Feedback — Quiz 2: Sections 5-6

You submitted this quiz on **Sat 17 Nov 2012 8:30 PM PST**. You got a score of **10.00** out of **10.00**.

So you're back? Great - that means that the first quiz went well enough to keep you here. Some of these questions might get a bit more tricky (but not too tricky); we want to give you a chance to apply the things we've been talking about in sections.

Section 5 covers how to model agents.

Section 6 covers linear models.

Remember, these quizzes contain questions of both conceptual and technical applications.

Good luck.

Question 1

Think about all of the methods we have covered that allow us to model agents.

Which of the following CAN be true?

Your Answer		Score	Explanation
☑ A simple rule can be exploited.	✓	0.25	See 5.4, "Rule Based Models"
☑ A person can be a rational actor and altruistic.	✓	0.25	See 5.2, "Rational Actor Models"
☐ A rational rule can include a behavioral bias.	✓	0.25	See 5.3, "Behavioral Models"
☑ Rational behavior can be a simple rule.	✓	0.25	See 5.2, "Rational Actor Models"
Total		1.00 / 1.00	

Question Explanation

A rational rule can be simple -- you can spend a fixed proportion of your money on donations in order to optimize utility.

Rational rules can also be altruistic - you can find $100 and give $50 to your friend.

A simple rule can be exploited - you can decide to demand $60 in a sale and to repeatedly reduce your demand by $1, which results in the buyer exploiting you by negotiating the price downward.

Rational rules cannot, however, include behavioral biases - they assume only that actors will maximize utility.

Question 2

The State of Minnesota Veteran's Administration is pushing for a bill to make contributions by military personnel to their retirement funds be automatic unless the military member checks a box asking for the money in salary instead. Currently, military personnel have to check a box to contribute to their retirement. The governor is against the bill, saying it will have no effect. What type of model is the governor most likely using?

Your Answer	Score	Explanation
◉ Rational Model ✓	1.00	Right. The governor assumes that people will make the same decision - the rational decision - regardless of whether or not they check a box. This is why the governor says the proposed bill will have no effect.
Total	1.00 / 1.00	

Question Explanation

Let's look at each option:

If the governor uses a Behavioral Model, she would expect to see a status-quo bias, which assumes military members will be biased toward not checking any boxes. Such a bias would mean the proposed bill would have a big effect.

If the governor uses a Rule Based Model, the result of the proposed bill wouldn't

be predictable.

If the governor uses a Rational Actor Model, however, she would assume military members would make the same choice regardless of whether it means checking a box or not checking it.

It is only with this Rational Model that the proposed bill would surely have no effect.

[See 5.2, "Rational Actor Models"] [See 5.3, "Behavioral Models"] [See 5.4, "Rule Based Models"]

Question 3

Imagine that you're a contestant on a game show in which you must answer multiple-choice questions. Your current winnings are $20,000. A question comes up that will double your winnings if you answer correctly - taking you to $40,000 - or reduce your winnings to nothing if you answer incorrectly. You may do one of two things: take your $20,000 and walk away; or answer the question and end up with either $0 or $40,000. You reason that you have a 60% chance of answering the question correctly. However, you decide to walk away instead of answering. What type of bias does this choice represent?

Your Answer		Score	Explanation
◉ Prospect Theory	✓	1.00	Correct. Prospect Theory tells us that when we're talking about gains - as opposed to losses - we tend to be "risk averse".
Total		1.00 / 1.00	

Question Explanation

What's the rational thing to do here? You can take the gauranteed $20,000, or risk losing it all based on the 60% chance you will answer correctly an win $40,000. Your expected winnings if you answer are $(.4)(0) + (.6)(40,000) = 24,000$. Since $24,000 > $20,000, the rational action is to attempt to answer the question. However, we assume here that you do the opposite and walk away. This would mean that you're being "risk averse" when thinking about potential gains. This bias is called "Prospect Theory".

[See 5.3, "Behavioral Models"]

Question 4

Alicia is a rational actor. She's in a market with 20 buyers and 20 sellers of corn. All of the other buyers and sellers are zero-intelligence agents. Assume that Alicia is a buyer. If Alicia has a relatively high value, how will she bid?

Your Answer		Score	Explanation
☑ Alicia bids significantly less than her true value.	✓	0.33	Right. Alicia is surrounded by zero-intelligence sellers, and she can take advantage of their naivety.
☐ Alicia bids only slightly less than her true value.	✓	0.33	Close. We often assume rational actors will bid slightly less than their true values; in this case, however - with so many zero-intelligence sellers - we expect Alicia to exploit this fact by bidding much less than her true value.
☐ Alicia will probability have the lowest bid among buyers.	✓	0.33	Alicia is surrounded by zero-intelligence traders, at least one of whom will make an irrationally low bid - lower than anything Alicia will want to bid.
Total		1.00 / 1.00	

Question Explanation

Alicia probably won't have the lowest bid: some zero-intelligence trader is likely to make a really low bid. Alicia will, however, bid less than her true value; otherwise, she won't come out ahead. Finally, we know Alicia will bid significantly less than her true value; there are lots of naive sellers, so she will want to take advantage of that fact.

[See 5.5, "When Does Behavior Matter?]

Question 5

If you are a rational person playing a "race to the bottom" game, how should you react to the addition of more people whom you know to be irrational?

