

# Homophily

Social Networks - July 2020

MCQ Assignment - Week 4

1. Consider figures A,B and C in Figure 1 and choose the right kind of closure they represent

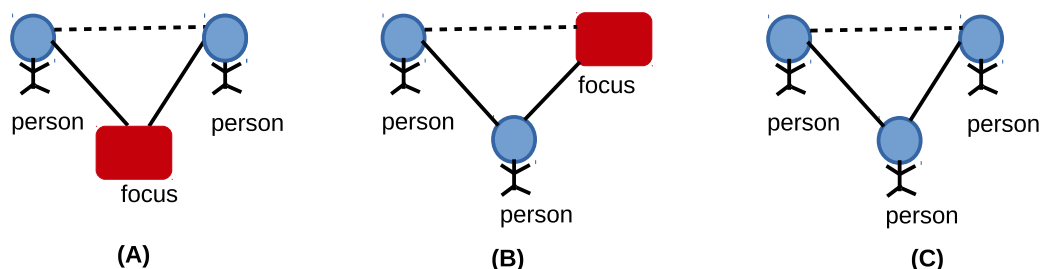


Figure 1: Closure scenarios

- A. A: Triadic closure, B: Membership closure, C: Focal closure  
 B. A: Focal closure, B: Membership closure, C: Triadic closure  
 C. A: Membership closure, B: Triadic closure, C: Focal closure  
 D. A: Focal closure, B: Triadic closure, C: Membership closure

**ANSWER: B**

Focal Closure is the tendency of two people to form a link when they have a focus in common. If 'a' and 'b' are people, and 'c' is a focus, then 'b' takes part in a focus that her friend 'a' is already involved in. This is called membership closure. Triadic closure is the property among three nodes 'a', 'b', and 'c', such that if a link exists between 'a'-b' and 'a'-c', then 'b' and 'c' are likely to form a link.

2. Let  $G$  be a complete graph with  $n$  nodes. The total number of triangles possible in  $G$  is:

- A.  $n^3$   
 B.  $\frac{n(n-1)(n-2)}{6}$   
 C.  $3n$   
 D. None of the above

**ANSWER: B**

In a graph having  $n$  nodes, there can be  $\binom{n}{3}$  triangles, which is equal to  $\frac{n(n-1)(n-2)}{6}$ .

3. What will the output of the following two variables respectively (written in Python3):

```
1 A = [1, 2, 3, 4] + [3, 4, 5, 6]
2 S = [1, 2, 3, 4] - [3, 4, 5, 6]
```

- A. [1, 2, 3, 4, 5, 6], [1, 2, 5, 6]  
 B. [4, 6, 8, 10], [-2, -2, -2, -2]

- C. 28, -8  
D. [1, 2, 3, 4, 3, 4, 5, 6], `TypeError: unsupported operand type`

**ANSWER: D**

The '+' operator when applied to two lists functions as concatenation, and hence will simply provide a list that has the elements of the first list, followed by the elements of the second list. '-' operator is not defined for lists.

4. *If two people in a social network have a friend in common, then there is an increased likelihood that they will become friends themselves at some point in the future.*

The above principle is referred as

- A. Triadic closure  
B. Foci closure  
C. Membership closure  
D. None of the above

**ANSWER: A**

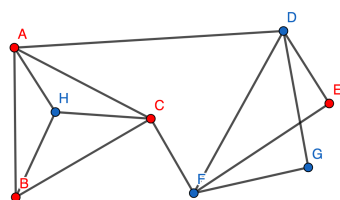
5. What is the average degree of the graph computed by `networkx.star_graph(n)` command (written in Python3)?

- A.  $n$   
B.  $\frac{2n-2}{n}$   
C.  $\frac{2n}{n+1}$   
D.  $\frac{n}{n+1}$

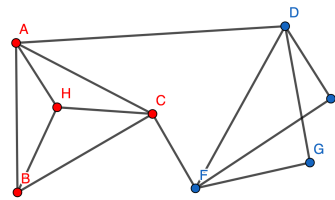
**ANSWER: C**

`networkx.star_graph(n)` command generates a graph with  $n+1$  nodes, one node as the center of the star and rest four as the legs of the star. Therefore, one node of degree  $n$  and rest of the four nodes with degree 1.

6. Among the given two networks below, which network shows the better evidence of Homophily? (Nodes are divided into two types-represented by different colors)



(a) Network A



(b) Network B

- A. Network A  
B. Network B

- C. Both exhibit equally
- D. Can't say

**ANSWER: B**

7. Suppose Ram and Rahim have 4 common friends. Given that each common friend gives Ram and Rahim an independent probability 0.2 of forming a link, what is the probability that there will exist a link between Ram and Rahim?
- A. 0.50
  - B. 0.64
  - C. 0.59
  - D. 0.80

**ANSWER: C**

Probability of forming a link due to one of the common friends =  $q$

Probability of a link not forming due to one of the common friends =  $1 - q$

Probability of not forming a link due to all the 'k' common friends =  $(1 - q)^n$

probability of forming a link due to atleast one of the 'k' common friends =  $1 - (1 - q)^n$

8. Two friends Joey and Monica like different set of food items. The set of food items Joey and Monica like is denoted by  $J$  and  $M$ , respectively.  $J$  has 28 elements whereas  $M$  has 10 elements and there are 6 items which are liked by both Joey and Monica ( $J \cap M = 6$ ). What is the *similarity measure* of Joey and Monica, with respect to food items.
- A. 6/38
  - B. 38/6
  - C. 3/16
  - D. 16/3

**ANSWER: C**