Feedback — Quiz 1: Sections 2-4

You submitted this quiz on **Sun 18 Nov 2012 12:21 AM PST**. You got a score of **12.00** out of **12.00**.

Welcome to the first quiz! You'll be seeing one of these quizzes after every two new sections. They all have a mix of multiple-choice questions, numeric answers - in which you have to input a number - and "checkbox" questions, in which more than one option might be correct. You can take these a number of times, until you feel that you have the material down; just make sure you get it done before the close date! If you're having trouble understanding any concepts (or if you encounter technical problems), let us know about it in the discussion forum. And for those of you who feel like the quizzes are a breeze, check out the forum anyway, especially if you feel like helping out your peers!

The 12 questions on this quiz will cover sections 2, 3, and 4 (we're ignoring Section 1 for now). Here's what we learned:

Section 2: Segregation and Peer Effects

Section 3: Aggregation

Section 4: Decision Models

Questions on all quizzes will be both conceptual and technical; you'll be asked to think both broadly and precisely.

There are more questions on this quiz than on the rest you will take because we're covering 3 sections here instead of the usual 2. But don't worry, there's nothing here that we didn't talk about in the videos.

Good luck!

Question 1

Who developed the racial and income segregation model that we covered in section 2?

You entered:

Thomas Schelling

Your Answer		Score	Explanation
Thomas Schelling	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Thomas Schelling developed the segregation model from section 2.

[See 2.2, "Schelling's Segregation Model"]

Question 2

Recall that the index of dissimilarity is a way to categorize, numerically, how segregated a city is. Imagine a city comprised of four equal sized blocks. One block contains all rich people; one block contains all poor people; and two blocks contain equal numbers of poor and rich people. What is the index of dissimilarity? Answer using decimal notation.

You entered:

.5

Your Answer		Score	Explanation
.5	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

There are equal numbers of rich and poor people.

For the block of all rich people, the contribution to the index of dissimilarity equals $|1 - 0.5| = 0.5$

For the block of all poor people, the contribution to the index equals

$|0-0.5|=0.5$

For the other two blocks the contribution equals $|0.5-0.5|=0$

Therefore, the index of dissimilarity equals $\frac{(0.5+0.5)}{2}=0.5$. Don't forget to divide by two.

[See 2.3, "Measuring Segregation"]

Question 3

Recall the standing ovation model. Suppose that in this case, perceptions of show quality are uniformly distributed between 0 and 100. Also suppose that individuals stand if they perceive the quality of the show to exceed 60 out of 100. Approximately what percentage of people will stand initially?

Your Answer		Score	Explanation
40	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The distribution is uniform between 0 and 100, which means that quality perceptions are evenly spread from 0 to 100. This means that half of the individuals will percieve the show quality to be greater than 50, and half will percieve show quality to be less than 50. Following this logic, we know that 40 out of 100 people will have quality perceptions above 60.

[See 2.5, "The Standing Ovation Model"]

Question 4

In the Standing Ovation model, does increasing the variation in perceptions of quality always increase the number of people initially standing?

Your Answer	Score	Explanation

No	✓	1.00	Not necessarily. Fewer people could stand initially.
Total		1.00 / 1.00	

Question Explanation

No, increasing variation in quality perception does not ALWAYS increase the number of people standing intially. Think of it this way: if the median quality perception is above the threshold for people to stand, fewer people will stand initially as variation in quality perception increases. On the other hand, if the median quality perception is BELOW the threshold for people to stand, then more people will stand initially as variation increases, since increasing the variation in quality perception, in this case, leads to more people with quality perceptions above the threshold.

[See 2.5, "The Standing Ovation Model"]

Question 5

Imagine a street on which there exist two sub shops: Big Mike's and Little John's. Each Saturday, Big Mike's draws an average of 500 people with a standard deviation of 20. Also on Saturdays, Little John's draws an average of only 400 people with a standard deviation of 50. If both distributions are normal, which shop is more likely to attract more than 600 people on a given Saturday?

Your Answer		Score	Explanation
Little John's	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

What is the likelihood of an event this far beyond the average? Mike's distribution is normal with a mean of 500 and a standard deviation of 20, so 600 people would be at least 5 standard deviations above the mean. Little John's distribution has a mean of 400 but a standard deviation of 50, so 600 people would be only 4 standard deviations above the mean. Therefore, Little John's is more likely than Big Mike's to draw more than 600 people on a given Saturday.

[See 3.2, "Central Limit Theorem"]

Question 6

In the game of life, a world begins with 4 cells in a row in the alive state, and no other cells alive. After 20 updates, what state is the world in? (In other words, which cells are alive at this point?)

Your Answer		Score	Explanation
There are six live cells in three rows	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Update 1: the 2 cells on the ends die (they each have only 1 neighbor), but the 2 in the middle stay alive (they each have 2 neighbors). Additionally, 4 cells become alive: the 2 cells above the 2 middle cells, as well as the 2 cells below the 2 middle cells. So, after one update, the world consists of 6 alive cells in a rectangle with height 3 and width 2.

