

# Unit 9 - Week 7

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## Assignment 7

The due date for submitting this assignment has passed.

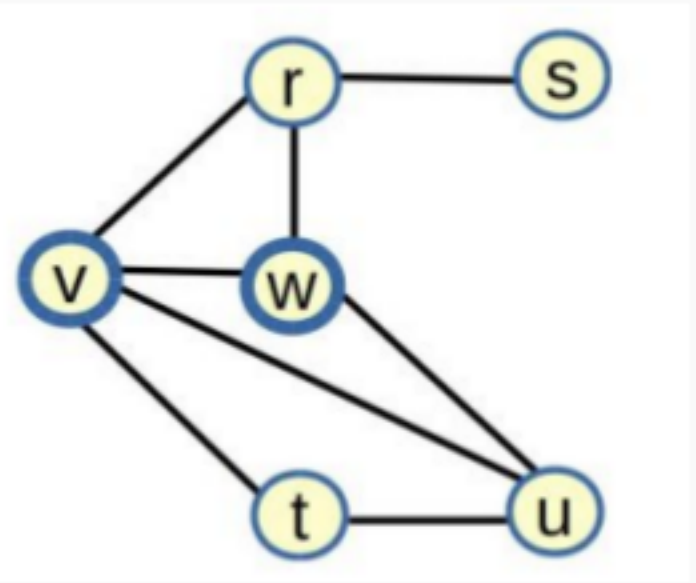
As per our records you have not submitted this assignment.

Due on 2020-03-18, 23:59 IST.

- 1)

Given a network as shown in the following Figure, assume that initially every node in this network has adopted behavior B. Next, a new behavior A is introduced in the network and the nodes 'v' and 'w' are the initial adopters of this behavior A, i.e., nodes 'v' and 'w' now have adopted behavior A and the rest of the nodes have adopted behavior B. The payoff associated with A is  $a = 3$  and the payoff associated with B is  $b = 2$ . After the introduction of this new behavior A in the network, all the nodes will start weighing their options and might change their behavior. This leads to a cascade in the network. After two iterations, which nodes would have adopted the behavior A?

1 point



- ☐ v, w, r

☐ v, w, t, s

☐ v, w, r, s, t

☐ v, w, r, s, t, u

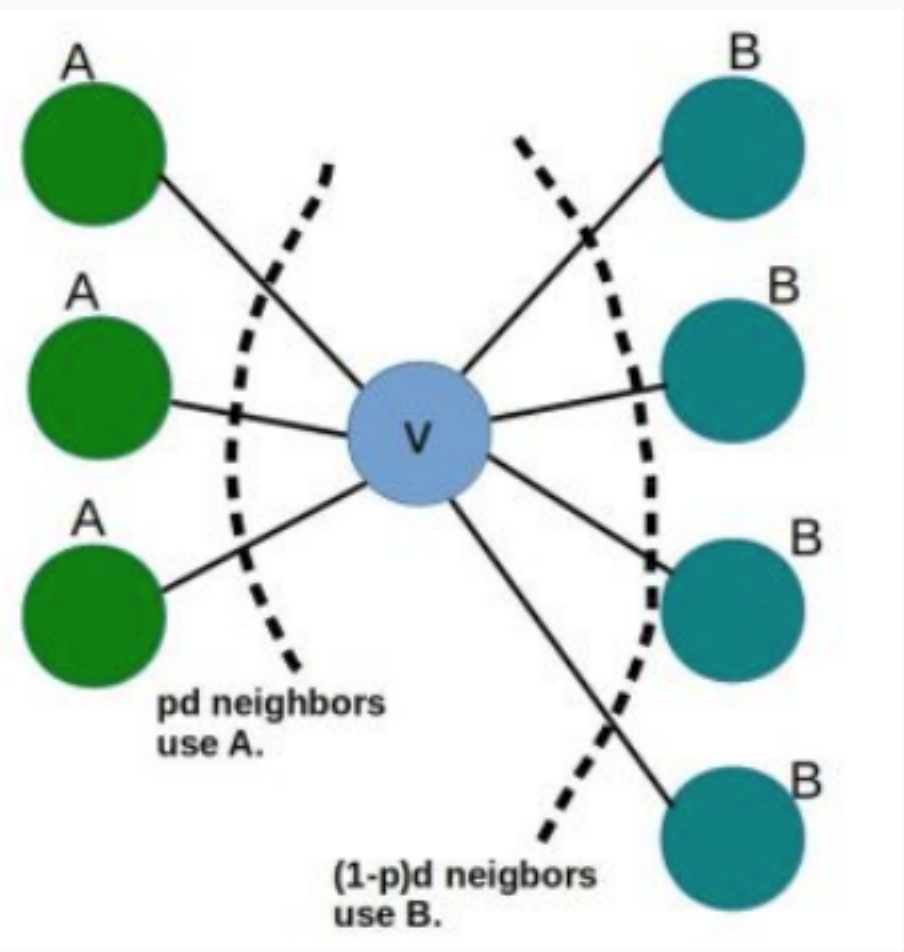
- No, the answer is incorrect.

