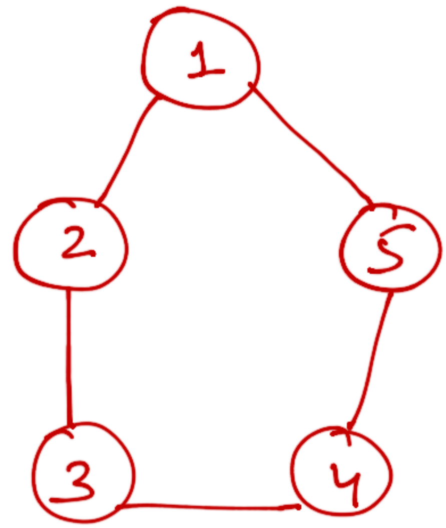
MST

Let MST be $G'(V', E')$

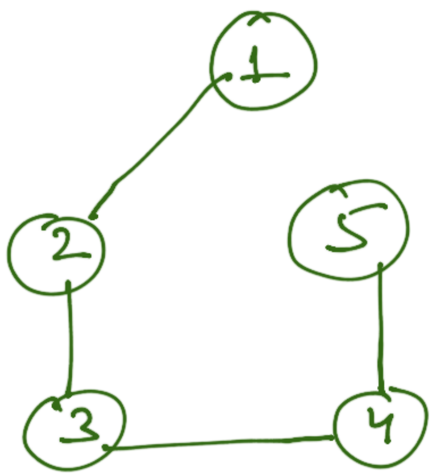
$$V' = V$$

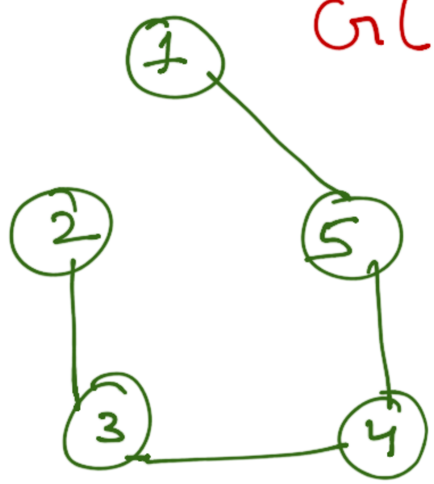
$$E' \subset E$$

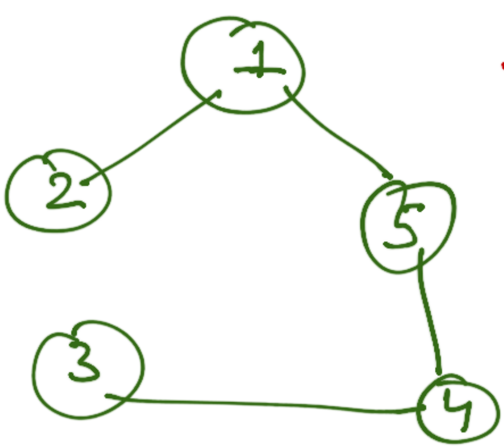
$$E' = |V| - 1$$



$G(V, E)$







→ If costs is given to these edges, MST will be the one with least cost

& it should be connected → No cycle in MST

Properties

1. Remove one edge from MST, it will become disconnected

