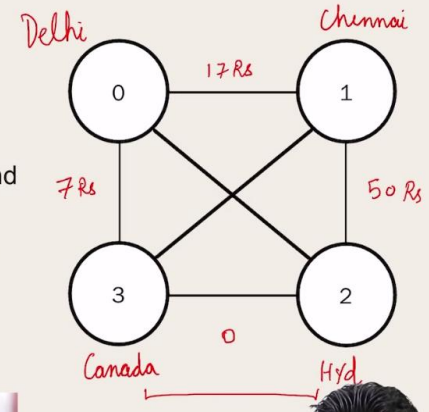
COST & MINIMUM SPANNING TREE

Meet Prem

- Prem travels from city to city to find his ***prem*** and wants to save petrol price while travelling
- He wants to find the ***prem*** at the minimum cost



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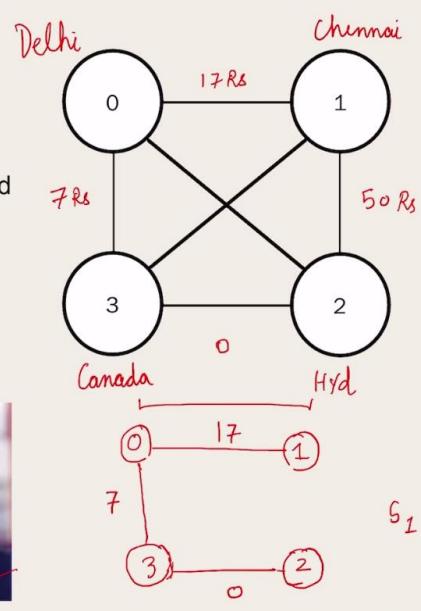
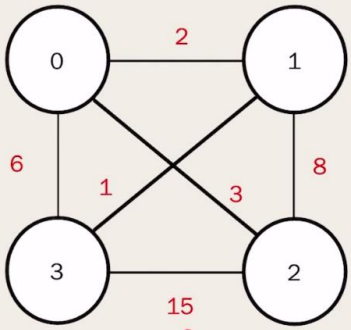


What is a Spanning Tree?

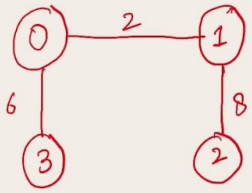
- A subgraph of a graph G is a graph whose vertices and edges are subsets of the original graph G.
- A **Connected subgraph** 'S' of Graph G(V, E) is said to be a **Spanning tree** of graph G iff (if and only if):
  1. *All vertices of G must be present in S*
  2. *No of edges in S should be V-1*
- The cost of the spanning tree is the sum of the weights of all the edges in the tree.
- A minimum spanning tree is the spanning tree with minimum cost

Exercise: Cost of a Spanning tree

- Find the cost of any 3 spanning trees of the graph at the right!

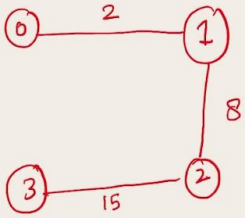


G



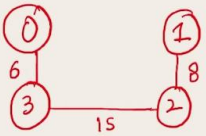
S_1

$C_1 = 6 + 2 + 8 = 16$



S_2

$C_2 = 15 + 8 + 2 = 25$



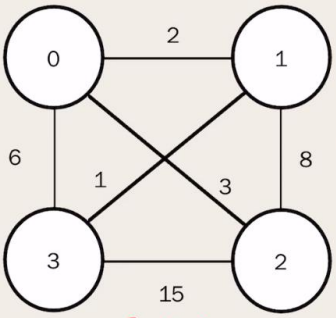
S_3

$C_3 = 6 + 8 + 15 = 29$

$C_1 < C_2 < C_3$

Exercise: Minimum Spanning tree

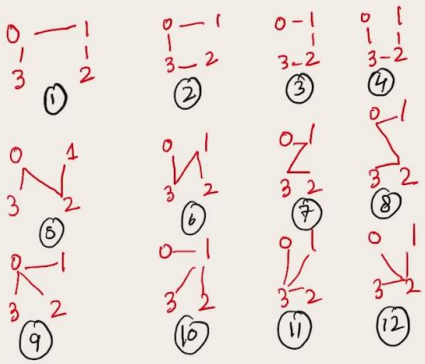
- Find the minimum spanning tree of the graph at the right!



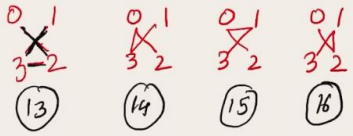
Graph G

K_4

$n^{n-2} = 4^2 = 16$



$C_{13} = C_{02} + C_{23} + C_{31}$



$C_{13} = 3 + 15 + 1 = 19$