

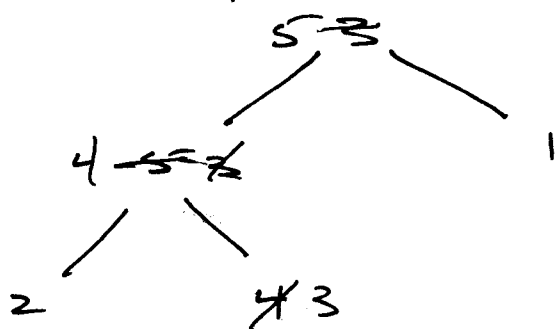
CSE 101 3-9-21

11

- SETs : if response $\geq 85\%$, then everyone +.5%
- Quiz 5 : Tonight.
- Final Exam : Tue 3/16 (time?)
- Pat : ext. 1 day only!!

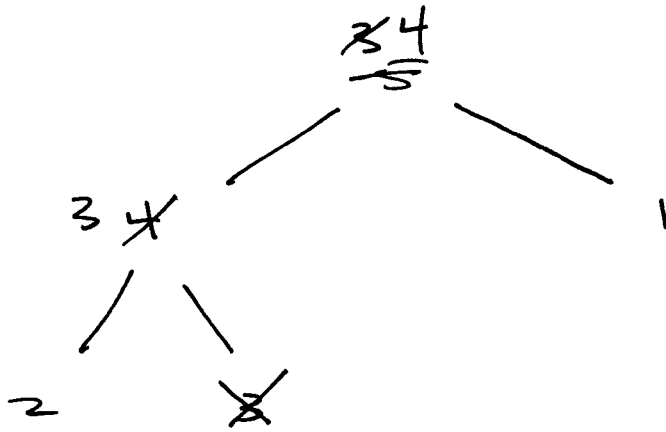
Ex. HeapSort

A : (~~3~~, ~~5~~, 1, 2, ~~4~~)
 5, 3, 4, 3

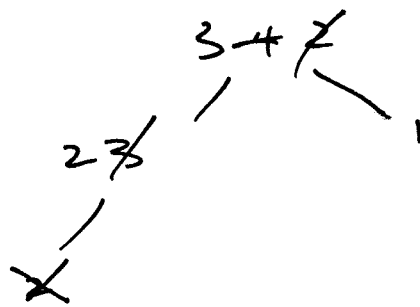


After BuildHeap:

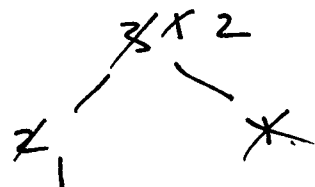
A = (~~3~~, 4, 1, 2, ~~4~~)
 3 5



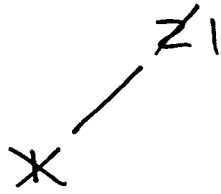
$$A = (\underset{2}{\cancel{4}}, 3, 1, \underset{4}{\cancel{2}} \mid 5)$$



$$A = (\underset{1}{\cancel{3}}, 2, \underset{3}{\cancel{1}} \mid 4, 5)$$



$$A = (\underset{1}{\cancel{2}}, \underset{2}{\cancel{1}} \mid 3, 4, 5)$$



$$A = (1 \mid 2, 3, 4, 5) \quad \checkmark$$

Exercise

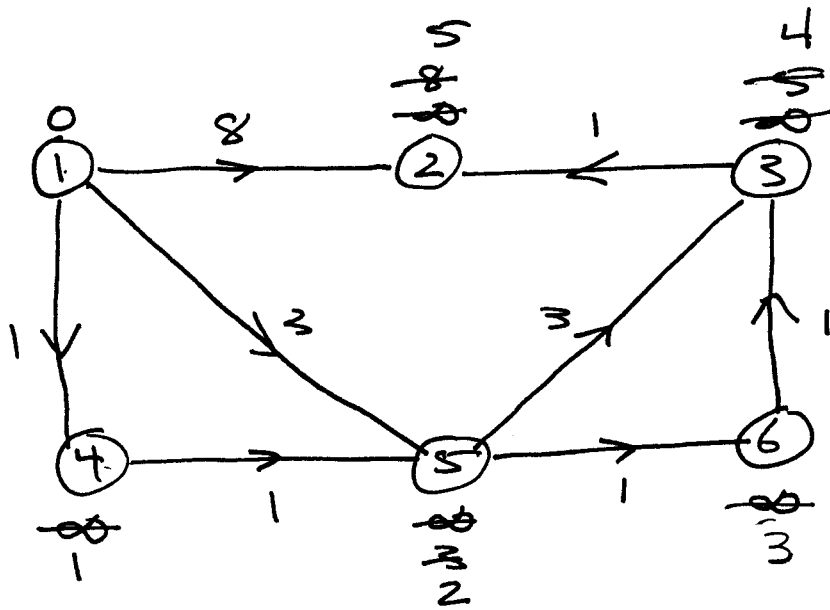
Do more examples!!

larger examples

examples with repeated elements.

$$A = (\textcircled{1}, \textcircled{2}, 3, \textcircled{4}, \boxed{1}, 5, \boxed{2}, \boxed{4})$$

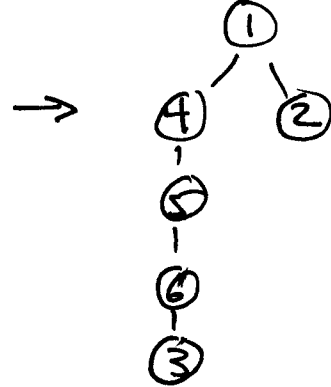
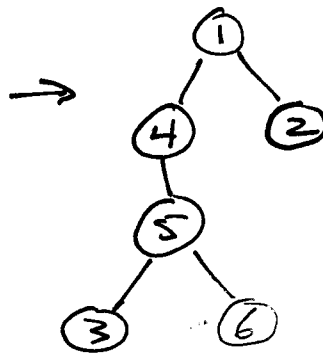
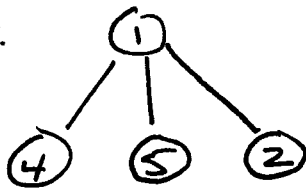
Ex. Dijkstra



