Module 3 Homework

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Mod. 3 HW

① Adjacency matrix for network A

	1	2	3	4	5	6
1	0	1	0	0	1	1
2	1	0	0	1	1	0
3	0	0	0	1	1	0
4	0	1	1	0	0	0
5	1	1	1	0	0	1
6	1	0	0	0	1	0

Adjacency matrix for network B

	1	2	3	4	5
1	0	1	1	0	1
2	1	0	0	1	0
3	1	0	0	1	0
4	0	1	1	0	1
5	1	0	0	1	0

② Degree Centralities for network A

Agent	Sum	N-1	Degree
1	3	5	3/5
2	2	5	2/5
3	2	5	2/5
4	2	5	2/5
5	4	5	4/5
6	2	5	2/5

answer

Degree Centralities for Network B

1	3	4	3/4
2	2	4	1/2
3	2	4	1/2
4	3	4	3/4
5	2	4	1/2

answer

③ Geodesics for network A

From	to	Geodesic
1	2	(1,2)
1	3	(1,5,3)
1	4	(1,2,4)
1	5	(1,5)
1	6	(1,6)
2	3	(2,4,3)
2	4	(2,4)
2	5	(2,5)
2	6	(2,1,6)
3	4	(3,4)
3	5	(3,5)
3	6	(3,5,6)
4	5	(4,2,5)
4	6	(4,2,6)
5	6	(5,6)

Geodesics for network B

From	to	Geodesic
1	2	(1,2)
1	3	(1,3)
1	4	(1,2,4)
1	5	(1,5)
2	3	(2,4,3)
2	4	(2,4)
2	5	(2,1,5)
3	4	(3,4)
3	5	(3,1,5)
4	5	(4,5)

④ Betweenness for network A

Agent	sum (numerator)	denom	Betweenness
1	1	10	.1
2	3	10	.3
3	0	10	0
4	2	10	.2
5	2	10	.2
6	0	10	0

answer

$$\frac{(6-1)(6-2)}{2} = \frac{(5)(4)}{2} = \frac{20}{2} = 10$$

Betweenness for network B

Agent	sum (numerator)	denom	Betweenness
1	2	6	$.3\overline{3}$
2	1	6	.16
3	0	6	0
4	1	6	.16
5	0	6	0

answer

$$\frac{(5-1)(5-2)}{2} = \frac{(4)(3)}{2} = \frac{12}{2} = 6$$

⑤ closeness for network A

	1	2	3	4	5	6	sum	closeness
1	0	1	2	2	1	1	7	5/7
2	1	0	2	1	1	2	7	5/7
3	2	2	0	1	1	2	8	5/8
4	2	1	1	0	2	3	9	5/9
5	1	1	1	2	0	1	6	5/6
6	1	2	2	3	1	0	9	5/9

closeness for network B

	1	2	3	4	5	sum	closeness
1	0	1	1	2	1	5	4/5
2	1	0	2	1	2	6	4/6 = 2/3
3	1	2	0	1	2	6	4/6 = 2/3
4	2	1	1	0	1	5	4/5
5	1	2	2	1	0	6	4/6 = 2/3

(6) For network A, Agent 5 may have the greatest influential because it has the highest degree centrality of .80.
For network B, Agents 1 & 4 have the highest degree centrality of .75.

(7) Network density of network A
possible paths: $\frac{6(6-1)}{2} = \frac{6(5)}{2} = 15$

# of edges: 8 8/15 = (53.33%)

Network density of network B
possible paths: $\frac{5(5-1)}{2} = 10$

# of edges: 6 6/10 (60%)

(8) Diameter of network A = 2 (from #3)
Diameter of network B = 2