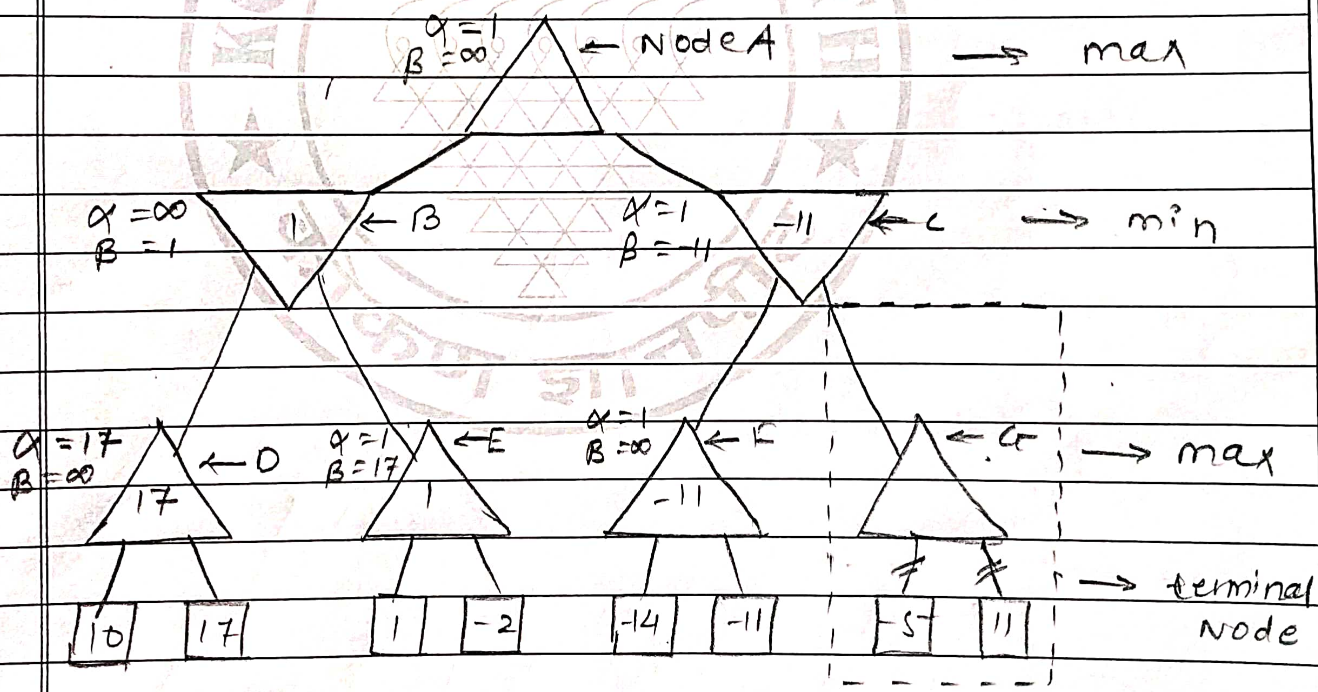


Step 7 - At Node C $\alpha = 1$ & $\beta = \infty$ here the value of β will chang it will compare with -11 so.

$$\beta = \min(\infty, -11) = -11$$

So now we have $\alpha = 1$ and $\beta = -11$ Here the condition to prune i.e. $\alpha \geq \beta$ satisfies so the next Righ node of the Node C will be pruned and the Node value of C will beome -11.