2. Adding one edge will create a loop

3. If each edge has a distinct wt, then only one unique MST

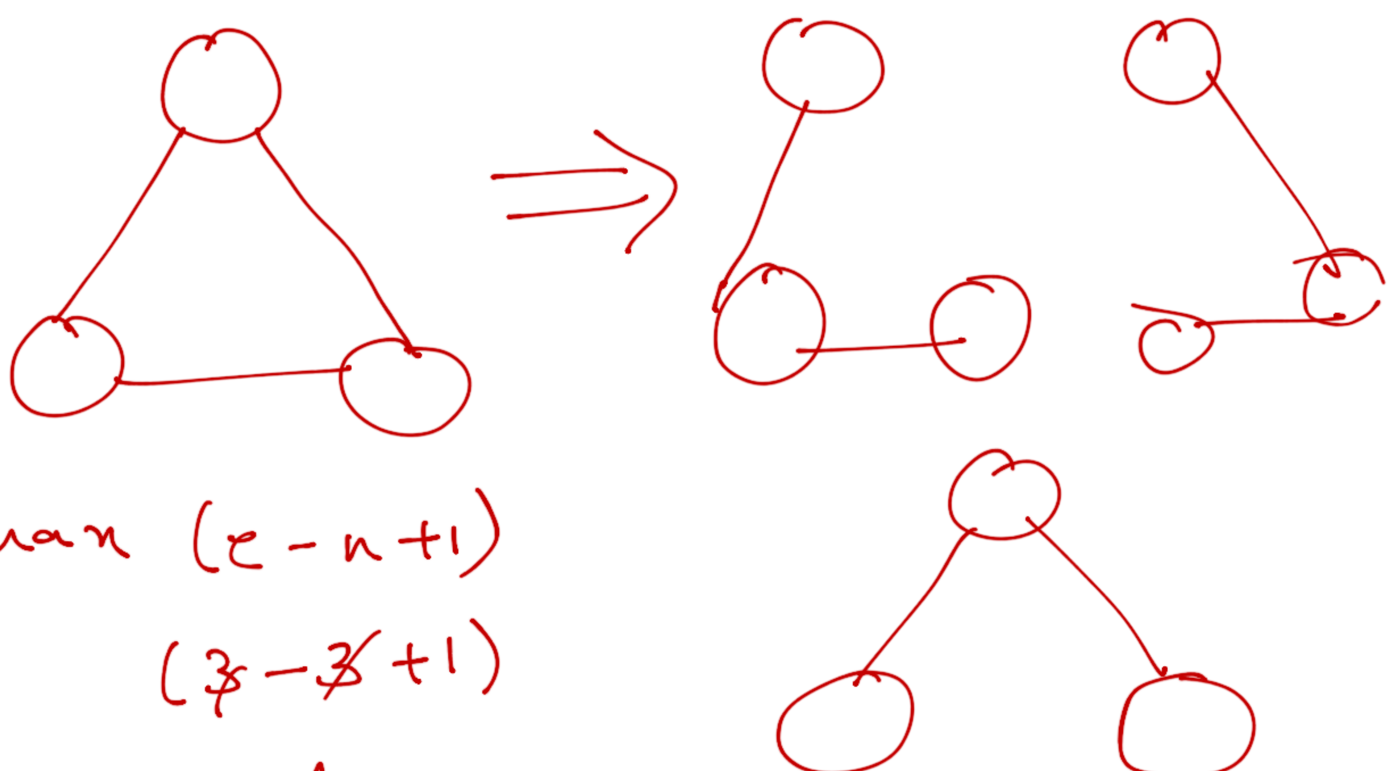
4. A complete (each vertex conn. to every other vertex) undirected graph, can have n^{n-2} no. of MST's

5. Every connected undirected graph has atleast one MST.

→ Disconnected graph has no MST

→ for a complete graph by removing max $(e-n+1)$ edges, we can construct a MST

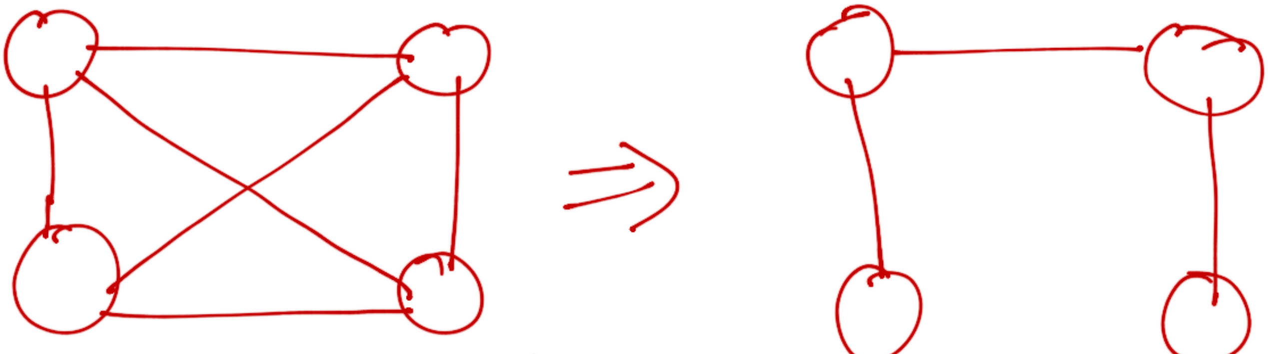
Eg:



