Assignment - 8

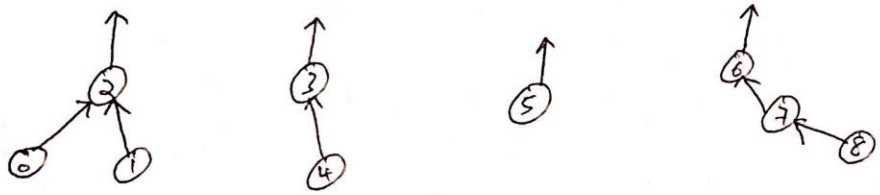
Manoj NATHA

1)

2	2	-1	-1	3	-1	-1	6	7
0	1	2	3	4	5	6	7	8

The array indexes with values -1 represent the roots Therefore, the trees looks as follows

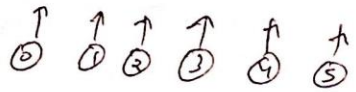
2, 3, 5 and 6 are roots since array indexes 2, 3, 5, 6 contain values -1



2) The set S is {0, 1, 2, 3, 4, 5}

Initially all are roots

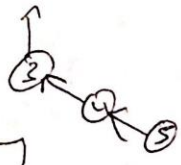
-1	-1	-1	-1	-1	-1
0	1	2	3	4	5



union (4,5)

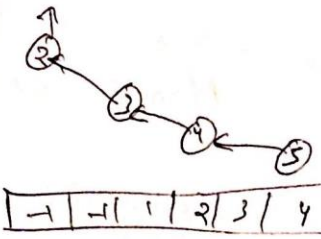
-1	-1	-1	-1	3	4
0	1	2	3	4	5

union (3,4)



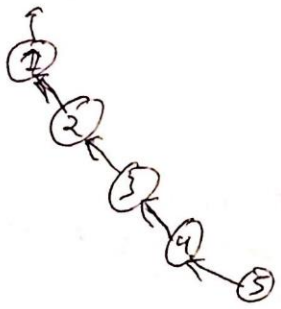
-1	-1	-1	2	3	4
0	1	2	3	4	5

union (2,1)

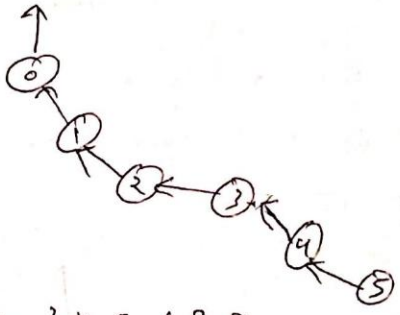


-1	-1	1	2	3	4

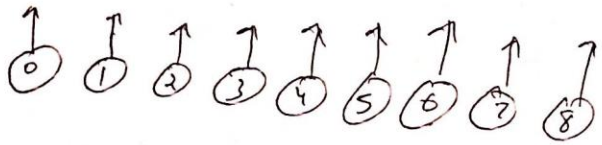
union (1,2)



-1	1	1	2	3	4
0	1	2	3	4	5



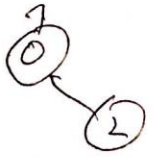
3) The set is { 0, 1, 2, 3, 4, 5, 6, 7, 8 }



Union by size

union (find (0), find (2))

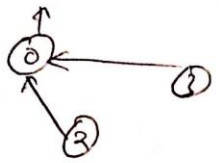
since both have same size, the second tree will become the child of the first



-2	-1	0	-1	4	-1	-1	-1	-1

Union (find(0), find(3))

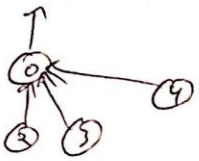
0 has larger size than 3



-3	-1	0	0	-1	-1	-1	-1	-1
0	1	2	3	4	5	6	7	8

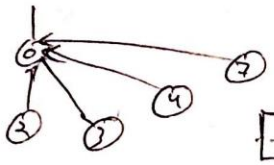
Union (find(0), find(4))

0 has greater size than 4



union (find(0), find(7))

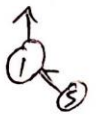
0 has greater size than 7



-5	-1	0	0	0	1	-1	0	-1
0	1	2	3	4	5	6	7	8

Union (find(1), find(5))

1 and 5 have same size, 5 becomes child of 1.



