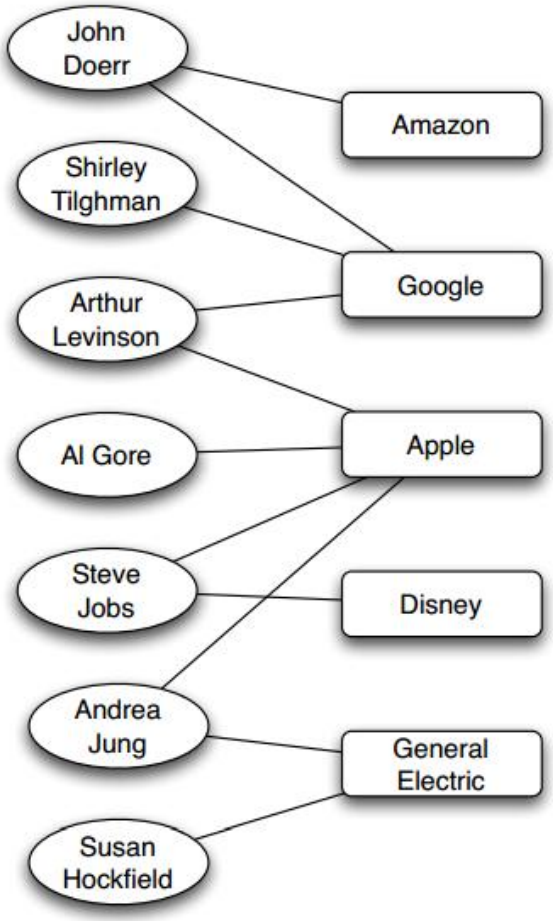
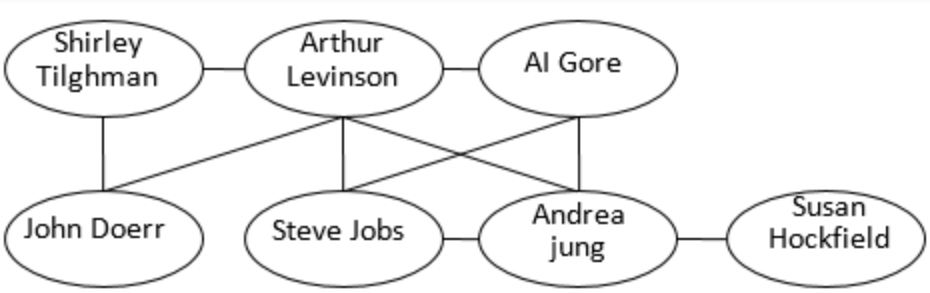
You need to give the reasoning of your answers. Otherwise, there is no mark.

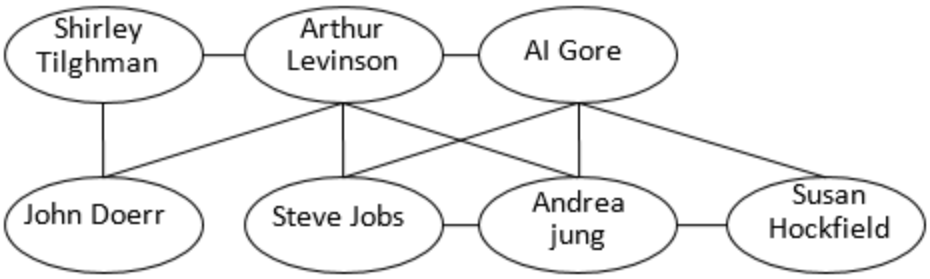
Question 1

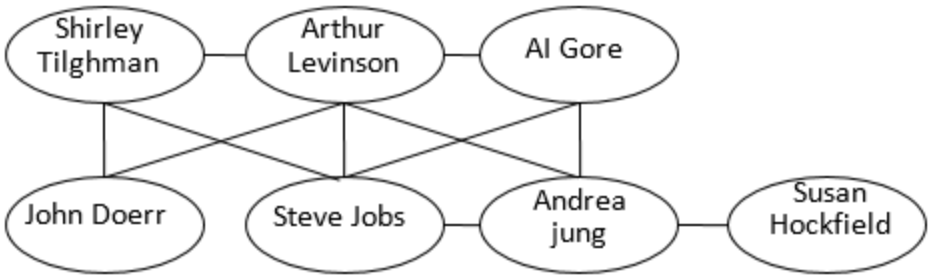
Affiliation network is an example of bipartite graphs. An affiliation network has two categories, people and foci, where each edge connects a person to a focus that he or she participates in. Consider the following graph. On the left hand side, there are 7 nodes representing people whereas on the right hand side, there are 5 nodes representing companies (foci). If a person is on the director board of a company, there will have an edge connecting the person node and the company node.