$\therefore$ at C $\alpha = 1, \beta = -11$



Step 8 :- C Now return the value of -11 to A here the best Value of A is

$$\alpha = \text{Max}(1, -11) = 1$$

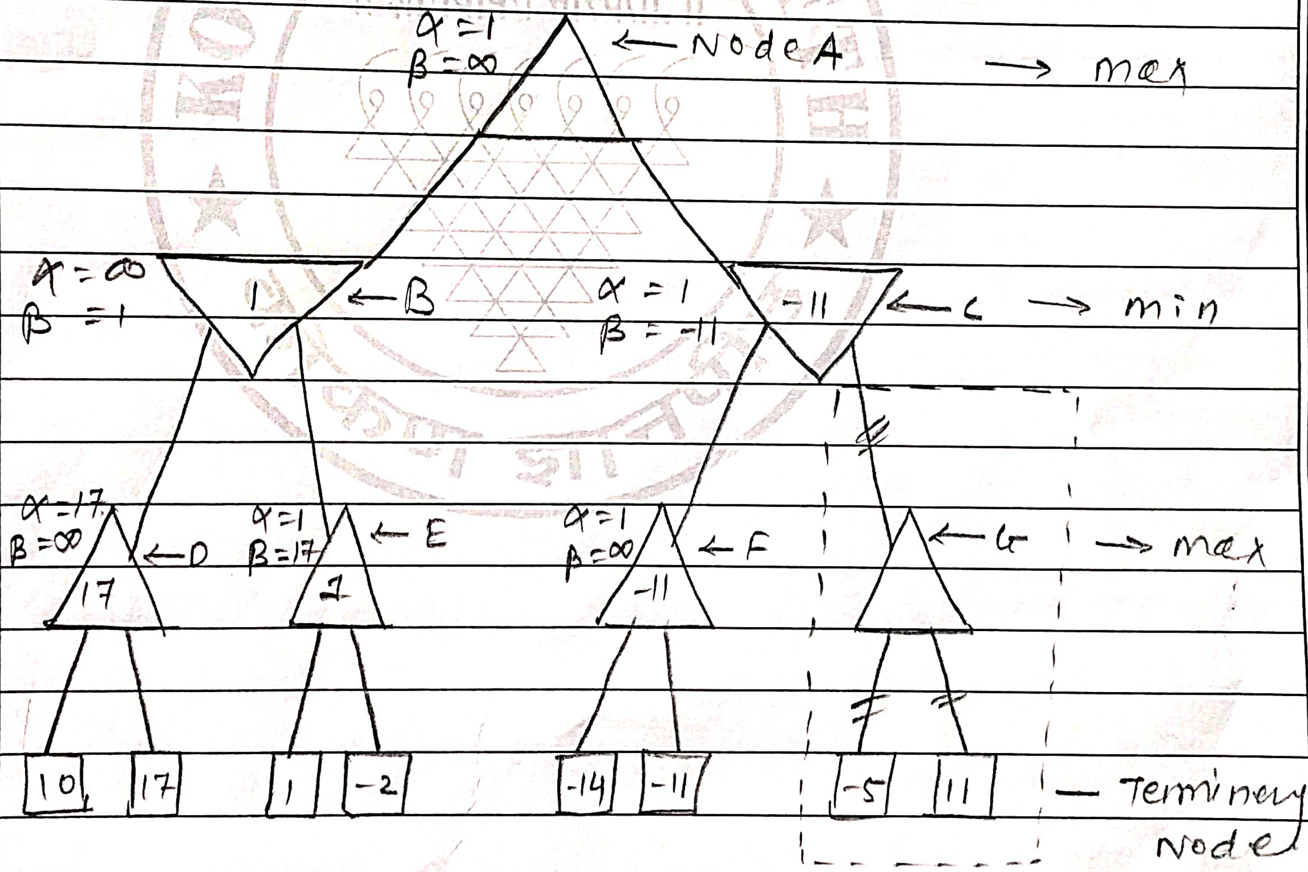
$\therefore$ So the final value of Node A will be 1