Update 2: the 2 alive cells in the center die (each has 5 alive neighbors). The other 4 live cells (the top and bottom rows of the rectangle) stay alive. The 2 cells to the left and right of the middle cells come to life. After this update, the configuration looks as if the two middle cells in the rectangle each took one step outward. In other words, there are six alive cells allocated across three rows. If we number the columns 1, 2, 3, and 4, then in rows 1 and 3, the live cells are in columns 2 and 3. In row 2, the live cells are in columns 1 and 4.

By observation, this configuration is stable. Each live cell has two neighbors, and no dead cell has exactly three neighbors. The system will remain in its current state until and beyond 20 updates.

[See 3.4, "Game of Life"]

Question 7

Recall Wolfram's one dimensional cellular automata model. Which of the following classes of outcomes can this model produce? (Hint: pick more than one).

Your Answer		Score	Explanation
Complexity	✓	0.25	
Equilibrium	✓	0.25	
Randomness	✓	0.25	
Periodic Orbits/ Patterns	✓	0.25	
Total		1.00 / 1.00	

Question Explanation

In the lecture, we saw examples of all four classes of outcomes. What else did we learn about this model? That simple rules can combine to form anything, and that complex and random outcomes are the result of interdependence. Remember Langton's Lambda?

[See 3.5, "Cellular Automata"]

Question 8

Suppose that there exist three voters, each of whom is given three alternatives: A, B and C. There exist six possible strict preference orderings for these three alternatives: A>B>C, A>C>B, B>C>A, B>A>C, C>A>B, and C>B>A. The first voter has preferences A>B>C. The second voter has preferences B>C>A. Preferences of the third voter are unknown. How many of the six possible preference orderings, if selected by the third voter, would produce a voting cycle? (In a voting cycle, A defeats B, B defeats C, and C defeats A).

Your Answer		Score	Explanation
1	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

C must be the first choice. Otherwise, either A or B would be the clear majority winner. This narrows our list of six preference orderings down to two: the third voter must prefer C>A>B or C>B>A to create a voting cycle.

Only C>A>B works, because it means that each alternative - A, B, and C - has one 1st place vote, one 2nd place vote, and one 3rd place vote.

This means that there is only one preference ordering - C>A>B - that, if selected by the third voter, would produce a voting cycle.

[See 3.6, "Preference Aggregation"]

Question 9

Sarah is shopping for a computer. She researches different aspects of the computers for sale: screen size, processing speed, battery life, and special keys on the keyboard. For which of these attributes would Sarah likely have $spatial$ preferences?

Your Answer		Score	Explanation
☑ Special Keys on Keyboard	✓	0.25	
☑ Screen Size	✓	0.25	
☐ Battery Life	✓	0.25	
☐ Processing Speed	✓	0.25	
Total		1.00 / 1.00	

Question Explanation

Remember that we use spatial models when we have an "ideal" point and we want to know which of our options is closest to that point.

First let's look at screen size. Most shoppers have an ideal size for the computer in mind, a point between "too small" and "too big." So screen size is spatial.

The number of special keys would probably be spatial as well. It's likely that Sarah has an ideal amount in mind, an amount somewhere between too few and too many keys.

Speed, on the other hand, would probably not be a spatial choice; faster is better.

Battery life would not be spatial either; more battery life is better.

[See 4.3, "Spatial Choice Models"]

Question 10

You want to go to a concert in Detroit, but you have only $80. The cost of driving will be $30. When you get to the concert, there's a 40% chance you'll be able to get a ticket for $50, and a 60% chance that tickets will cost more than $50. If it's worth $130 to you to go to the concert, what's your expected value of driving to Detroit and trying to buy a ticket?

You entered:

2

Your Answer		Score	Explanation
2	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Draw the decision tree and work backwards:

If you go to the concert, there are two branches: 60% of the time the ticket is too expensive for you, so you lose the $30 it took to make the drive; 40% of the time, you pay $30 for gas, $50 for the ticket, and go to the concert. In this second case, you get a $50 net gain in value, because it's worth $130 to go and you just spent $80.

Now, do the calculation to find your expected value:

$$(0.6)(-30) + (0.4)(50) = 2.$$

So your expected gain is $2, and you should make the drive to Detroit.

[See 4.5, "Decision Trees". Also consult 4.6, "Value of Information"]

Question 11

How many possible preference orderings exist for four alternatives? These orderings must satisfy transitivity.

You entered:

24

Your Answer		Score	Explanation
24	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Any of the four could be ranked first.

This leaves three to be ranked second, two to be ranked third, and only one left to be ranked last.

So the total possible preference orderings equals $4 * 3 * 2 * 1 = 24$.

[See 3.6, "Preference Aggregation"]

Question 12

Suppose that each of 400 people is equally likely to vote "yes" or "no" in an election. What's the size of the standard deviation for the total number of "yes" votes?

You entered:

10

Your Answer		Score	Explanation
10	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The standard deviation equals $\frac{1}{2}\sqrt{(N)}$ where $N = 400$, or 10.