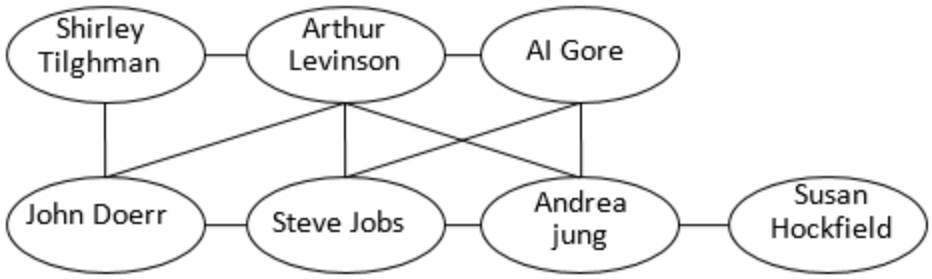


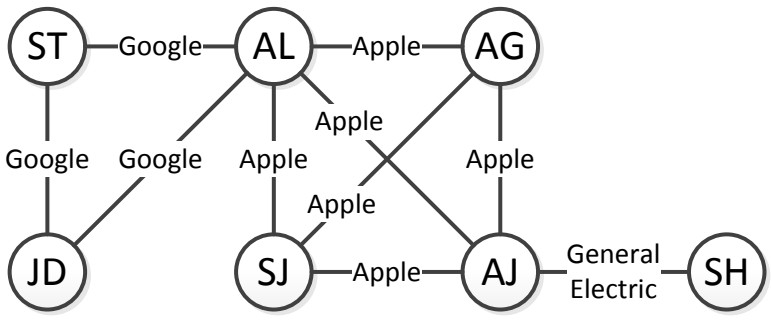
Given a bipartite affiliation graph, showing the membership of people in different social foci, researchers sometimes create a projected graph on just the people, in which we join two people when they have a focus in common. An edge will be formed between two persons to represent they participated in the same social activity. Please select which of the following graph represents such "projection" of the graph above.

1. 

2. 

3. 

4. 

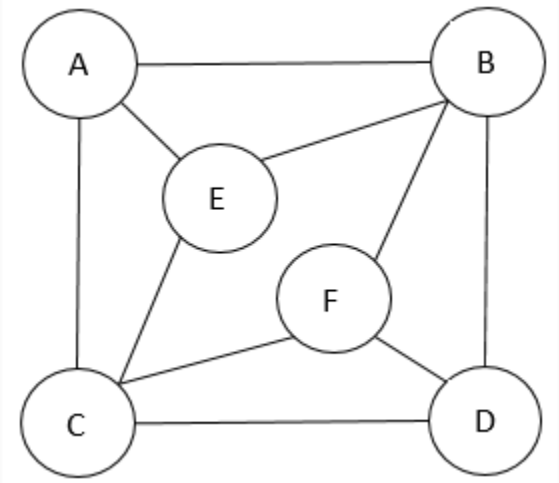


1 is correct.

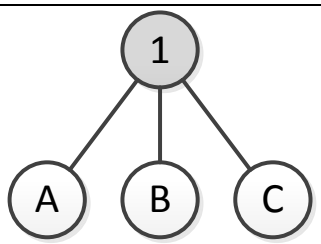
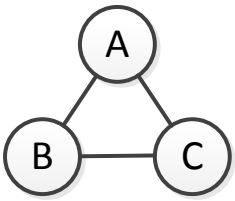
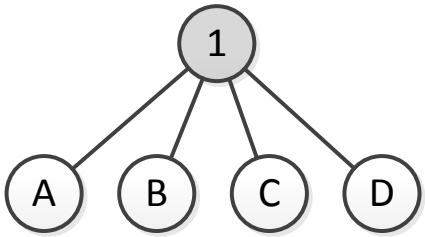
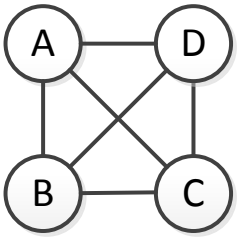
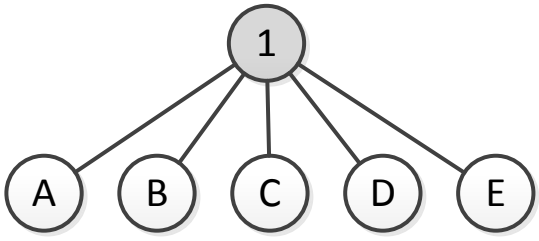
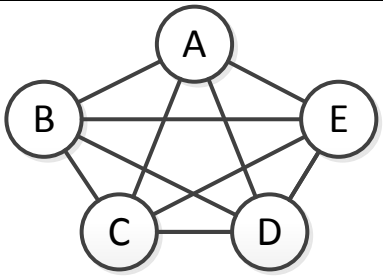
Question 2

Projected graph satisfies: an edge will be formed if two individuals participate the same social activities (foci).

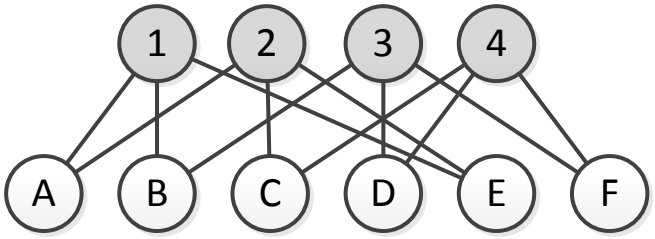
If the following graph is a projection of an affiliation network, what is the minimum number of social activities (foci) in that affiliation network?



To minimize the number of foci, we should make more No. of node pairs share the same focus. Therefore, we can get:

No. of nodes share the same focus	Bipartite affiliation graph	Projection graph
3		
4		
5		

The sub graphs of original graph only have 3-nodes projection graphs.
Therefore, the bipartite affiliation graph is:



The answer is 4.