CSC 4170

Web Intelligence and Social Computing

Homework Assignment #2

Sample Answer

1,

(a) (10 marks)

	Alice	Bob	David	Cathy
Alice	0	3	4	0
Bob	3	0	8	1
David	4	8	0	0
Cathy	0	1	0	0

(b) (10 marks)

	Alice	Bob	David	Cathy
Alice	0	1	1	0
Bob	1	0	1	1
David	1	1	0	0
Cathy	0	1	0	0

2.

(a) (8 marks)

The eccentricity ε of the vertex v is the greatest distance (the distance means minimum distance here) between v and any other vetex.

eccentricity (A) = max(AB,AD,AC)=max(3,2,1)=3

ref:

http://mathworld.wolfram.com/GraphDistance.html

(b) (6 marks)

The radius of a graph is the minimum eccentricity of any vertex.

eccentricity(A) = max(AB,AD,AC)=max(3,2,1)=3

eccentricity(B) = max(BA,BC,BD)=max(3,2,3)=3

eccentricity(C) = max(CA,CB,CD)=max(1,2,1)=2

eccentricity(D) = max(DA,DB,DC)=max(2,3,1)=3

radius = 2

(c) (6 marks)

The diameter of a graph is the maximum eccentricity of any vertex in the graph.

diameter = 3

3.

(a) (10 marks)

# of strongly connected components: 2

1,2,3

4,5,6

(b) (10 marks)

# of weakly connected components: 1

1,2,3,4,5,6

4(a) (10 marks)

For undirected graphs, the graph density is:

$$D = \frac{2|E|}{|V|(|V|-1)}$$

density = 2*8/(5*(5-1))=0.8

(b) (10 marks)

Let G=(V,E) with n vertices, the Degree centrality $C_D(v)$ for a vertex v is defined as

$$C_D(v) = \frac{\deg(v)}{n-1}$$

$C_D(A) = 3/4 = 0.75$

$C_D(B) = 3/4 = 0.75$

$C_D(C) = 4/4 = 1$

$C_D(D) = 3/4 = 0.75$

$C_D(E) = 3/4 = 0.75$

5. (20 marks)

For undirected graphs, the graph density is:

$$D = \frac{2|E|}{|V|(|V|-1)}$$

Graph with 5 nodes, and 6 edges.