Assignment 10: Dynamics II

Performance summary

Assessed

Success status	Score	Attempts
Undefined	0 of 100 points	1

Results

Course	Network Theory and Dynamic Systems (SS 2025) ID: 4669112833 / 109995682475558
Test	Assignment 10: Dynamics II ID: 4611146152

This are your test results

Duration	0h 0m 3s 6/23/2025, 8:57 PM - 6/23/2025, 8:57 PM
Answered	0 of 7 questions (0%)
Your score	0 of 100 points (0%)

0%
Score: 0

1. Knowledge Tasks (20 points) 2

0%
Score: 0
of 20

go to section

2. Practical Tasks (40 points) 2

0%
Score: 0
of 40

go to section

3. Programming Tasks (40 points) 3

0%
Score: 0
of 40

go to section

1. Knowledge Tasks (20 points) 0 of 20 points (0%)

Voter Model vs. Majority Dynamics (10 points)

Status	Seen but not answered	
Your score	0 / 10	0%

Response

Compare and contrast the voter model and majority rule dynamics in terms of their mechanisms and outcomes in opinion formation. What are the advantages and limitations of each approach in predicting real-world opinion changes?

0 word

Solution

Impact of Homophily on Opinion Clusters (10 points)

Status	Not started	
Your score	0 / 10	0%

Response

Evaluate the role of homophily (the tendency of individuals to associate with similar others) in the formation of opinion clusters within a network. How does homophily contribute to the polarization and fragmentation of opinions?

0 word

▸ Solution

go back to overview

2. Practical Tasks (40 points) 0 of 40 points (0%)

Opinion communities (20 points)

Status	Not started	
Your score	0 / 20	0%

Response

Given a coevolution model with two opinions initially randomly distributed among the nodes, how many opinion communities are likely to form when selection is highly influential (p is close to 1)? What would be the approximate size of these communities? Assume the network is not too sparse.

0 word

▸ Solution

Coevolution Model with Majority Dynamics (20 points)

Status	Not started	
Your score	0 / 20	0%

Response

In the coevolution model, nodes typically change their opinion to match that of a random neighbor, following the voter model. Now, let's consider a different approach using majority dynamics. In this updated model, here's how it works for each node:

- With probability p, the node changes one of its connections to link up with a node that isn't a neighbor but has the same opinion.
- With probability 1-p, the node adopts the opinion held by the majority of its current neighbors.

Describe the final stable state of the system when p is near zero and when p is near one.

0 word

▸ Solution

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3. Programming Tasks (40 points) 0 of 40 points (0%)

Bounded-confidence Model (20 points)

Status	Not started	
Your score	0 / 20	0%

Response

Simulate the bounded-confidence model of opinion dynamics on a complete network with N = 1000 nodes.

- The initial opinions are random numbers between zero and one.
- Consider three different values of the confidence bound: epsilon = 0.125, 0.25, 0.5.
- For each epsilon, use different values for the convergence parameter, say μ = 0.1, 0.3, 0.5.
- Run every simulation until each opinion varies by less than 1% between consecutive iterations, and plot a histogram of the final opinions.
- Does the number of final opinion clusters depend on epsilon? Why or why not?

- Does the number of final opinion clusters depend on epsilon? Why or why not?
- Does it depend on μ? Why or why not?

Hint: Feel free to modify the code in this chapter's tutorial to run the simulations.

0 word

▸ Solution

Greedy- Search (20 points)

Status	Not started	
Your score	0 / 20	0%

Response

- Build a small-world network with N=1000 nodes, k=4, and these values for the rewiring probability: p = 0.001, 0.01, 0.1, 1.
- Choose a source node s and a target node t at random.
- Apply the greedy search algorithm, where the message is passed to the neighbor that is closest to the target along the ring, and compute the number of steps needed to deliver the message from s to t for each value of p.
- Interpret the results.
- Hint: For each p, average your measurement across multiple runs with different random pairs of nodes.

0 word

▸ Solution

Upload Jupyter Notebook

Status	Not started	
Your score	0 / 0	0%

Response

Upload your Jupyter Notebook with the two programming tasks.

File

No file uploaded

▸ Solution

go back to overview

Test execution

Information

Availability: Expired at 6/24/2025, 11:59 PM

Max. attempts: Unlimited

Results of this test are visible to administrators and tutors of this course.

Start test

▸ Change log