Assignment Week 4
(Social Networks)

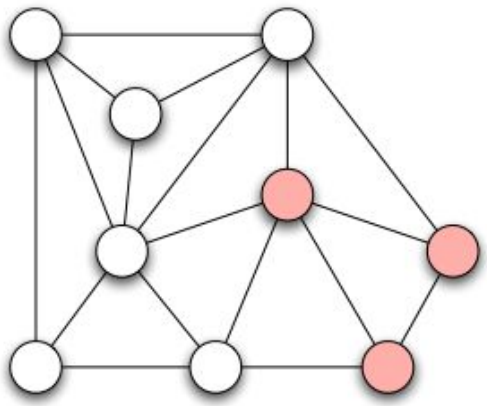
1. Homophily refers to the friendship between people
    a. Who are introduced to each other because of a common friend
    b. Who are dissimilar to each other
    c. **Who are similar to each other**
    d. Who have different ethnicity but live at the same place

    Explanation: Homophily refers to the theory which states that based on the node attributes, similar nodes may be more likely to attach to each other than dissimilar ones.

2. Identify the type of Homophily in the following situation:
    "The followers of leaders such as Adolf Hitler accepted and often internalized the Nazi leader's fascist views without question."
    a. Social influence
    b. Selection
    c. Both A and B
    d. None of these

3. Triadic closure implies that:
    a. Two people having a common enemy have more probability of becoming friends with each other.
    b. Three people having a common enemy have more probability of becoming friends with each other.
    c. Two people having a common friend have more probability of becoming friends with each other.
    d. Two people having a common person as a distant acquaintance have more probability of becoming friends with each other

4. If in the given network, pink nodes represent females and white nodes represent males. Does the network exhibit homophily?



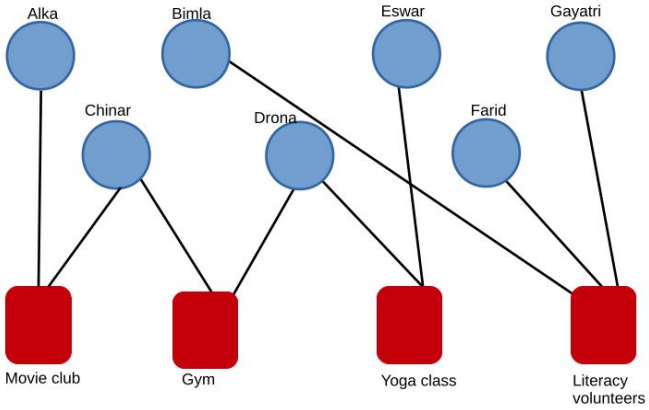
a. Yes
b. No Homophily
c. Some evidence of homophily

Explanation: Homophily Test: If the fraction of cross-gender edges is significantly less than 2pq, then there is evidence for homophily.
In the given Figure, for example, 5 of the 18 edges in the graph are cross-gender. Since p, i.e. fraction of males = ⅔ and q, i.e., fraction of females = 1/3 in this example, we should be comparing the fraction of cross-gender edges to the quantity 2pq = 4/9 = 8/18. In other words, with no homophily, one should expect to see 8 cross-gender edges rather than 5, and so this example shows some evidence of homophily.

5. Affiliation networks are
   a. Complete and bipartite
   b. Bipartite and not complete
   c. Complete and not bipartite
   d. Neither complete nor bipartite

6. Dynamics of friendships' formation and behaviour of people in a network is impacted by:
   a. Social Influence
   b. Selection
   c. Both selection and social influence
   d. Neither selection and social influence

7. Given an affiliation graph in the following Figure that shows the membership of people in different social foci, researchers sometimes create a projected graph on just the people, in which they connect two people when they have a focus in common. When such a projected graph is created for the given figure, what would be the number of edges in it?

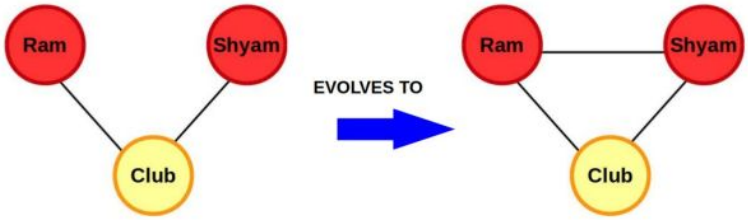


a. 4
b. 5
c. 6
d. 7

8. Consider the following two cases:
   Case 1: A and B become friends as they have ‘n’ common friends.
   Case 2: X and Y become friends as they have ‘n’ common social foci.
   (where ‘n’ is a large number) Choose the correct option from the following.
   a. Case 1 and Case 2 are equally probable.
   b. Case 2 is more probable than Case 1.
   c. Case 1 is more probable than Case 2.
   d. None of the above

   Explanation: Let us first talk about the plot where number of common friends is on the X axis and the probability of link formation is on the Y axis. This curve is almost linear (close to linear).
   Let us now talk about the plot where number of common social foci is on the X axis and the probability of link formation is on the Y axis. Here, as the number of common social foci increases, the probability of link formation increases upto a point and then decreases. This means that the first case is more probable.

9. Which phenomenon best describes the network evolution in the following Figure?



   a. Homophily
   b. Triadic Closure

c. **Foci Closure**
d. Membership Closure

Explanation: Two persons are part of a club (a common focus). Then they became friends. This phenomenon is called foci closure.

10. Suppose Akash and Bhumi have ‘k’ common friends. Given that each common friend gives Akash and Bhumi an independent probability ‘p’ of forming a link, what is the probability that there will NOT exist a link between Akash and Bhumi.
    a. p^k
    b. 1 − (1 − p) × k
    c. **(1-p)^k**
    d. 1 − (1 − p)^k

    Explanation: Probability of forming a link due to one of the common friends = p
    Probability of a link not forming due to one of the common friends = 1 − p
    Probability of not forming a link due to all the ‘k’ common friends = (1 − p)^k