-5	-2	0	0	0	1	-1	0	-1
0	1	2	3	4	5	6	7	8

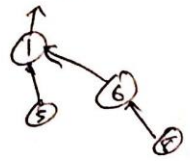
Union (find(6), find(8))

6 & 8 have same size, 8 becomes child of 6

-5	-2	0	0	0	1	-1	0	6

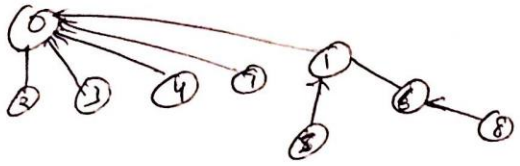
union (Find (5), Find (8))

both have equal size, 8's tree becomes child of 5's tree

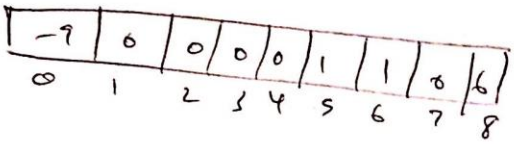


Union (Find (7), fin (8))

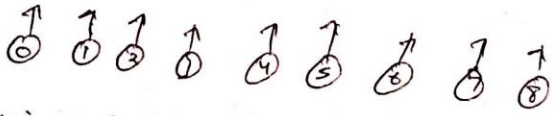
8's tree becomes child of 7's tree



4) The final array for final forest is

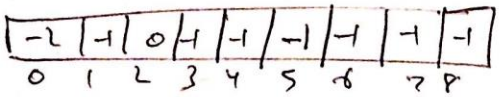


5) union by height



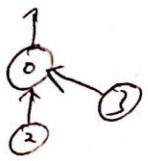
Union (Find (0), Find (2))

0 & 2 have same height



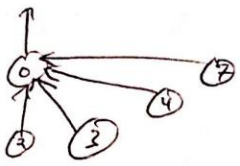
union (find (0), find (3))

0 has greater height (2) than 3 which has height 1



-2	-1	0	0	-1	-1	-1	-1	-1

union (Find (0), Find (7))



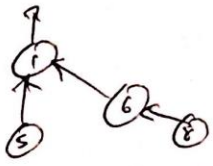
Union (Find (1), Find(5))

-2	-2	0	0	0	1	-1	0	-1
0	1	2	3	4	5	6	7	

Union (Find (6), Find (8))

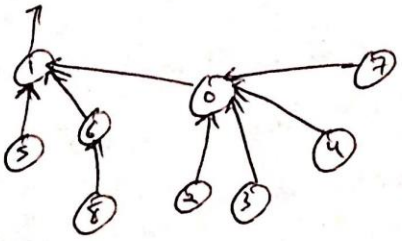
-2	-2	0	0	0	1	-2	0	6
0	1	2	3	4	5	6	7	8

union (Find (5), Find (7))



-2	-3	0	0	0	1	1	1	6

union (Find (7), Find (8))



6)

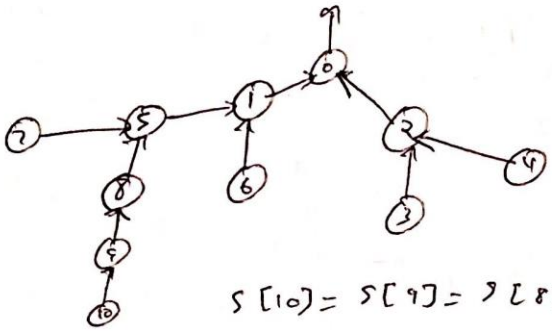
1	-3	0	0	0	1	1	0	6
0	1	2	3	4	5	6	7	8

root of tree is 1 which is at height 2, 2, 3, 4, 7 have 0 as their parent 0, 5, 6 nodes have node 1 as their parent.

7) node 8 has 6 as its parent

7)

-1	0	0	2	2	1	1	5	5	8	9
0	1	2	3	4	5	6	7	8	9	10

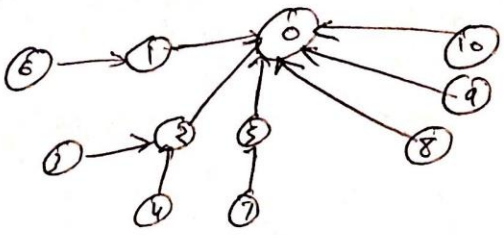


s[10] = s[9] = 9[8] = s[5] = 8[1] = 6

Find array below

-1	0	0	2	2	0	1	5	0	0	0

8)



1, 2, 6, 5, 8, 9 & 10 → 0 parent

node 6 → 1 as it parent

3 & 4 have 2 as their parent

node 7 has node 5 as its parent