Module 2 Problem Set Hsuan-You(Shaun) Lin

1. My Answer: $O(M)$
My reason:

According to the Sum of a Geometric Sequence: $\frac{a(1-r^n)}{(1-r)}$

$M = 3^n$

$$C(M) = 1 + 3 + 9 + \cdots + 3^n$$

$$= \frac{3^{n+1} - 1}{3-1} = \frac{3^{n+1} - 1}{2} = \frac{3M-1}{2} = O(M) \#$$

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2. My Answer: $O(M)$
My reason:

According to the Sum of a Geometric Sequence: $\frac{a(1-r^n)}{(1-r)}$

$M = 11^n$

$$C(M) = 1 + 11 + 121 + \cdots + 11^n$$

$$= \frac{11^{n+1} - 1}{11-1} = \frac{11^{n+1} - 1}{10} = \frac{11M-1}{10} = O(M) \#$$

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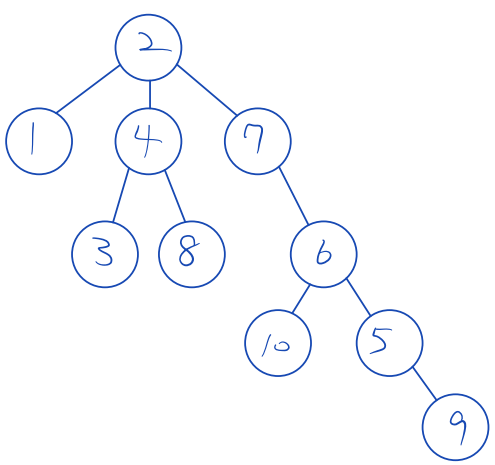
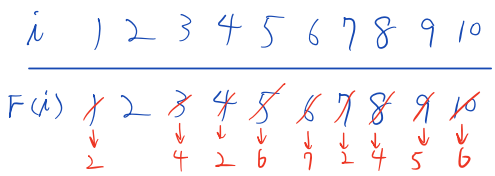
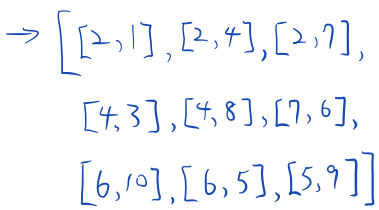
3. My Answer:



4. My Answer: This is impossible that problem 3 be a result of running weighted quick union.
My reason:





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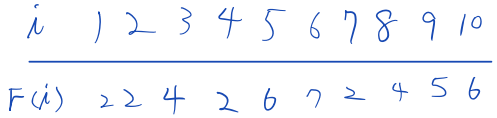

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5. My Answer: O(M*(logN))
My reason

The complexity of weighted quick union is O(logN)

add_new_set() complexity is O(1)

add, add, add, u(1,3), f(2), f(3), add, add, add, u(1,4), f(5), u(6,3)

add, add, add, add, add, add, u(1,3), f(2) f(3), u(1,4), f(5), u(6,3)

add, add, u/f, u/f, u/f, add

∴ O(M*(logN)) + O(M)

∴ The complexity is O(M*(logN)) #