Feedback — Final Exam: Sections 11-20

Thank you. Your submission for this exam was received.

You submitted this exam on **Sun 26 May 2013 12:46 AM PDT (UTC -0700)**. You got a score of **11.00** out of **11.00**.

Question 1

People learn from others about which policies to support. Three policies are currently proposed: raising taxes, lowering taxes, and keeping taxes the same.

In October, 10% prefer cutting taxes, 30% prefer raising taxes, and 60% prefer keeping taxes the same.

In November, 25% prefer cutting taxes, 0% prefer raising taxes, and 75% prefer keeping taxes the same.

Darwin Charles, a political commentator, argues using replicator dynamics that this data proves that everyone will soon want tax cuts. Imagine a replicator model that supports his conclusions by giving each policy a fitness. Which one of the following set of fitness levels supports Charles' argument? While calculating, round all calculations to the nearest hundredths place (i.e. if your calculator shows 0.346, round to 0.35).

Your Answer		Score	Explanation
○ Fitness for cutting taxes = 0; Fitness for same taxes = 1; Fitness for raising taxes = 3.			
● Fitness for cutting taxes = 2; Fitness for same taxes = 1; Fitness for raising taxes = 0.	✔	1.00	
○ Fitness for cutting taxes = 0; Fitness for same taxes = 2; Fitness for raising taxes = 1.			
○ Fitness for cutting taxes = 1; Fitness for same taxes = 2; Fitness for raising taxes = 4.			
Total		1.00 / 1.00	

Question Explanation

Remember our replicator equation: $Pr_{t+1}(i) = \frac{Pr_t(i)\pi(i)}{\sum_{j=1}^{N} Pr_t(j)\pi(j)}$

In words, this means that the probability of being type i at time $t+1$ is equal to the weight of type i at time t divided by the total weight of all types at time t.

Make an educated guess of the fitness levels (given the options) and see if they fit. That means looking at whether each policy gains or looses support during October. In this case, you should choose a group of fitness levels in which the fitness of cutting taxes and the fitness of keeping taxes the same are both greater than the fitness of raising taxes.

Next, Multiply the proportions in October by the fitness levels to find weights.

Then calculate the total weight for all policies

Next, find the proportions in favor of each policy by dividing the weight of that policy by the total weight for all policies.

If you selected the correct fitness levels, these proportions will match those given for November. If we run this operation several times, we find that the proportion of people in favor of cutting taxes continues to increase. After about 10 time periods, effectively 100% of people will be in favor of cutting taxes.

[See 19.2, "The Replicator Equation"]

Question 2

The City of Ann Arbor opened a new dog park. If D equals the number of dogs that are at the park, then happiness per dog (at the park) equals 30 - D. This holds so long as there are more than 10 dogs at the park. If there are 10 dogs or fewer in the park, happiness per dog equals 9. Any dogs not at the park have a happiness of 4 in either scenario. Assume there are 90 dogs in Ann Arbor. If there are 12 dogs at the park, what is the total happiness of all dogs in Ann Arbor?

Your Answer		Score	Explanation
600			
528	✔	1.00	
479			
582			
Total		1.00 / 1.00	

Question Explanation

Consider this a public access or common pool resource problem.

Simply do the math:

Multiple the number of dogs at the park by the formula for their happiness, 30-D.

Add your result to the total happiness of all dogs not at the park.

Your result will be the total happiness of all dogs in Ann Arbor.

For extra thought, try to figure out how to maximize this function by calculating the optimal number of dogs at the park.

[See 17.4, "Collective Action and Common Pool Resource Problems"]

Question 3

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
False			
True	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

[See 12.3, "Pure Coordination Game"]

Question 4

A small group of revolutionaries are fighting against their current colonial government. The revolutionaries have 415 troops. The government has 750 troops. What is the *minimum* number of fronts required for the revolutionaries to have any chance of winning the war? Winning the war is defined as winning more than 50% of fronts. Assume that the government always distributes its troops as evenly as possible across all fronts, and that the revolutionaries are strategic.

Your Answer		Score	Explanation
3			
11	✔	1.00	
4			
7			

Total	1.00 / 1.00

Question Explanation

Start with 3 fronts. Distribute the government troops evenly across these fronts. Now divide the revolutionaries troop count by 2, since winning 2 out of 3 fronts means victory. Can the revolutionaries win?

