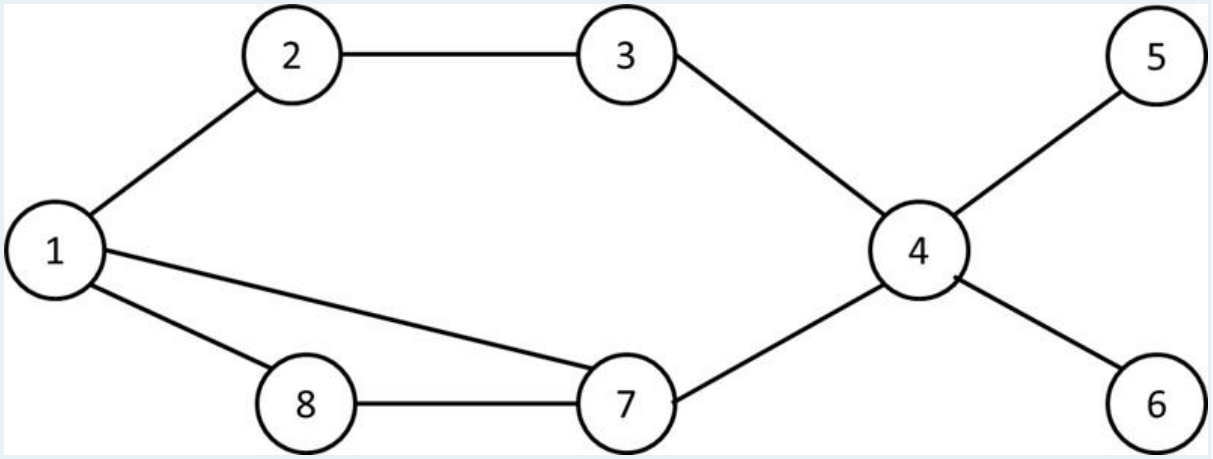
CS544 Introduction to Network Science

Answer all the questions. For multiple choice, there may be more than one correct answers. You need to correctly choose them all for getting marks.

Points:

20/25

Answer questions 1 to 6 below based on the above graph



1

Consider the subgraph consisting of nodes 3, 4, 5, 6. The rank of the nodes in descending order of Eigen Vector cenrality is: Write the node numbers separate by comma and no space like 3,6,5,4

(3/3 Points)

4,3,5,6

2

Consider the subgraph with nodes 4,5,6. The Katz centrality vector X can be written as given below. What values of *a* should be avoided so that the centralities do not diverge

(0/3 Points)

$$\vec{X} = aA\vec{X} + \vec{1}$$

Correct answers: $\frac{1}{\sqrt{2}}$,0.707,.707,0.71,.71

3

For the subgraph with nodes 1,2,7,8, the ranking of the nodes with respect to closeness and betweenness centralities are same

(3/3 Points)

- True
- **False**

4

The redundancy and local clustering coefficient of node 4 in the above graph is: (Write the values separated by a comma with no space in between. Round to 2 decimal places only)

(4/4 Points)

0.00, 0.00

5

For the above graph, the cosine similarity of nodes 4 and 6, rounded to 2 decimal places is

(3/3 Points)

0.00

6

The Adamic Adar index for the local neighborhood overlap of nodes 7 and 8, rounded to 3 decimal places is

(3/3 Points)

2.096

Section 2

The questions are true false based. More than one options may be correct. You have to select all the options that are correct to get full marks. There is no partial marking

7

In the page rank equation given below, if the value of \beta equals 0, then the ranking of the nodes would be similar to

(0/2 Points)

- Eigen Vector Centrality
- **Degree Centrality**
- Katz Centrality
- None of the above

8

The closeness centralities of the nodes run into following problems

(2/2 Points)

- The centralities are very similar to PageRank centrality
- The centralities of the nodes have a very high variance
- **The centralities of the nodes changes rapidly with slight changes to network**
- **The centrality scores of the nodes are very close, thereby making it difficult to distinguish the high importance ones**

9

The Eigen vector centrality of a node that is part of an acyclic directed network is

(2/2 Points)

0