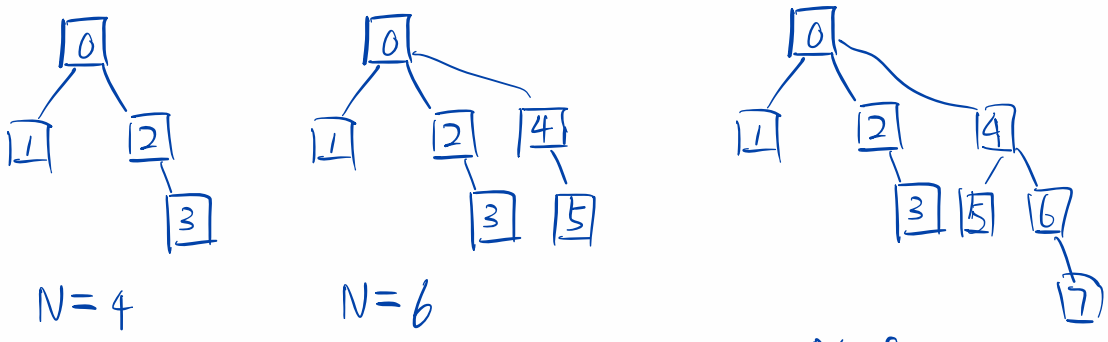
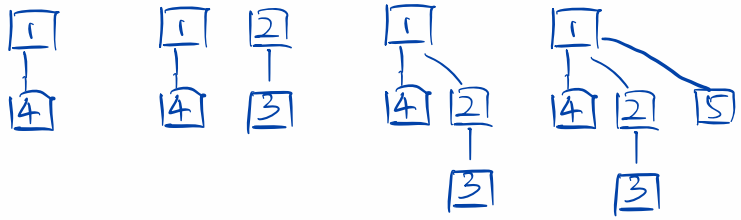
C level

