

Feedback — Quiz 5: Sections 11-12

You submitted this quiz on **Sat 17 Nov 2012 8:10 PM PST**. You got a score of **10.00** out of **10.00**.

Section 11 covers Lyapunov Functions. Topics on the quiz include exchange markets, equilibrium, applications of Lyapunov, and externalities.

Section 12 focuses on Coordination and Culture. Make sure you're familiar with pure coordination games, Axelrod's Culture Model, and Bednar's Model.

Good luck!

Question 1

I drop a ball down the side of a bowl. It slides down the side, then up the other, and so on, until it eventually settles on the bottom of the bowl. Which of the following aspects of this process are Lyapunov Functions?

Your Answer	Score	Explanation
<input checked="" type="radio"/> Neither height nor speed	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

Neither height nor speed will be a Lyapunov Function.

The height of the ball goes up and down - so the height is neither constantly increasing nor constantly decreasing.

As the ball goes up and down, the speed increases, then decreases, then increases, and so on. So the speed of the ball is neither constantly increasing nor constantly decreasing.

[See 11.1, Lyapunov Functions"]

Question 2

An externality is an action by one party that materially affects the happiness of someone who is not directly a party to the action. What is the implication of externalities in regards to Lyapunov Functions?

Your Answer	Score	Explanation
<input checked="" type="radio"/> Where externalities exist, we need to define a new process (besides Lyapunov) through which equilibrium is reached.	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

Externalities are actions that materially affect someone *not* party to the action. Examples are second-hand smoke and business mergers.

The implication of externalities is NOT that systems with externalities do not go to equilibrium; they might.

However, we would need to define a different process (other than simple Lyapunov) through which the equilibrium is reached.

A further implication, then, is that Lyapunov Functions help us to think about what models are appropriate given the context of a process.

[See 11.3, Exchange Economies and Externalities"]

Question 3

Imagine a Lyapunov Function that has a maximum value of 200 and a minimum value of 0, and that increases by at least four if it is not at an equilibrium. In other words, $K = 4$. Which of the following must be true? Read each answer carefully. You may pick more than one answer.

Your Answer	Score	Explanation
<input checked="" type="checkbox"/> If the Lyapunov Function has a value of 200, then the process stops.	✓ 0.33	

☐ The Lyapunov Function will have a value of 200 when the process stops. ✓ 0.33

☒ The process cannot take more than 50 periods to reach an equilibrium. ✓ 0.33

Total 1.00 / 1.00

Question Explanation

Since the function increases by AT LEAST four if the system is not at equilibrium, and the maximum value is 200, the process cannot take more than 50 periods to reach equilibrium ($4 * 50 = 200$).

Since 200 is the maximum value of the function, the function cannot go above 200. If it gets to 200, the process will stop.

But it is possible that the system will stop before reaching 200. So it is not true that the function MUST have a value of 200 when the process stops.

[See 11.4, "Time to Convergence and Optimality"]

Question 4

Daria has e-mails arrive every day in random amounts. She answers exactly four e-mails every day, unless her inbox is empty. Can you put a Lyapunov Function on this process?

Your Answer	Score	Explanation
<input checked="" type="radio"/> No	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

You cannot put a Lyapunov Function on this process. Recall that one crucial assumption of Lyapunov Functions is that the process has a minimum or a maximum. If Daria receives 6 e-mails a day, then her inbox will grow and grow and grow, and the process will have no maximum.

[See 11.5, "Lyapunov: Fun and Deep"]

Question 5

A firm has twenty offices. Employees can choose whether to wear suits or casual clothes. However, it turns out that people tend to feel more comfortable if they're dressed like the other people in the office. What do you expect to happen?

Your Answer	Score	Explanation
<input checked="" type="radio"/> Within an office, people dress similarly. Across offices, people dress differently.	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

We would expect people in the same office to eventually dress the same, but we have no reason to believe that across offices, groups of people will dress similarly.

Think of clothing here as a culture. When we introduced the lectures on culture and coordination, we discussed "similarities within" cultures and "differences between" cultures. This problem is an example of that distinction.

[See 12.1, "Coordination and Culture"]

Question 6

True or False:

Coordination tends to be a measurable difference - in which no one is better off not coordinating - whereas Standing Ovation tends to be more psychological - in which there may be some personal reason not to do what most others are doing.

Your Answer	Score	Explanation
<input checked="" type="radio"/> True	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

In a Pure Coordination Game, all players are better off when they are all doing the same action.

In a Standing Ovation, however, there might be a threshold or a percentage of people standing required before an individual adopts an action. If the threshold or required percentage isn't met, the individual prefers not to 'stand' even if a majority of people are standing.

[See 12.3, "Pure Coordination Game"]


Question 7

Let's assume that a Leader and a Follower meet. Four of their dimensions are measured on a scale of 1-9.

Leader: 7, 3, 2, 1

Follower: 5, 4, 2, 6.

What is the probability of interaction between the Leader and the Follower?

Your Answer	Score	Explanation
<input checked="" type="radio"/> 25%	 1.00	
Total	1.00 / 1.00	

Question Explanation

The Leader and the Follower each have a 2 for their 3rd dimension; they match on one dimension out of four.

Probability of interaction = $\frac{1}{4} = 0.25$ or 25%.

[See 12.4, "Emergence of Culture"]

Question 8

Assume culture is determined by 3 dimensions, each with 2 possible traits:

Dimension 1: Greeting - players can wave or bow;

Dimension 2: Volume of speech - players can be loud or quiet;

Dimension 3: Leisure time - players can play soccer or hockey.

How many different cultures are possible?

Your Answer	Score	Explanation
<input checked="" type="radio"/> 8	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

Two ways to coordinate for each of three games means that there are $2^3 = 8$ possible cultures.

We can list these 8 cultures out:

wave, loud, soccer;

wave, loud, hockey;

wave, quiet, soccer;

wave, quiet, hockey;

bow, loud, soccer;

bow, loud, hockey;

bow, quiet, soccer;

bow, quiet, hockey.

[See 12.4, "Emergence of Culture"]

Question 9

If small errors can occur in a culture that is otherwise consistent and coordinating, which model allows us to find an equilibrium where there is some *heterogeneity within* cultures?

Your Answer	Score	Explanation
<input checked="" type="radio"/> Markov	✓ 1.00	

Total

1.00 / 1.00

Question Explanation

Recall the flow chart from the Bednar Lecture.

Small errors in the consistent & coordinating state allow us to fulfill the assumptions for a Markov Model (namely, that we can get from any one state to any other).

Using a Markov Model, we can calculate an equilibrium that will show cultures with similarities within. (This does not mean the cultures will be uniform or identical within).

[See 12.5, "Coordination and Consistency"]

Question 10

Do we always coordinate on the best action?

Your Answer	Score	Explanation
<input checked="" type="radio"/> No	✓ 1.00	
Total	1.00 / 1.00	

Question Explanation

No, we don't always coordinate on the best actions.

Recall the Maui-Iowa game and the Metric English game from the Pure Coordination video?

For a three reasons in particular, we sometimes coordinate on sub-optimal behaviors. These reasons are:

- 1) Idiosyncratic coordination (i.e., use of the English measurement system)
- 2) Overall consistency (i.e., someone generally prefers mainlands to islands, so that person chooses Des Moines over Maui)
- 3) What was once optimal is no longer optimal (i.e., due to communicable diseases, bowing begins to have a greater payoff than shaking).

[See 12.5, "Coordination and Consistency"]