$\max(e-n+1)$

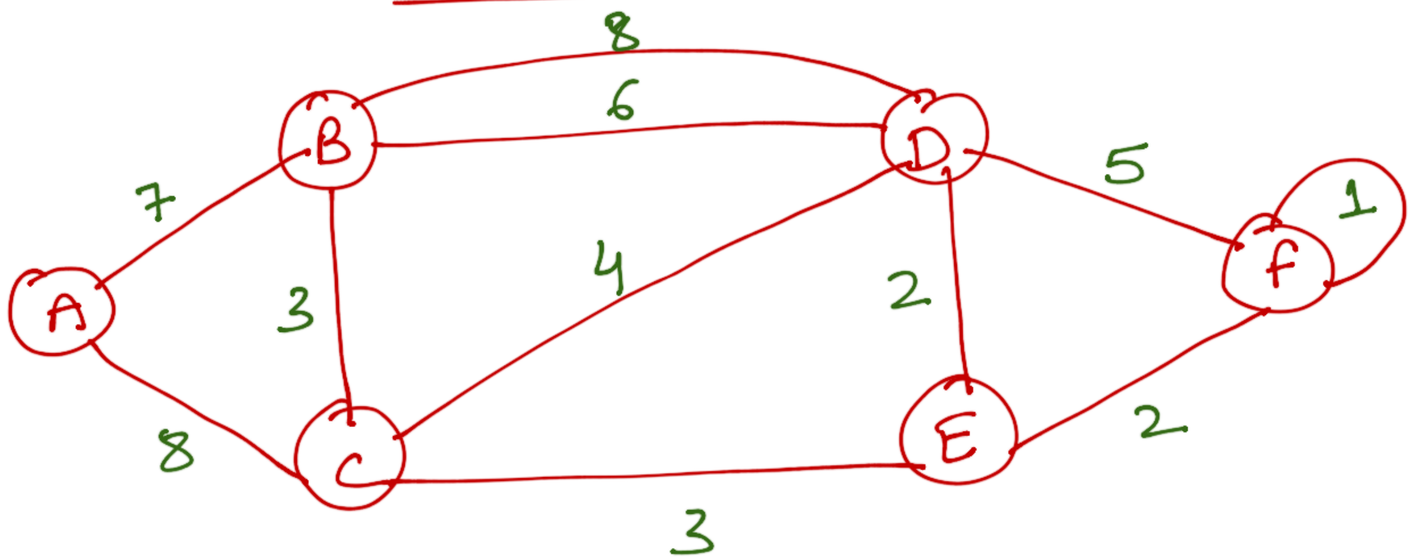
$(\cancel{3}-\cancel{3}+1)$

$= 1$



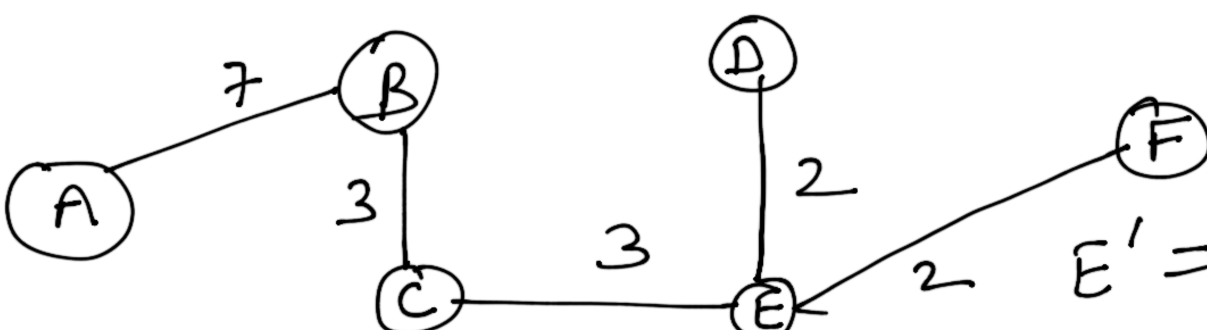
$\max(6-4+1) = 3$ edges can be removed

Prim's Algorithm



1. Remove all loops & parallel edges (based on cost, remove)

2. Choose any node as starting node, check incident edges, & chose one with minimum cost.

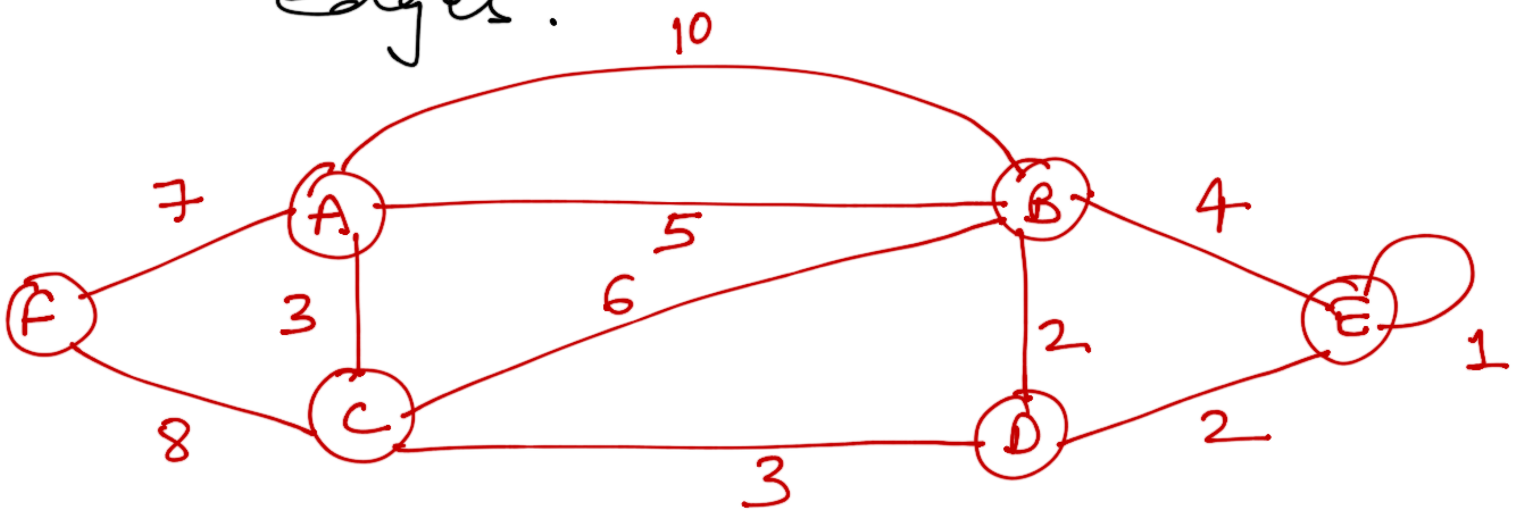


$E' = |V| - 1 = 6 - 1 = 5$

