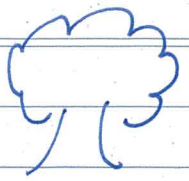
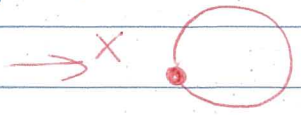
MINIMUM SPANNING TREES



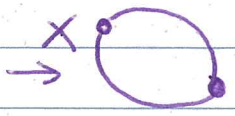
Ex10 H Notes

A A tree is → connected graph

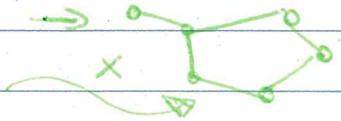
→ NO loops →



→ NO multiple edges



→ NO circuits



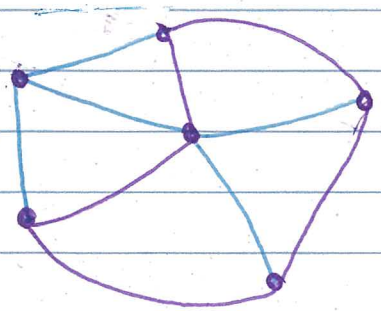
but it can be part of a larger graph.

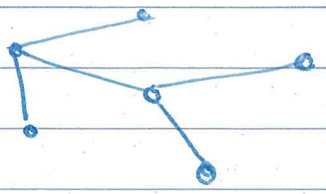
For n vertices, the tree has $(n-1)$ edges

B A spanning tree – connects ALL vertices

(no loops, multiple edges or circuits)

spanning tree (1 option)





* there are other options *

But how do I find a spanning tree ??
hmmm .... excellent question !!

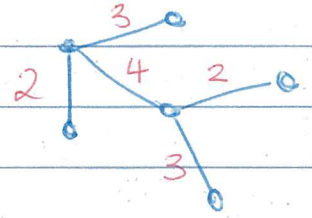
use the relationship between vertices and edges i.e. n and $n-1$

so in previous graph, there are 6 vertices so I need $(6-1) = 5$ edges.

So then take out edges to get back to required number.
* just make sure the conditions for a tree are still being met ok!

In Ex10A, we looked at "weighted graphs". we can use this knowledge to work out the length of the spanning tree.

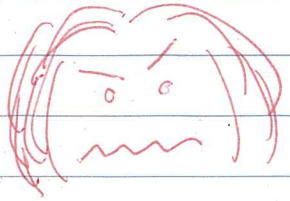
Simply add to numbers on the edges! yay!



Length = 2+3+4+2+3
= 14 units

So we can compare lengths of different spanning trees to find the shortest one

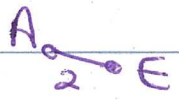
Of course we can Mrs Vincent ....

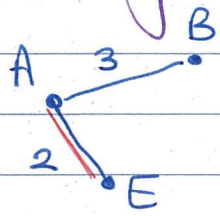


Prim's Algorithm → rules to follow for minimum spanning tree

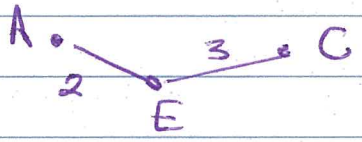
① Choose any vertex

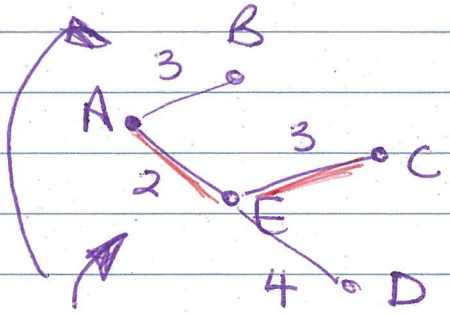
② Follow edge with lowest weighting to next vertex





③ Choose the lowest edge coming off your 2 vertices

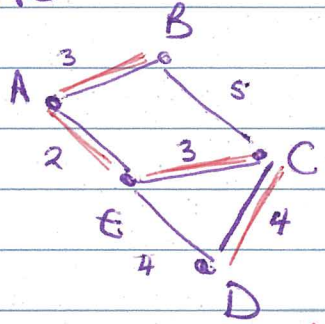




could choose either EC or AB

now choose lowest from A, E & C

④ Repeat until all vertices connected
↳ choose AB, then CD



NOTE: You CANNOT choose an edge that forms a cycle

∴ Each step adds another vertex to consider ∴ ALWAYS choose the lowest number path

check 5 vertices
∴ 5-1 edges required

Finally, add up the weightings to find 'length'!

Length = 3 + 2 + 3 + 4
= 12 units

NOW TRY EX 10 H questions