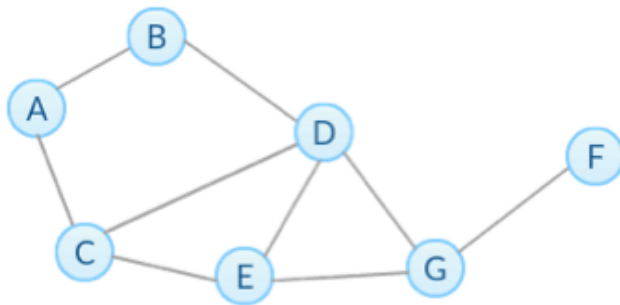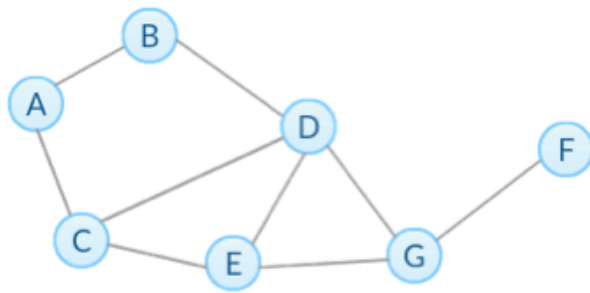1. Based on the network below, what is the degree centrality of node D?

○ 0.67

○ 0.57

○ 0.42

○ 0.50

2. Based on the network below, what is the closeness centrality of node G?

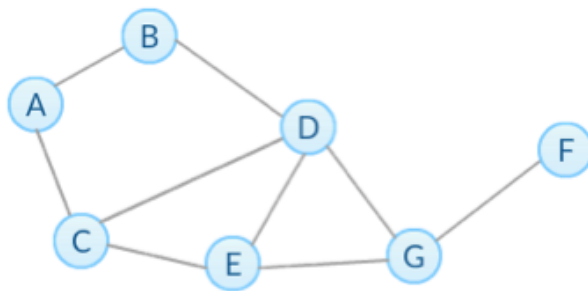

- ○ 0.875
- ◉ 0.6
- ○ 0.7
- ○ 0.75

3. Based on the network below, what is the normalized betweenness centrality (excluding endpoints) of node G?
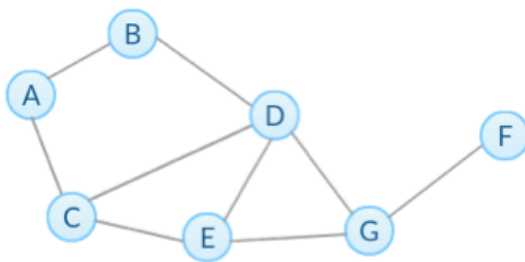

○ 0.67

○ 0.47

○ 0.24

◉ 0.33

4. Based on the network below, what is the betweenness centrality without normalization of edge (G,F)?

○ 4

○ 5

◉ 6

○ 7

5. Select all True statements.

☐ In directed networks, in-degree and out-degree centrality of a node are always the same.

☐ The node with highest betwenness centrality in a network also has the highest closeness centrality.

☑ We can use subsets of node-pairs to approximate betweenness centrality.

☑ The assumption of degree centrality is that important nodes have more connections.

☑ The closeness centrality of a node describes how far the node is from others.

6. Select all True statements about Page Rank (PR) and HITS in directed networks.

☐ Adding out-links of a node will always decrease its PR.

☐ Adding in-links of a node will never decrease its PR.

☑ Nodes that have outgoing edges to good hubs are good authorities, and nodes that have incoming edges from good authorities are good hubs.

☐ The authority and hub score of each node is obtained by computing multiple iterations of HITS algorithm and both scores of most networks are convergent.

☑ Nodes with high in-degree centrality have higher PRs than nodes with low in-degree centrality.

7. Given the network below, which value of alpha (damping parameter) listed below in the NetworkX function pagerank maximizes the PageRank of node D?

○ 0.8

○ 0.5

○ 0.9

◉ 0.95

8. Based on the network below, what is the basic PR of node C at step k = 1?
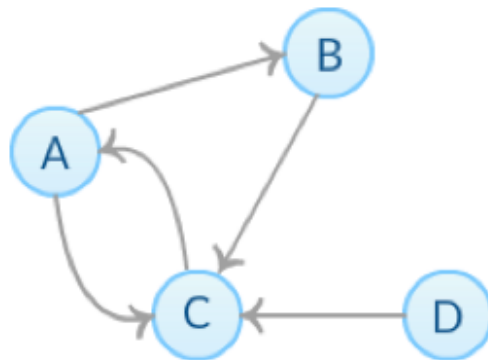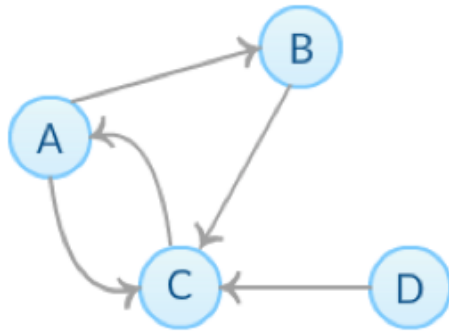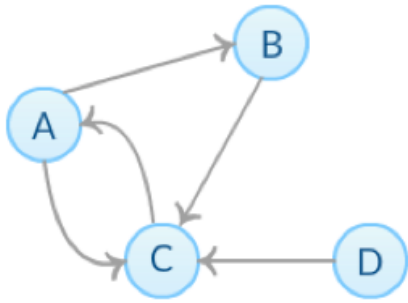

- ○ 0.375
- ○ 0.5
- ○ 0.25
- ○ 0.125
- ● 0.625

9. Based on the network below, what are the corresponding normalized authority and hub scores of node C correspondingly after two iterations of HITS algorithm?

- ○ 0.4, 0.4
- ○ 0.8, 0.2
- ● 0.57, 0.09
- ○ 0.33, 0.33

10. Based on the network below, which of the following is NOT True? Check all that apply.

☑ Node D's basic PR at step k (k>=1) is always 0.

☑ Node D's authority and hub score after k iterations (k>=1) are always 0.

☐ At step k (k>=1), node A's basic PR is always the same as node C's basic PR at step k-1.

☑ At each step, the sum of all nodes' basic PR is always 1.