wt of MST = 17

Kruskal's Algorithm for MST

1. Remove all loops & parallel edges.



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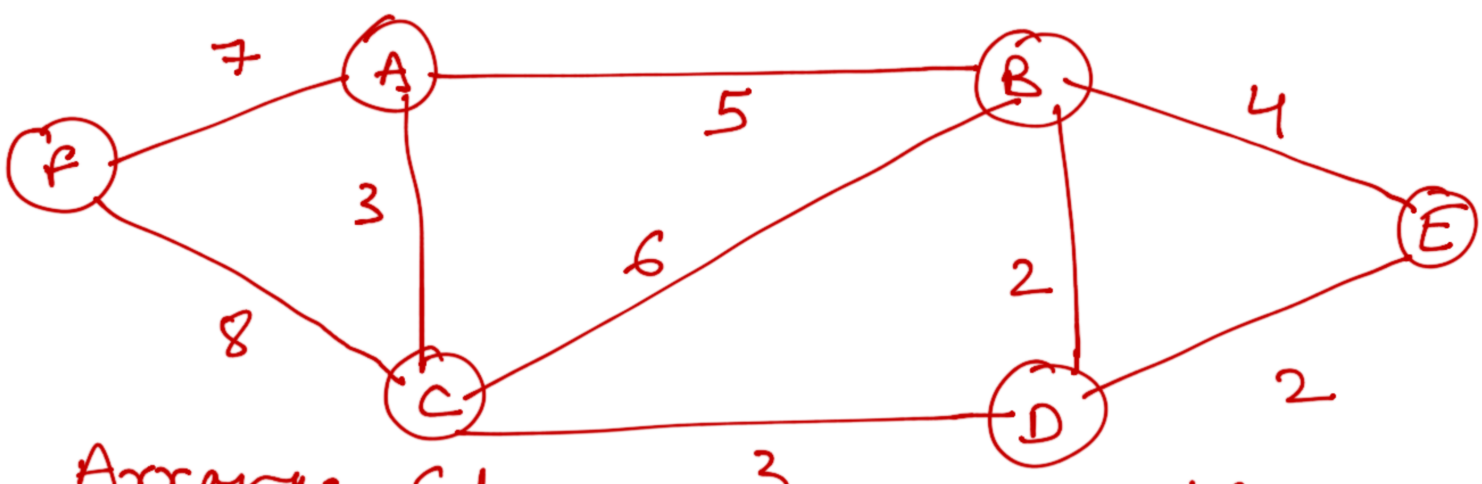

2. Arrange Edges inorder of wts

BD, DE, AC, CD, BE, AB, BC, AF, FC

3. Taking minimum edges, but no cycle should be allowed

BD = 2

DE = 2

AC = 3

CD = 3

~~BE~~ = 4

~~AB~~ = 5

~~BC~~ = 6

Af = 7

~~fC~~ = 8

$E' = |V| - 1$

$= 6 - 1$

$= 5$