Feedback — Midterm Exam: Sections 1-10

You submitted this exam on **Tue 20 Nov 2012 7:09 AM PST**. You got a score of **15.00** 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

Which of the following did we learn from the Standing Ovation Model?

Your Answer		Score	Explanation
☑ Variance in perceptions of show quality can increase the probability of an ovation.	✓	0.33	
☑ Higher quality shows are more likely to get ovations.	✓	0.33	
☐ The transition probabilities cannot change if we want an ovation.	✓	0.33	
Total		1.00 / 1.00	

Question Explanation

The two correct answers - concerning show quality - are direct consequences of the Standing Ovation Model. The incorrect answer - having to do with transition probabilities - is out of place, since it's a condition of the Markov Convergence Theorem.

[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
☑ Reducing the size of a standard error so that if you get a six standard deviation error, your process still functions.	✓	0.33	
☐ Creating six sigma events as often as possible.	✓	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

"Tit for Tat" is an example of which type of action?

Your Answer		Score	Explanation
◉ Rule Based	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

"Tit for Tat" is an example of a fixed strategy. It is not necessarily rational (although in some cases it may be) and it is not behavioral (or in other words, given to whims or individual preferences). Instead, it is a rule based action in which the actor mimics that of another person, going "tit" for their "tat".

[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
☑ A person's height as a function of her age.	✓	0.33	
☑ The probability of winning a drawing as a function of the number of entrants.	✓	0.33	
☐ The height of a building as a function of the number of floors.	✓	0.33	

Total	1.00 / 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

Choose one of the options below to fill in the two blanks:

A (1) _____ tip occurs when a gradual change in the value of a variable leads to a large, i.e. discontinuous, jump in that same variable in the future.

A (2) _____ tip occurs when a gradual change in the value of one variable leads to a discontinuous jump in some other variable of interest.

Your Answer		Score	Explanation
(1) Direct (2) Contextual	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

A direct tip occurs when a gradual change in the value of a variable leads to a large, i.e. discontinuous, jump in that same variable in the future. A good example is "the straw that broke the camels back". At some point, the addition of straw, which has been occurring gradually, leads to the camel suddenly falling, and all of the straw with it.

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. An example is the forest fire percolation model. We can gradually increase the density of trees without much change in the likelihood of a forest fire occurring until some point, at which a slight increase in tree density causes a discontinuous jump in the

probability of a forest fire occurring.

While scholars and writers often focus on direct tips, contextual tips often make direct tips possible, such as when human rights conditions in a state deteriorate, creating the potential for an uprising.

[See 7.5, "Classifying Tipping Points" - under "Tipping Points"]

Question 10

What is the irony of the Basic Growth Model?

Your Answer		Score	Explanation
◉ Growth stops at some point.	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Both of the options are true: in the Basic Growth Model, investment is one key to growth, and growth will stop at some point. But here we're looking for the "irony" of the growth model, and that irony is that the model shows us that growth eventually stops.

[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 Heuristics	✓	0.33	
☑ Diverse Perspectives	✓	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 five person team has one unique idea for how to approach a problem. If ideas can be applied individually and in pairs 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	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

They have 5 individual ideas: A, B, C, D, and E

They have 10 pairs of ideas: AB, AC, AD, AE, BC, BD, BE, CD, CE, and DE.

$5 + 10 = 15$, so they have a total of 15 approaches.

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

Question 14

What model from class could explain why it's not really worthwhile to clean your room or to buy flowers for a friend?

Your Answer		Score	Explanation
◉ Markov Model	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The Markov Model tells us that a change in state has no long term effect. You could use the Markov Model to argue that temporarily changing the cleanliness of your room, or the happiness of your friend, will not effect long term cleanliness, or happiness.

[See 10.2, "A Simple Markov Model", under the Section "Markov Models"]

Question 15

I'm writing models on people's decisions to take online courses, the decisions being: (1) whether to enroll and (2) which courses to take. Which models from this class might be useful?

Your Answer		Score	Explanation
☐ Growth Model	✓	0.25	
☑ Decision Theory Model	✓	0.25	
☑ Markov Model	✓	0.25	
☑ Diffusion Model	✓	0.25	
Total		1.00 / 1.00	

Question Explanation

The Decision Theory Model (Lecture 4 - Decision Models) makes a lot of sense in this case; people could be deciding on the costs and benefits of each class.

I could also construct a Markov Model (Lecture 10 - Markov Processes) if I assume that people choose "types" of class based on the previous "types" of class that they took.

The Diffusion Model (Lecture 7 - Tipping Points) could also be used, as people are more likely to take online courses as they learn about others taking these courses.

It's difficult to see how I could use the Growth Model (Lecture 8 - Economic Growth), because this question has nothing to do with output, investment, depreciation, and such.