S = 1

P.Q.: $\times \neq \neq \neq \neq \neq \neq$

Tree:

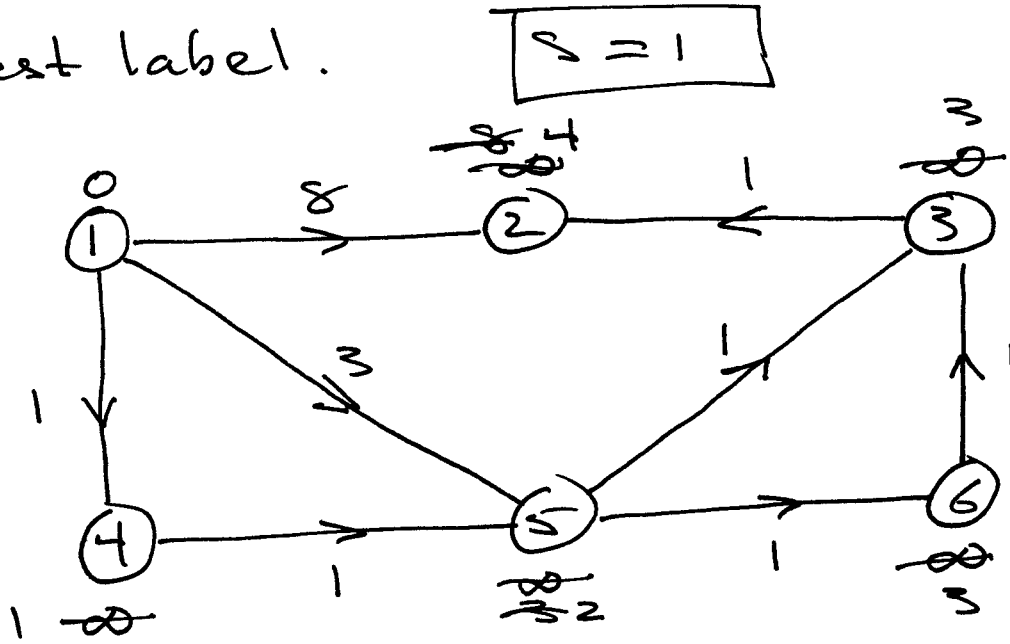


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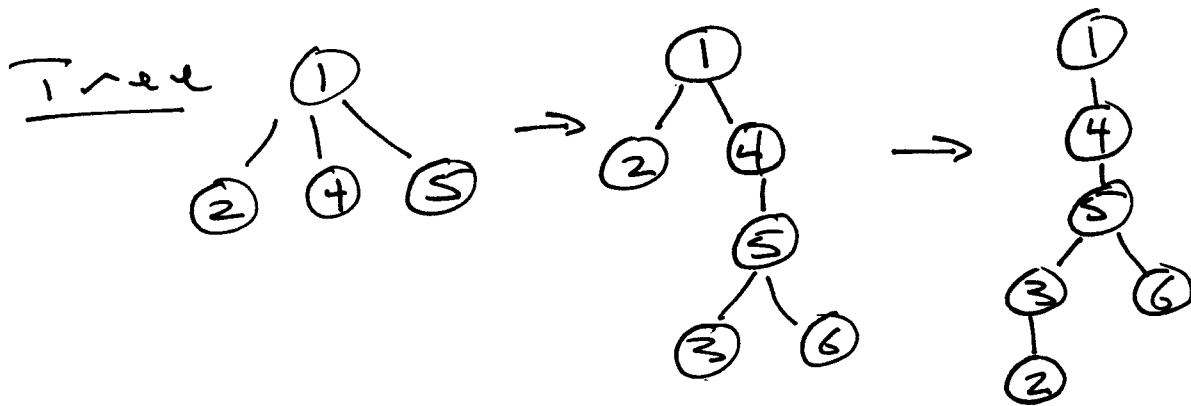


Vertex	1	2	3	4	5	6
d	0	5	4	1	2	3
p	n	3	6	1	4	5

Ex Policy : if two vertices have same min. d-value, Extract the vertex with lowest label.



P.Q. ~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ ~~6~~



Vertex	1	2	3	4	5	6
d	0	4	3	1	2	3
p	1	3	5	1	4	5

Runtimes $|V|=n, |E|=m$

• BellmanFord

- Init. $\Theta(n)$

- nested loop: $(n-1) \cdot m \cdot \Theta(1) = \Theta(nm)$

- last loop: $\Theta(m)$

cost: $\Theta(n+m+nm) = \Theta(nm)$.

• Dijkstra (modified: min-heap, min-PQ.)

Init: $\Theta(n)$

Build Heap: $\Theta(n)$

scanning adj lists: $\Theta(m)$

Relaxations: $\Theta(m \cdot \log(n))$

cost: $\Theta(n) + \Theta(n) + \Theta(m) + \Theta(m \log(n))$

$= \Theta(m \log n)$

Next: chap. 23

minimum weight spanning trees
(MWST).

Defn let $G = (V, E)$ be an
(undirected) g -aph. A sp. tree
in G is a sub g -aph T s.t.

(1) T is a tree

and (2) $V(T) = V(G)$

weight of T :

$$w(T) = \sum_{e \in E(T)} w(e)$$

Goal: find a sp. tree whose
weight is minimum.