Repeat this process until you arrive at a number of fronts that allows the revolutionaries to win.

[See 16.4, "Blotto: Troop Advantages"]

Question 5

Natalie is bidding in a second price auction. If she and her opponents are rational, what should she bid?

Your Answer		Score	Explanation
She should bid half her value.			
She should bid her value.	✔	1.00	
She should bid above her valuation.			
She should bid the value she thinks is directly below her own.			
Total		1.00 / 1.00	

Question Explanation

[See 18.3, "Auctions"]

Question 6

There are three predictions: 288, 249, 368. The actual value is 310. Which of the following values is closest to the crowd (squared) error?

Your Answer		Score	Explanation
0			
69.44	✔	1.00	

○ 25.43		
○ 300.23		
Total	1.00 / 1.00	

Question Explanation

$Step\ 1$: Calculate the average prediction.

$Step\ 2$: Calculate each individual squared error and then the average error.

$Step\ 3$: Calculate each individual diversity and then the crowd diversity.

$Step\ 4$: Calculate crowd error:

Crowd Error = Average Error - Diversity

[See 20.3, "Diversity Prediction Theorem"]

Question 7

Consider an exchange economy in which each of four people brings a different good. Suppose that these people are altruistic - when someone becomes happier, everyone else also derives some happiness. Can trade in this environment create a Lyapunov Function?

Your Answer		Score	Explanation
○ No			
● Yes	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

Let the Lyapunov Function be total happiness.

The difference between this example and the arms race is that here, the externalities are all positive, so total happiness still increases.

[See 11.3, "Exchange Economies and Externalities"]

Question 8

True or False:

The Efficient Market Hypothesis tells us that if we apply a random walk model, it is possible to

beat the market.

Your Answer		Score	Explanation
True			
False	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

The Efficient Market Hypothesis tells us that prices reflect all relevant information, and that any sort of fluctuation is therefore random.

[See 15.5, "Random Walks and Wall Street"]

Question 9

You are given the following information about a network:

It has an average path length of about 2,

An average degree of about 20,

And a very low clustering coefficient.

Which one of the following scenarios best fits this network structure?

For this question, use your reasoning instead of trying to set up each network and do all of the math.

Your Answer		Score	Explanation
Friendship network of college students			
Airline's flight network	✔	1.00	
Lending network of adults (people who've loaned money to one another)			
European Union geographic network (nodes = countries, edges = shared boundaries)			
Total		1.00 / 1.00	

Question Explanation

Let's use a process of elimination for this one:

Path length from node A to node B denotes the minimal number of edges that must be traversed to get from node A to node B. The average path length of a network is the average path length between all pairs of nodes. So which of the options could have an average path length of about 2? Airline network and friendship network can both work because it's reasonable in both cases that to get from node A to node B, you have to traverse an average of roughly 2 edges. For example, with flights, this suggests it takes an average of two flights to get from any airport to any other airport. This path length doesn't work with loans or EU countries, however. In both cases, it will take more than an average of 2 edges to get from node to node. So loan network and country network are eliminated.

Next is degree. Degree is the number of edges connected to a node. The degree of a network is the average degree across all nodes. A high degree network is one in which nodes are very interconnected, and a low degree network is one in which there are few connections between nodes. Which of the two remaining options are likely to have an average degree of about 20?

Finally, Clustering Coefficient is the percentage of triples of nodes that have edges between all three nodes. In other words, it's the percentage of all possible triangles in a network that are realized. Which of the two remaining options are likely to have a very low clustering coefficient?

[See 14.2, "The Structure of Networks"]

Question 10

True or False:

Tipping points occur when likelihood of different outcomes changes drastically at a given point in time.

Path dependence means there are gradual changes in what is going to happen as events unfold.

Your Answer		Score	Explanation
○ False			
● True	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

[See 13.6, "Path Dependent or Tipping Point"]

Question 11

What are the three classes of outcomes - other than equilibrium - that a model can produce?

Your Answer		Score	Explanation
Chaotic, cyclic, periodic			
Complex, periodic, chaotic	✔	1.00	
Path dependent, phat dependent, chaotic			
Path dependent, tipping points, chaotic			
Total		1.00 / 1.00	