Your Answer		Score	Explanation
◉ Shade your answer in the direction of a less rational response.	✓	1.00	Right. More irrational players, the more we need to shade toward an irrational answer - assuming we are acting rationally.
Total		1.00 / 1.00	

Question Explanation

If we add a couple more irrational people into our equation, the mean of responses will move upward, toward irrationality. This means that your response should also move upward toward irrationality.

[See 5.5, "When Does Behavior Matter?]

Question 6

You have the following data on the number of dishes of ice cream that 4 people eat in a month:

Alice: 12

Baruk: 12

Carlos: 6

Daria: 14

You create two categories based on gender: Daria and Alice in one, and Carlos and Baruk in the other. You make predictions based on these categories. How much of the variation can you explain based on these categories, i.e. what's your R-squared? Write your answer to the nearest whole percentage.

You entered:

44

Your Answer		Score	Explanation
44	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The original mean is 11. So the variation, without categories, is $1 + 1 + 25 + 9 = 36.$

Now we calculate within categories:

For the women, the mean is 13 and the variation is $1 + 1 = 2$

For the men, the mean is 9 and the variation is $9 + 9 = 18$ (Remember, to find variation we $square$ the distance from the mean).

Next, find the total variation within groups:

$2 + 18 = 20.$

The original variation was 36, so we have explained 16.

Finally, calculate the R-squared value:

$\frac{16}{36} = 44.4$

[See 6.2, "Categorical Models"]

Question 7

A student, Samuel, speculates that exam scores may be linearly related to hours spent studying. Samuel collects five data points, (X,Y), where X represents hours studied and Y represents exam score -- Ricardo: (2,45); Janette: (4,80); Calvin: (7,95), Edith: (3,55); Joachim: (1,30). The mean score is 61. Samuel uses the equation $Y = 20X$ to represent the data. Calculate the R-squared value of this line. Assuming that an R-squared value less than 0.4 is "poor", a value between 0.4 and 0.8 is "fair", and a value above 0.8 is "good", how well does this line Y=20X represent the data?

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

Question Explanation

Step 1: Calculate the total variation: For Ricardo, (2,45): $(45-61)^2 = 256$. Repeat this step for each student, then sum all results.

You should get 2,770

Step 2: Calculate how much of the variation is accounted for by the line Y=20X: For Ricardo, (2,45): $20 * 2 = 40$; $(40-45)^2 = 25$. Repeat this step for each student, then sum all results.

You should get 2,175

Step 3: Calculate the R-squared value:

$$1 - \frac{2,175}{2,770} = 0.215$$

Step 4: Compare to our criteria:

$$0.215 Therefore, the line Y = 20X is a "poor" representation of the data.

[See 6.3, "Linear Models"]

Question 8

Let's assume that temperature in the State of Michigan increases linearly between January and June. We'll assign each day between January 1st and June 31st a number, such that January 1st=1, January 2nd=2.....July 1st=151. The following five data points (X,Y) were collected, where X represents the day and Y represents the temperature that day in degrees Fahrenheit: (1,5); (25,15); (46,22); (76,32); (140, 77). Which line better represents the data: Y=0.6X or Y=0.5X? In other words, which of these lines has the greater R-squared value?

Your Answer		Score	Explanation
◉ Y=0.5X	✓	1.00	

Total	1.00 / 1.00

Question Explanation

See the explanation for question 6 for help with calculating R-squared values.

Once you do the math, you should find that Y=0.5X has an R-squared value of .964 and that Y=0.6X has an R-squared value of about 0.909.

Therefore, the line Y=0.5X has the greater R-squared value.

[See 6.4, "Fitting Lines to Data"]

Question 9

Larry has a multiple-variable equation that explains "points scored" in a soccer match as a linear function of passing skill, shooting skill and player compatibility. Each of these three variables is ranked on a scale from 1 to 10. As a team improves in one of these three respects, their score will increase. Let's assume that the equation is precisely: Points Scored = 0.18(Passing Skill)+0.25(Shooting Skill)+0.12(Compatibility). MT United is a new soccer team using Larry's model to maximize points scored. Should they focus most of their practice on passing, shooting or player compatibility?

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

Question Explanation

This is a Big Coefficient question. Since shooting has the biggest coefficient, MT United should spend most of their time on shooting practice.

[See 6.7, "The Big Coefficient vs. The New Reality"]

Question 10

In the previous question, we assumed that points scored in a soccer match was a linear function: Points Scored = 0.18(Passing)+0.25(Shooting)+0.12(Compatibility), with each variable measured on a scale of 1 to 10. Imagine that all teams begin by using this equation. Suddenly "Team A" (passing=7; shooting=6; compatibility=6) BEATS "Team B" (passing=9; shooting=8; compatibility=7). How might this outcome be possible?

Your Answer		Score	Explanation
◉ Team A invested in a 'New Reality' that also focused on defensive skills. This allowed them to decrease the score differential enough to win.	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

Team A could have invested in a New Rreality that also focused on defense, which could have changed how the game was being played in this league.

The other two options are false: if Team B had better offense and defense, there is no explanation as to how they were defeated; also, Team B is better at shooting than team 1 (8>6), so big coefficients cannot account for Team A's win.

[See 6.7, "The Big Coefficient vs. The New Reality"]