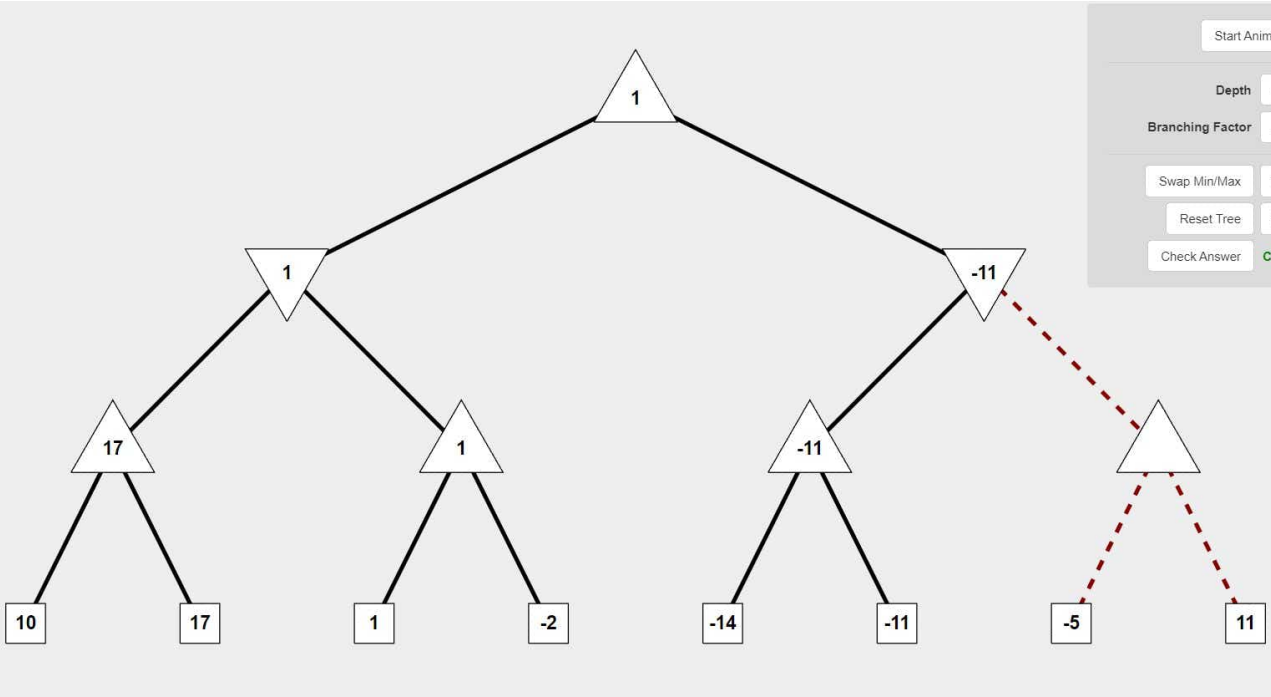
$\therefore \alpha = 1$

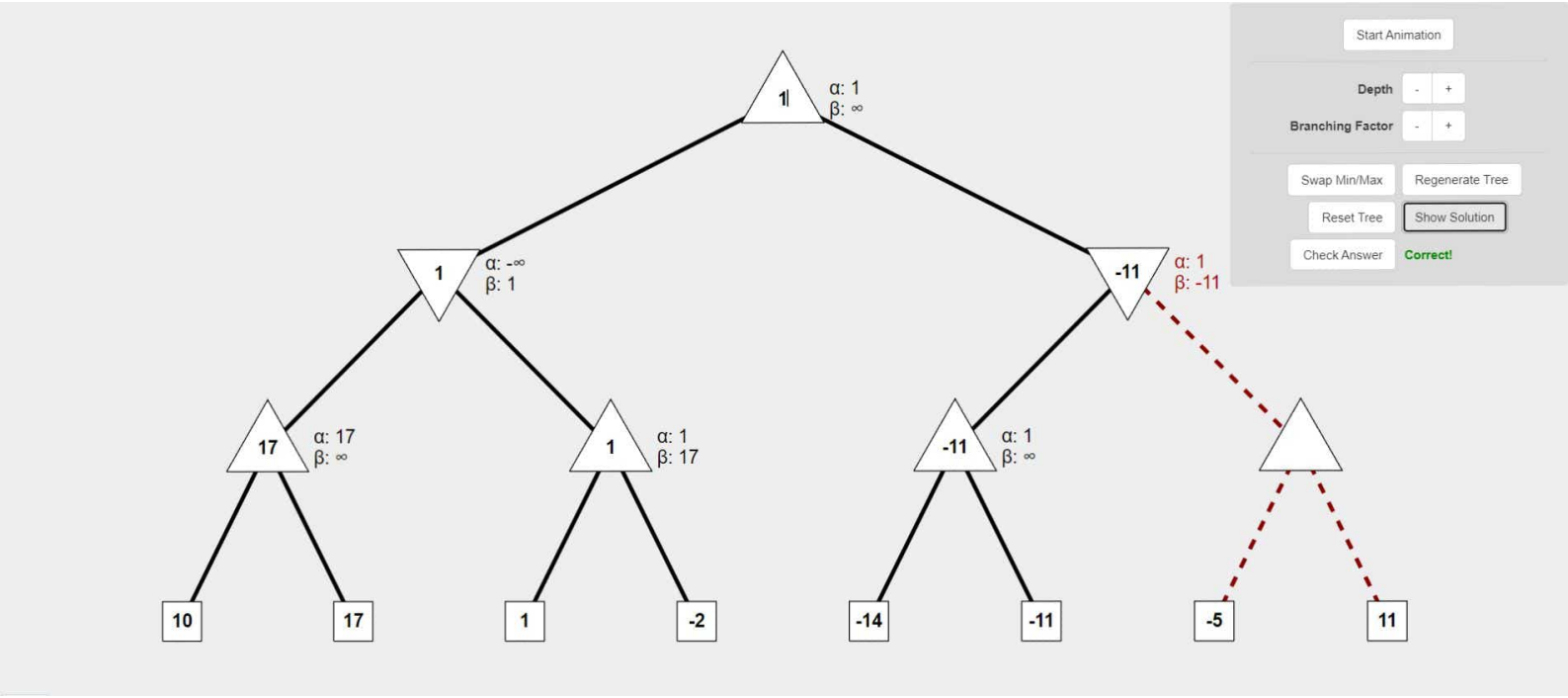
$\beta = \infty$ at A

Following is the final game tree which showing the nodes which are compared & nodes which has never computed Hence the optimal value for the maximize is 1. for this tree.

solution :-




1
1
-11
17
1
-11
10
17
1
-2
-14
-11
-5
11
Start Animation
Depth
-
+
Branching Factor
-
+
Swap Min/Max
Regenerate Tree
Reset Tree
Show Solution
Check Answer
Correct!


Start Animation
Depth
Branching Factor
Swap Min/Max
Regenerate Tree
Reset Tree
Show Solution
Check Answer
Correct!
1
α: 1
β: ∞
1
α: -∞
β: 1
-11
α: 1
β: -11
17
α: 17
β: ∞
1
α: 1
β: 17
-11
α: 1
β: ∞
10
17
1
-2
-14
-11
-5
11