Ques 4:

A complete undirected graph is a graph where the total no of edges is n(n-1)/2 and there must be a path from each node to every other node

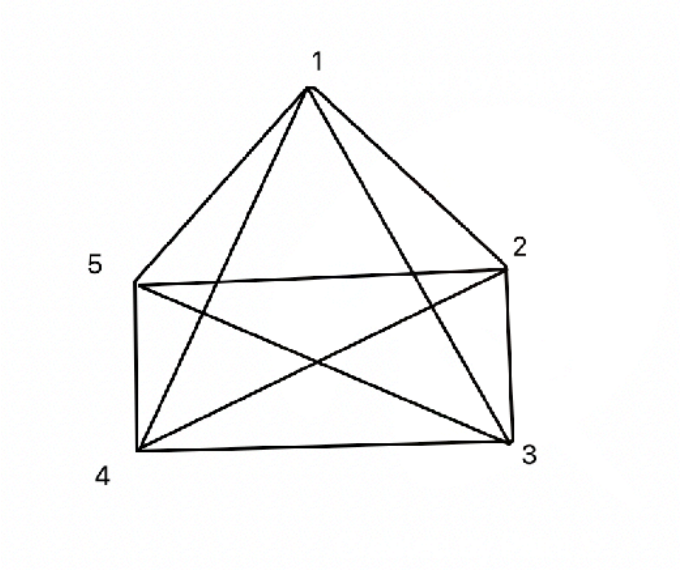
For 1 vertex, we have: (1)

For 2 vertices, we have : (1) -- (2)

For 3 vertices, we have : (1) -- (2)
| |
| |
(3)---->(this is not an edge, just showing connection between 3 and 2)

For 4 vertices, we hvae : (1) -- (2)
| |
| |
(3)----(4)

For 5 vertices, it will have a shape of a pentagon with a star inside



In order to prove that an n vertex complete graph is n(n-1) / 2. We can use mathematical induction to prove this.

1st case: n = 0. For 0 nodes, there is exists no eddges

2nd case: n =1. For 1 node, there is no edge because it is an isolated vertex.

3rd case: n = k. For k nodes, suppose that Ek = K(K-1)/2 and we take a complete graph with k + 1 vertices. Therefore if we take one vertex and remove it together wit the edges from it, we get a graph with k vertices

Therefore,

Ek+ 1 = Ek + n

Thus, by our assumption:

Ek + 1 = k(k-1)/2 + k = k^2 + k/2 = k(k+1)/2.

Ques 5:

The graph is strongly connected as there is a path from each vertex to each vertex for all the total vertices

0 to 1 : 0 -> 1
1 to 0 : 1 -> 2 -> 0
1 to 2: 1 -> 2
2 to 1: 2-> 0 -> 1
3 to 2: 3-> 2
2 to 3: 2 -> 0 -> 3
3 to 0: 3 -> 2 -> 0
0 to 3: 0 -> 3
2 to 0: 2 -> 0
0 to 2: 0 -> 1-> 2 or 0 -> 3 -> 2
1 to 3: 1-> 2 -> 3
3 to 1: 3-> 2->0-> 1