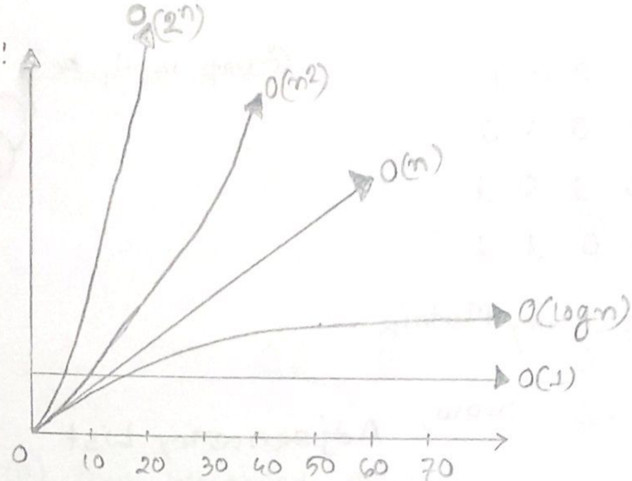
Time complexity graph:

1. $O(n) + O(1)$

$\equiv O(n)$

2. $O(n) + O(n) \equiv O(n)$

3. $O(n^2) + O(n) \equiv O(n^2)$



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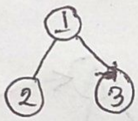
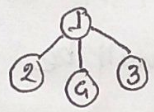
☑ Practice Problem 2.5:

1. In tree graph, every node will connect at least one edge with another node but there will no cycle.



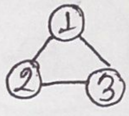


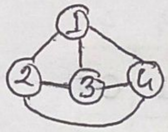
node = 3
edge = 2
= 3-1

node = 4
edge = 3
= 4-1

∴ if there is n node then edge will $= n-1$

2. Each node is connected with the others nodes.





node = 3
edge = 3

node = 4
edge = 6

Here, an observation, every node has $(n-1)$ edge.

① → $n-1$
② → $n-2$
③ → $n-3$
④ → $n-4$ [As all are counted]

$a = n-1$
$d = -1$

.Now,

$E = (n-1) + (n-2) + (n-3) + (n-4) + \dots + 0$

$= 0 + 1 + 2 + 3 + 4 + \dots + (n-3) + (n-2) + (n-1)$

$E = (n-n) + \dots + (n-n) + (n-3) + (n-2) + (n-1)$

$E = \frac{n}{2}\{2n-2-(n-1)\}$

$= \frac{n}{2}(2n-2-n+1)$

$= \frac{n(n-1)}{2}$

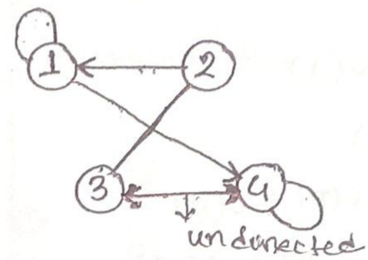
$\therefore \boxed{\text{Edge} = \frac{n(n-1)}{2}}$

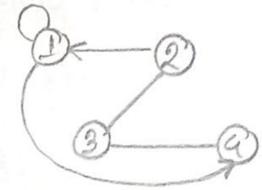
3.

$$\begin{matrix} 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{matrix}$$

Adjacency Matrix

Graph will be





Now, Adjacency List

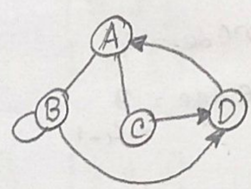
① → 1, 4
② → 1, 3
③ → 2, 4
④ → 3, 4

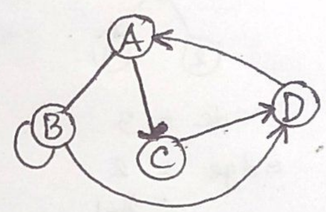
— x —

4.

Ⓐ → B, C
Ⓑ → B, A, D
Ⓒ → D, A
Ⓓ → A

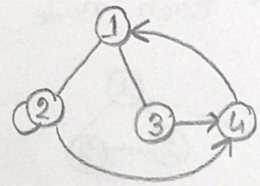
Graph will be





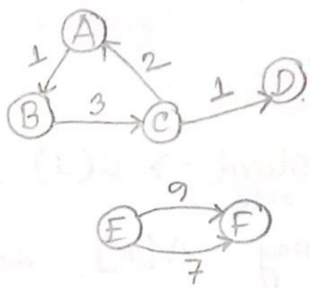
Adjacency Matrix

	1	2	3	4
1	0	1	1	0
2	1	1	0	1
3	1	0	0	1
4	1	0	0	0



5) [
[A, B, 1]
[B, C, 3]
[C, A, 2]
[E, F, 9]
[C, D, 1]
[E F, 7]
]

Graph will be



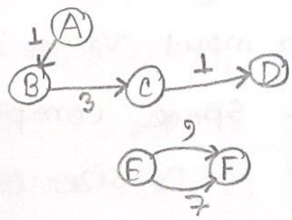
Adjacency List

A -> (B, 1)
B -> (C, 3)
C -> (A, 2), (D, 1)
D ->
E -> (F, 7), (F, 9)
F ->

(a) This weighted graph.

(b) Graph has a cycle.

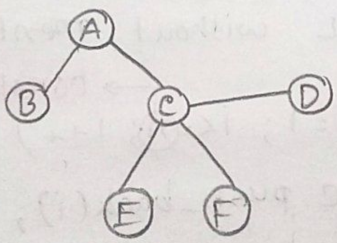
(c)



Acyclic graph

(d) It is not a tree because it has 1 cycle, 1 multi edge and it creates 2 graphs and it is directed graph.

(e) Making it Tree:



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