Introduction to Complexity (Fall 2016)

7.9 Take Unit 7 Test » Unit 7 Test

Instructions 1

You may use any course materials, websites, Netlogo models, calculators, etc. for this test. Just don't ask another person for the an share your answers with other people.

Question 2

According to the definition given in the lecture, self-organization refers to which of the following?

- A. Organized patterns across an entire system that result from interactions within the system itself.
- B. Organized patterns across and entire system that result from the selfish choices made by individuals in the system.
- C. The ability of biological organisms to organize their environments.
- D. The emergence of self-consciousness in complex systems.

Question 3

In the description of the NetLogo flocking model, three rules were given for flocking: align, cohere, separate. Which one is applied f

- A. Cohere
- B. Separate
- C. Align

Question 4

Consider the following statements about the Netlogo Fireflies model described in the lectures:

I. The model assumes there is no leader

II. All fireflies have the same cycle length

III. When the simulation begins, all fireflies synchronize their clocks to zero.

IV. At each timestep, fireflies are able to perceive the flashes of neighboring fireflies (within a radius of one patch).

Which of these statements are true statements about the model?

- A. All of them (statements I – IV).
- B. All but statement I.
- C. All but statement II.
- D. All but statement III.
- E. All but statement IV.

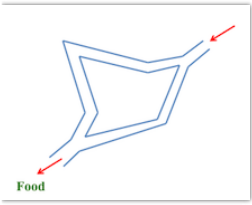
Question 5

The lectures demonstrated the NetLogo Fireflies model. Which of the following is a true statement about this model?

- A. A firefly will never flash at a given time step if it has flashed within the last 5 time steps (ticks).
- B. Under the phase delay strategy, a firefly will never flash if all the other fireflies in its neighborhood are flashing.
- C Under the phase advance strategy, a firefly will reset its clock to zero if it sees enough of its neighbors flashing.

Question 6

Consider the experiment discussed in Video 7.4 in which ants can choose two possible paths through a structure like this one:



It was observed that the vast majority of ants end up taking the shorter path to the food source. This is because:

- A. Ants can see far enough to determine which path is shorter.
- B. Pheromone concentration along the shorter path ends up being stronger.
- C. The smell of food is stronger along the shorter path.
- D. Ants dislike having to turn right and left multiple times.

Question 7

Consider the following possible explanations for how an ants chooses a task to perform (for example, foraging or nest maintenance)

I. An ant performs the task it was assigned at birth

II. An ant typically chooses a task that it has done successfully in the past

III. An ant chooses a task that depends on how many other ants it currently perceives to be performing that task

IV. An ant chooses a task based on current environmental conditions

V. An ant chooses a task based on the Queen ant's directions

Which of these are actual explanations, as described in Video 7.4? (Note that more than one of these can be true.)

- A. I and II
- B. II and III
- C. III and IV
- D. IV and V
- E. I, II, III, and IV
- F. V

Question 8

In Video 7.5 it was stated that self-organizing biological systems are different from traditional computers in the way they process infc
Which of the following is an example of a difference that was discussed in that video?

- A. Biological systems are made of cells, which have very different properties from computer chips made of silicon.
- B. Traditional computer programs use deterministic rules whereas biological systems use rules that have some random elements.
- C. Traditional computers can be programmed by humans whereas biological systems cannot.