Feedback — Midterm Exam: Sections 1-10

You submitted this exam on **Mon 19 Nov 2012 6:50 AM PST**. You got a score of **13.33** out of **15.00**.

This quiz covers the first ten sections of Model Thinking. The questions are both conceptual - i.e., they ask which model best applies - and technical - i.e., involving calculations.

There are two variations to every question, so when you retake the quiz, you will see fresh versions. These will deal with similar concepts, but will differ within those concepts.

You have the usual 5 attempts on this exam. Please attempt it as many times as best suits you within that limit. It may take one or two more attempts than you are used to, given the variations. The exam is intended as a slightly more rigorous test of your skills than the section quizzes. You will be asked 15 questions instead of 10.

Please be prepared to use any concepts discussed in the first ten sections of the course. If you have watched all of the videos and studied a bit, you should be in great shape.

Best of luck.

Question 1

What are the two types of tips most relevant to Schelling's Segregation Model?

Your Answer		Score	Explanation
◉ Exodus and Genesis	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

In Schelling's neighborhood segregation model there are particular characteristics that will cause agents to either move out of a neighborhood or stay put. These characteristics may be race, wealth, religion, or some others.

There are two types of tips that may occur; these are called Genesis tips and Exodus tips. A Genesis tip occurs when one agent moving $into$ a neighborhood causes another agent to move out. An Exodus tip occurs when one agent moving out of a neighborhood causes another agent to move out as well. Both Genesis tips and Exodus tips are examples of active tipping points.

[See 2.2, "Schelling's Segregation Model" - under "Segregation and Peer Effects"]

Question 2

Choose two applications of the Standing Ovation Model. Please select two of the four possible answers.

Your Answer		Score	Explanation
☑ Measuring the probability of a riot or uprising.	✓	0.25	The Standing Ovation Model can take into account such variable as average level of discontent in a populace, diversity of levels of discontent, and variance in thresholds for citizens to join riots.
☐ Classifying various types of tipping points.	✓	0.25	
☐ Accounting for the psychological biases of human agents when creating a model.	✓	0.25	
☑ Estimating the number of students that will sign up for an online course.	✓	0.25	We can use the Standing Ovation Model to estimate how many students will sign up for an online course based on the quality of the course, the threshold in quality level for various people to join, and so on.
Total		1.00 / 1.00	

Question Explanation

[See 2.5, "The Standing Ovation Model" - under "Segregation and Peer Effects"]

Question 3

The Identification Problem refers to which one of the following?

Your Answer		Score	Explanation
◉ The difficulty of determining whether people have sorted into similar groups or if they have become like one another.	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The Identification Problem has to do with Sorting and Peer Effects. Remember the "soda" vs. "pop" example from Section 2? In that case, it's safe to say that people adopt the regional word, thus adjusting to be like the people around them (and example of Peer Effects). In other cases - like political allegiance - it may be the case that people move to be around others who share similar views (an example of Sorting).

[See 2.6 "Identification Problem" - under "Segregation and Peer Effects"]

Question 4

The "Six Sigma" idea focuses on which of the following? You may select more than one answer.

Your Answer		Score	Explanation
☐ Creating six sigma events as often as possible.	✓	0.33	
☑ Reducing the size of a standard error so that if you get a six standard deviation error, your process still functions.	✓	0.33	
☑ Determining the distribution of errors.	✓	0.33	
Total		1.00 /	

1.00

Question Explanation

To do Six Sigma, we must first determine the distribution of errors and then figure out how to reduce them. The goal is to reduce the size of standard errors so even the least likely errors are accounted for.

[See 3.3, "Six Sigma" - under "Aggregation"]

Question 5

Paul wants to decide for whom he will vote in an upcoming municipal election. Paul is primarily concerned with one attribute of the candidates: how liberal or conservative they are. He makes a plot with "very liberal" on one end and "very conservative" on the other end. He plots both candidates along this line, and then draws a dot indicating where his ideal candidate would fall on the line. Paul then decides for whom to vote based the closeness of each candidate to his ideal point along this line plot. This process is a simple use of which concept from class?

Your Answer		Score	Explanation
◉ Spatial Choice Model	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

[See 4.3, "Spatial Choice Models" - under "Decision Models"]

Question 6

In regards to the Rational Actor Model, which of the following would make you MORE likely to assume that individuals act rationally?

Your Answer	Score	Explanation

☑ Repeated Choice	✓	0.33
☑ High Stakes Choice	✓	0.33
☐ Emotional Decision	✓	0.33
Total		1.00 / 1.00

Question Explanation

People are more like to be rational when the stakes are large and when the choice is repeated as they continue to learn. When a decision is particularly emotional, on the other hand, people may be prone to psychological biases.

[See 5.2, "Rational Actor Models" - under "Thinking Electrons: Modeling People"]

Question 7

Dave owns a spice store. He hires a consultant to construct a linear model that predicts the sales of a spice as a function of its cost. The consultant's model states that sales in pounds per week, S, equals $20 - 4P$, where P = the price per pound in dollars. Prices of the spices range from five to ten dollars. Should Dave rely on the consultant's model?

Your Answer		Score	Explanation
◉ No. The model cannot be correct.	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

No, because in the model the sales of spices will all be zero or negative. If P=10, then sales will equal negative twenty pounds.

We discussed linear models in Section 6. To review, watch the videos under "Categorical and Linear Models".

This question is also a good example of why models can be useful - even when they fail. To review some reasons why we model, check the videos in Section 1, under "Introduction: Why Model".

