

1. Who developed the racial and income segregation model that we covered?
2. Recall the standing ovation model. Suppose that for a particular show, 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?
 - (a) 50%
 - (b) 40%
 - (c) 0%
 - (d) 60%
3. Imagine that you have never been a cigarette smoker, but suddenly you begin to hang out with a group of people who smoke cigarettes frequently. After a few weeks, you become a regular smoker as well. This phenomenon is known as: Peer Effects or Sorting
4. While America is an incredibly diverse country, many of the places where Americans live are filled with people who think, believe, and vote like we do. A big reason for this is that we can choose the neighborhood we live in, the people who we associate with, the news outlets that we follow, etc. Which concept from class can best help us understand this phenomenon? Peer Effects or Sorting
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?
 - (a) Big Mike's
 - (b) Little John's
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?).
 - (a) The cells blink on and off
 - (b) The same four cells are alive
 - (c) There are six live cells in three rows
 - (d) No cells are alive
7. Recall the one dimensional cellular automata model. Which of the following classes of outcomes can this model produce? (Hint: pick more than one).

- (a) Randomness
 - (b) Periodic Orbits/ Patterns
 - (c) Equilibrium
 - (d) Complexity
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: $A_i B_i C_i$, $A_i C_i B_i$, $B_i C_i A_i$, $B_i A_i C_i$, $C_i A_i B_i$, and $C_i B_i A_i$. The first voter has preferences $A_i B_i C_i$. The second voter has preferences $B_i C_i A_i$. 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).
- (a) 4
 - (b) 1
 - (c) 2
9. Sarah is shopping for a computer. She researches different aspects of the computers for sale: screen size, processing speed, battery life, and price. All other things being equal, for which of these attributes would Sarah likely have preferences? (For this question, please familiarize yourself with the concept of) Screen Size Processing Speed Battery Life Price
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, should you drive to Detroit to attend this concert? To solve, use a decision tree.
- (a) yes
 - (b) no
11. How many possible preference orderings exist for four alternatives? These orderings must satisfy transitivity.
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 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 as a number between 0 and 1 to the hundredths place (like this: 0.XX). Write only your final answer
13. 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 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?

- (a) Not enough information
- (b) Fair
- (c) Good
- (d) Poor

14. Let's assume that temperature increases linearly between January and June. We'll assign each day between January 1st and June 30th 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?

- (a) $Y = 0.5X$
- (b) $Y = 0.6X$

15. 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 = $0.18(\text{Passing Skill}) + 0.25(\text{Shooting Skill}) + 0.12(\text{Compatibility})$. 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?

- (a) Defense
- (b) Compatibility
- (c) Passing
- (d) Shooting

16. In the previous question, we assumed that points scored in a soccer match was a linear function: Points Scored = $0.18(\text{Passing}) + 0.25(\text{Shooting}) + 0.12(\text{Compatibility})$, 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?

- (a) Team A invested in a 'New Reality' that also focused on defensive skills. This allowed them to decrease the score differential enough to win.
- (b) Team A had a larger value in the Big Coefficient of shooting, and therefore scored more points overall.

- (c) Team B invested in defensive skills, making them superior both offensively and defensively.
17. What are the two types of tips most relevant to Schelling's Segregation Model?
 18. True or False: The standing ovation model teaches us that increased variance in the quality of a show can increase the probability of a standing ovation.
 19. You read the following statement from an educational reformer in a popular magazine: I've visited many schools and I always notice that the best students hang out together. That's why I tell parents that their children should interact with other high achievers. In brief, I tell them: if your child hangs out with smart kids, she'll become smart. What two effects from this course is this reformer conflating?
 - (a) Standing Ovation and Peer Effects
 - (b) Sorting and Peer Effects
 - (c) Rational Action and Sorting
 - (d) Spatial Preferences and Sorting
 20. You run a company that makes seat cushions for airplanes. To fit on the plane, the cushions must be between 20 and 23 inches wide. If you adopt the Six Sigma approach to manufacturing the cushions, what should your goal be for the standard deviation of seat width? Give a numerical answer using decimals to the hundredths place. For example, your answer should look like 0.67 or 0.32 or 0.99.
 21. Which of the following is linear?
 - (a) World population as a function of time.
 - (b) The number of parking spaces required at OW as a function of the number of students
 - (c) The effect of an aspirin on combating my headache as a function of time.
 - (d) The cost of my lunch bill as a function of the number of pizza slices I order.