1. Problem 2a from Sp 2016 mid-2

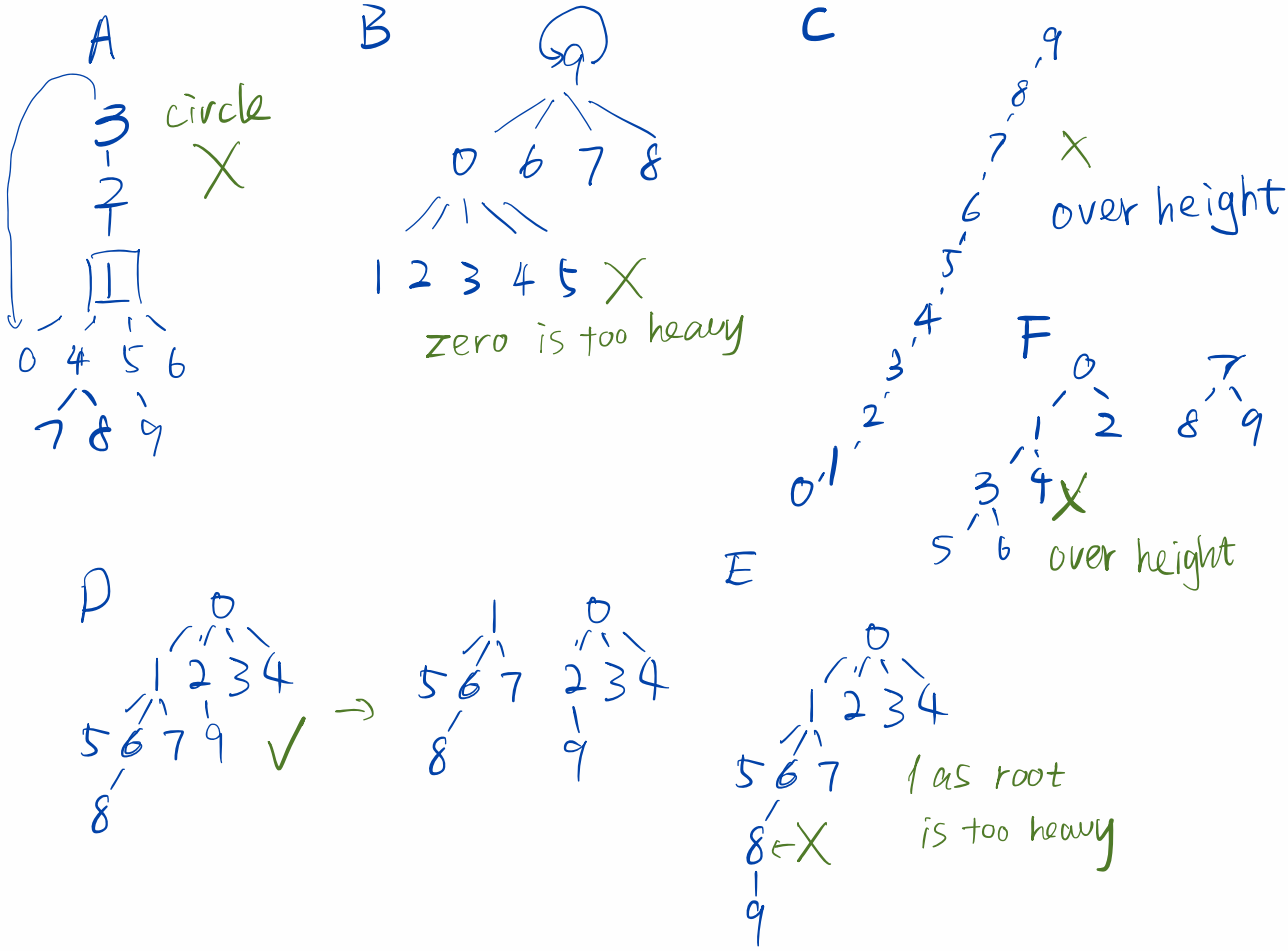


2. Problem 1d from Sp 2015 mid2

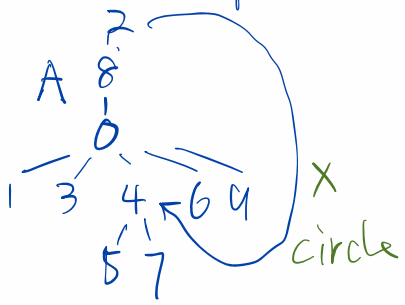


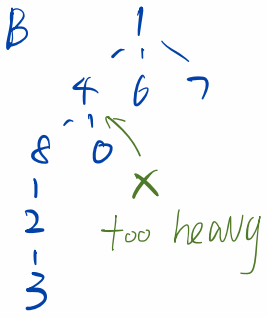
B level

1. Problem 1 from Princeton Fall 2011 mid

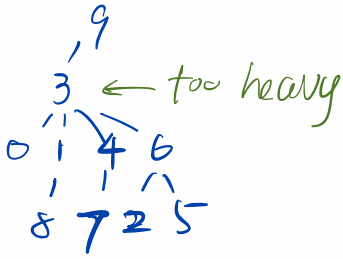


2. Problem 1 from Princeton Fall 2012 mid

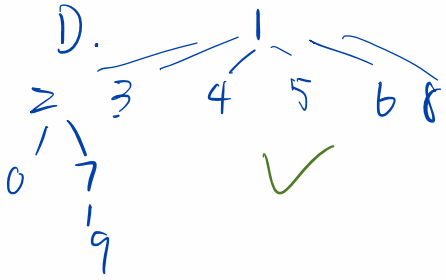




C.



D.



3

$O(N+(M_u+M_c)\log N)$

Here BigO is used to describe a serials of operations.

4

We create a "quickUnionFind" object with all N the nodes already connected. and perform M_u, M_c. $\longrightarrow O(N+M_u+M_c)$

5. The so called Textbook refers to the Algorithm, Fourth Edition by Wayne and Sedgewick.

Of course not work.

Official Answer: The value of id[p] changes to id[q] in the for loop. Thus, any object r>p with id[r] equal to id[p] will not be updated to equal id[q].

6. Problem 3 from Sp 2017 mid 2

a

- impossible

connect(2,0)
connect(4,0)
connect(6,0)
connect(5,3)
connect(3,0)

b. every of datastructure is impossible.

c it's a graph question.

(H) $(N+M)$
(H) $(V+E)$

7. Problem 2b from Sp2016 mid 2

Best: (H) $O(1)$
Worst: (H) $\log N$

A-level

1.

Official answer: Yes, However, it would increase the tree height, so the performance guarantee would be invalid.

2.

Height is hard to calculate. That's why we don't use it.

Worst-case for WBU: $\log_2 N$

for HBU: $\log_3 N$

Average tree height:

Could'nt tell the exact number. but HBU might be better. Since the tree height increase by one only if the two tree are the same height.

3. Problem 3 from Spring 2018 midterm 2

a) 1 2

1 2

b) 2^M

c)

d) Out of coverage. Skip. (Really don't know what is SimplePPMImage)

4.

coding