Question 8

Which of the following are NOT linear? You may choose more than one answer.

Your Answer		Score	Explanation
☐ The probability of winning a drawing as a function of the number of entrants.	✗	0.00	
☑ A person's height as a function of her age.	✓	0.33	
☑ The height of a building as a function of the number of floors.	✗	0.00	
Total		0.33 / 1.00	

Question Explanation

Height will be non-linear because at some age, a person stops growing.

The probability of winning the drawing in this case is $\frac{1}{N}$, which is non-linear.

If each floor is approximately 10 feet, then building height should equal 10F, which is linear.

[See 6.3, "Linear Models" - under "Categorical and Linear Models"]

Question 9

Which of the following models have contextual tipping points?

Your Answer		Score	Explanation
☑ SIS Model	✓	0.33	
☑ Percolation Model	✓	0.33	
☐ Solow Growth Model	✓	0.33	
Total		1.00 / 1.00	

Question Explanation

A contextual tip occurs when a gradual change in the value of one variable leads to a discontinuous jump in some other variable of interest.

In the Percolation Model, the density of filled-in squares, p, produces a contextual tipping point in the probability of percolation.

In the SIS model - which predicts the spread of disease - R-zero is a tipping point in the probability of disease spreading.

The growth model does not have a tipping point. Growth rates vary but do not demonstrate the discontinuous jumps associated with contextual tipping point.

Each of the models in this questions are discussed in lectures.

To review Tipping Points, Percolation, and SIS, look in Section 7, "Tipping Points".

The Solow Growth Model video is in Section 8, "Economic Growth".

Question 10

True or False:

In order to attain long run equilibrium in the Basic Growth Model, investment must be equal to depreciation.

Your Answer		Score	Explanation
◉ True	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Let's look at the basic elements of the Basic Growth Model from Section 8 on Economic Growth:

We have workers, machines, output of a good, consumption of that good, new investment, a savings rate, and a depreciation rate.

An essential tenant of this model is that long run equilibrium is achieved when investment and depreciation are equal.

[See 8.3, "Basic Growth Model" - under "Economic Growth"]

Question 11

Imagine you live near a university with a popular basketball team. Every basketball game, you notice that exactly 30% of people take the bus and 70% walk. You also notice that half the people who walk to one game take the bus to the next game. What percentage of those who take the bus to one game, walk to the next game?

Your Answer		Score	Explanation
◉ This is impossible; it would be more than 100%	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

This is a Markov question in which the equilibrium is 70% who walk. Yet the model says that 50% of those who walk take the bus next time. This means that at least 35% must take the bus. Thus, the percentage of those who take the bus who walk next time must be over 100%. At this point, you could say either “this is impossible” or you could say “more than 100% of them.” The only way that this could be true would be if one of the assumptions of the model doesn’t hold. The most likely one here would be that not the same people go to the game each week. Don’t over think this one; ot should be clear from the numbers that what was said cannot hold. One skill that we’re trying to get across is thinking clearly and logically using models.

[See 10.3, "Markov Model of Democratization" - under "Markov Models"]

Question 12

Which of the following explains why groups outperform individuals when solving problems?

Your Answer		Score	Explanation
☑ Diverse Perspectives	✓	0.33	
☑ Diverse Heuristics	✓	0.33	

☑ Diverse Local Optima	✓	0.33
Total		1.00 / 1.00

Question Explanation

Diverse heuristics and diverse perspectives both lead to diverse local optima.

Diverse local optima, in turn, enable groups to not get stuck where individuals would get stuck.

Therefore, all three answers are correct.

[See 9.4, "Teams and Problem Solving" - under "Diversity and Innovation"]

Question 13

Each member of a four person team has one unique idea for how to approach a problem. If ideas can be applied individually, in pairs, and in triples to create approaches to the problem, how many total approaches does the team have? (Hint: think of this as recombination). Please input your answer as a whole number with no punctuation.

You entered:

15

Your Answer		Score	Explanation
15	✗	0.00	
Total		0.00 / 1.00	

Question Explanation

They have 4 individual ideas: A, B, C, and D.

They have 6 pairs of ideas: AB, AC, AD, BC, BD, and CD.

They have 4 triples of ideas: ABC, ABD, ACD, and BCD

$4 + 6 + 4 = 14$, so they have a total of 14 approaches.

[See 9.5, "Recombination" - under "Diversity and Innovation"]

Question 14

An analysis of consumer data claims that Americans' color preferences for cars satisfy a Markov Process. This model assumes that each individual follows the same Markov Process. In the model, the states are the colors of cars. Which of the following must be true?

Your Answer		Score	Explanation
☐ Someone's previous car color choice has no effect on their current choice.	✓	0.50	
☑ The market shares of each color car should be relatively constant.	✓	0.50	
Total		1.00 / 1.00	

Question Explanation

The model averages over lots of people.

This means that car sales of each color should approximate the Markov equilibrium, so the market shares should be constant.

However, this does not mean that one's previous color choice does not effect one's current choice. The transition probabilities could be such that a person who buys a white car is more likely to buy a silver car than a black car.

[See 10.5, "Exapting the Markov Model" - under "Markov Processes"]

Question 15

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

Your Answer		Score	Explanation
◉ complex, periodic, chaotic	✓	1.00	

Total	1.00 / 1.00

Question Explanation

We have discussed four possible classes of outcomes in this class: equilibrium, complexity, periodic (cyclic), and chaos. These outcomes have been discussed in a number of sections.