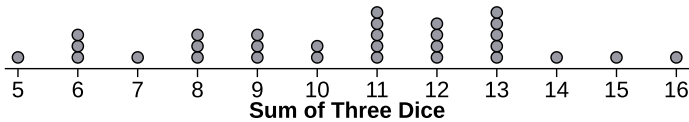


1. About 50% of the time Marissa packs a sandwich for her lunch. About 25% of the time Marissa packs leftovers and about 25% of the time she does not pack a lunch and orders take-out instead. Explain how you could use a standard 52-card deck of cards to simulate what Marissa eats for lunch on any given day.

2. Nick tells his sister Penny that he gets up when his alarm clock rings the first time (without pressing snooze) about 85% of the time. Within the next month, Penny takes a random sample of seven days and finds that on four of the days, Nick gets up when his alarm clock rings the first time, but on the other three days, he continues to sleep after his alarm clock rings.
 - a. Does Penny have some evidence that Nick is lying? Explain.

 - b. Does Penny have proof that Nick is lying? Explain.

3. Fran uses a simulation to estimate the probability that the sum of the values on three dice is 15 or higher. She rolls three dice 30 times and records the sum each time. The dotplot of her results is shown.



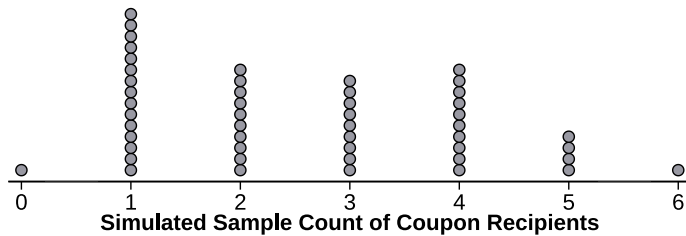
- a. What does the single dot above the 5 represent?
- b. Based on Fran's simulation, what is the probability that the sum of the values on three dice is 15 or greater?
- c. The true probability of getting a sum of 15 or greater with three dice is 0.0926. Compare Fran's simulated probability and the true probability. What might account for the difference?
4. A student brings a penny to class that she claims is a fair coin. To try to prove it, she tosses the coin seven times and gets heads on all seven tosses.
- a. For a fair coin, the probability of getting this result purely by chance is about 0.8%. Is this result statistically significant? Explain.
- b. What conclusion should be made about the coin?

5. A café advertises a promotion during a certain week. They claim that during the promotion week 20% of the members in their loyalty program will be emailed a coupon for a free cookie. A group of 12 friends are all members of this café's loyalty program. During the week of this promotion, only 1 of the 12 friends received the email with the coupon.

a. If the café's claim is true, how many of the friends would you expect to have received the coupon? Justify your answer.

b. Is there some evidence that the café's claim is false? Explain.

- c. A simulation is done to determine the probability of getting a result like this, purely by chance. The dotplot displays the results of 50 simulated trials. Each dot represents the number of coupon recipients in a group of 12, if the probability of winning was truly 20%. How many of the 50 simulated trials included 1 or fewer coupon recipients?



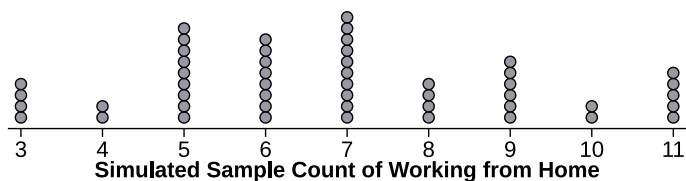
d. Assuming the café's claim is true, what is the approximate probability of getting 1 or fewer coupon recipients in a group of 12?

e. Is there convincing evidence that the café's claim is false? Explain.

6. Aarav read an article on his school's website that claimed that 50% of students at his school do not eat breakfast.
- Assuming the claim from the article is true, explain how Aarav could simulate surveying 42 students about their breakfast habits.
 - When Aarav actually surveyed 42 students at his school, he found that only 12 of them did not eat breakfast. Explain how Aarav could design a simulation to determine if his result is likely to have happened purely by chance or if there is convincing evidence that the article on the school's website is wrong.
7. In a certain town, 20 percent of the citizens get the daily recommended servings of fruits and vegetables. You are to design a simulation to estimate the probability that none of six randomly selected citizens gets the daily recommended servings of fruits and vegetables. Which of the following would be an appropriate way to assign the digits 0 through 9 to represent a citizen's behavior in this simulation?
- Assign "0, 1, 2" to getting the daily recommended servings of fruits and vegetables and "3, 4, 5, 6, 7, 8, and 9" to not getting the recommended amount.
 - Assign "0, 1, 2, 3, 4" to getting the daily recommended servings of fruits and vegetables and "5, 6, 7, 8, and 9" to not getting the recommended amount.
 - Assign "0" to getting the daily recommended servings of fruits and vegetables and "1, 2, 3, 4, 5" to not getting the recommended amount and ignore all other digits.
 - Assign "0,1" to getting the daily recommended servings of fruits and vegetables and "2, 3, 4, 5, 6, 7, 8, and 9" to not getting the recommended amount.

8. The U.S. Bureau of Labor Statistics found that 34% of employees do part or all of their work at home. In a large corporation, a random sample of 20 employees revealed that 10 employees do part or all of their work at home. To determine if this is convincing evidence that the true percent of employees working from home is greater than 34% for this corporation, a simulation was performed.

The dotplot shows the results of 50 simulated trials of taking an SRS of size 20 and counting the number of employees who work from home, under the assumption that the true percent of employees doing part or all of their work at home is 34%. Based on the results of the simulation, which of the following statements is an appropriate conclusion?



- A) There is some evidence that the true percent of employees at this corporation who do part or all of their work at home is less than 34%.
- B) There is convincing evidence that the true percent of employees at this corporation who do part or all of their work at home is greater than 34%.
- C) There is convincing evidence that the true percent of employees at this corporation who do part or all of their work at home is less than 34%.
- D) There is not convincing evidence that the true percent of employees at this corporation who do part or all of their work at home is greater than 34%.