Score: 0

Accepted Answers: v, w, t, s
- 2)

Let 'v' be a node in a graph. Suppose that a 'p' fraction of the neighbors of 'v' have behavior A, and a  $(1 - p)$  fraction have behavior B; that is, if 'v' has 'd' neighbors, then  $pd$  adopt A and  $(1 - p)d$  adopt B, as shown in the following Figure. Behavior A has a payoff of 'a' and behavior B has a payoff of 'b'. Then A is a better choice for 'v' if

1 point



- ☐  $p \geq a/b$

☐  $p \geq b/a$

☐  $p \geq a/(a+b)$

☐  $p \geq b/(a+b)$

- No, the answer is incorrect.

Score: 0

Accepted Answers:  $p \geq b/(a+b)$
- 3)

The spreading of a contagion on a network depends on

1 point
- ☐ only the pathogen

☐ only the contact network

☐ both the pathogen and the contact network

☐ None of the above
- No, the answer is incorrect.

Score: 0

Accepted Answers: both the pathogen and the contact network
- 4)

Given a node X having 8 friends/neighbors. 3 of its neighbors have decided to adopt the behavior/action A having a payoff of 11 while 5 of its friends have adopted the action B yielding a payoff of 6. This is shown in the following Figure. What is (i) the payoff that X gets from its friends who have adopted the action A, (ii) the payoff that X gets from its friends who have adopted B, (iii) The final action/behavior adopted by X?

1 point
- 
- ☐ (i) 33 ,(ii) 30, (iii) B

☐ (i) 33 ,(ii) 30, (iii) A

☐ (i) 11 ,(ii) 6, (iii) A

☐ (i) 11 ,(ii) 6, (iii) B
- No, the answer is incorrect.

Score: 0

Accepted Answers: (i) 33 ,(ii) 30, (iii) A
- 5)

Given a network as shown in the following Figure, assume that initially every node in this network has adopted behavior B. Next, a new behavior A is introduced in the network and the nodes 1 and 3 are the initial adopters of this behavior A, i.e., nodes 1 and 3 now have adopted behavior A and the rest of the nodes have adopted behavior B. The payoff associated with A is  $a = 3$  and the payoff associated with B is  $b = 2$ . After the introduction of this new behavior A in the network, all the nodes will start weighing their options and might change their behavior. This leads to a cascade in the network. When the cascade ends, which all are the nodes who have adopted the behavior A.

1 point
- 
- ☐ 1, 3, 2

☐ 1, 3, 2, 4

☐ 1, 3, 2, 4, 7

☐ 1, 3, 2, 4, 5, 6, 7, 8
- No, the answer is incorrect.

Score: 0

Accepted Answers: 1, 3, 2, 4

6)

Consider a set of initial adopters of behavior A, with a threshold of  $q$  for nodes in the remaining network to adopt behavior A. Given the following two statements.  
Statement 1: If the remaining network contains a cluster of density greater than  $1 - q$ , then the set of initial adopters will not cause a complete cascade.  
Statement 2: Whenever a set of initial adopters does not cause a complete cascade with threshold  $q$ , the remaining network must contain a cluster of density greater than  $1 - q$ . Choose the correct option from the following.

1 point

☐ Both Statement 1 and Statement 2 are true.

☐ Both Statement 1 and Statement 2 are false.

☐ Statement 1 is true but Statement 2 is false.

☐ Statement 2 is true but Statement 1 is false.

No, the answer is incorrect.

Score: 0

Accepted Answers: Both Statement 1 and Statement 2 are true.

7)

Which of the following social network phenomenon can act as a barrier to the diffusion of an innovation?

1 point

☐ Triadic closure

☐ Homophily

☐ Small world phenomenon

☐ Core-Periphery structure

No, the answer is incorrect.

Score: 0

Accepted Answers: Homophily