GER1000 Quiz 8

1. The following is the adjacency matrix for a friendship network between 5 students. We number the students from 1 to 5.

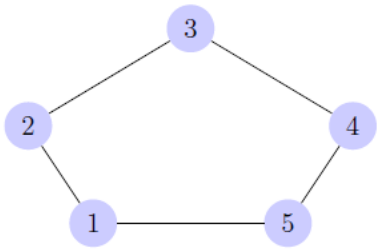
$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{pmatrix} 0 & 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 \end{pmatrix} \end{array}$$

The entry in the ith row and jth column of the matrix would be 1 if student i and student j are friends with each other and 0 otherwise. What is the distance between student 3 and student 5?

(A) 1
(B) 2
(C) 3
(D) 4

Answer: B

We have the following network:



Hence, the distance between student 3 and student 5 is 2.

2. In the movie graph, two vertices are adjacent if they both acted in a common movie. Bacon number of a vertex is defined as its distance from Kevin Bacon. Suppose the Bacon number of actor A is 3, and the Bacon number of actor B is 1. Let us denote the distance between actor A and actor B by x. Then x cannot be _____

(A) 1
(B) 2
(C) 3
(D) 4

Answer: A

If the distance between actor A and actor B is 1, then the difference in their Bacon number is at most 1. Since (Bacon number of actor A) – (Bacon number of actor B) = 3-1=2, the distance between actor A and actor B cannot be 1.

3. There are four ‘1’s and five ‘0’s in the adjacency matrix of a network. How many vertices does this network have?

(A) 2
(B) 3
(C) 4
(D) 5

Answer: B

Since the adjacency matrix has nine entries, it is a 3 x 3 matrix. So, the network has 3 vertices.

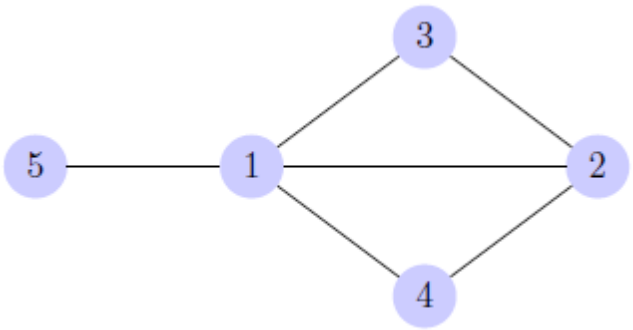
4. In another network where adjacency means not having acted in a common movie, define the "nah Bacon number" as the distance to Kevin Bacon.

John's Bacon number is 2. What is John's nah Bacon number?

(A) 1
(B) 2
(C) 3
(D) 4

Answer: A
Since John’s Bacon number is 2, John and Kevin Bacon have never acted in a common movie. In the network where adjacency means not having acted in a common movie, John is adjacent to Kevin Bacon. Therefore, John’s nah Bacon number is 1.

5. Consider the network shown below.



What is the closeness centrality of vertex 2?

(A) 2/3
(B) 5/4
(C) 1
(D) 3/4

Answer: B

Ccen(2) = (1+1+1+2)/4 = 5/4.