

1. You can choose to play one of two games. Each game costs one dollar to play. Which one would you play?

Game 1:

A wheel with three numbers on it--zero, one, and two--is spun so that there is a 40% chance that the wheel lands on zero, a 10% chance the wheel lands on one, and a 50% chance the wheel lands on two. You get back the amount in dollars of the number that the wheel lands on.

Game 2:

A different wheel with three numbers on it--zero, one, and two--is spun so that there is a 5% chance that the wheel lands on zero, a 80% chance the wheel lands on one, and a 15% chance the wheel lands on two. You get back the amount in dollars of the number that the wheel lands on.

2. Shaquille O'Neal is one of the best players on the professional basketball team the Los Angeles Lakers. Shaq, as he is nicknamed, stands 7' 1" tall and weighs 330 pounds. Most of the shots he takes are close to the basket, and because he is so big other players have a hard time stopping him from making baskets. In fact, he makes 57.2% of his shots, which is impressive given that most players make about 45%.

In basketball, when a player trying to make a shot is hit on the body by someone on the opposing team, thereby causing the player to miss the shot, the player gets to take two free shots from 15 feet away from the basket. These shots are called foul shots. Shaq does not shoot foul shots very well. In fact, he makes only 51.3% of his foul shots.

Regular shots are worth two points. Foul shots are worth one point each.

Because Shaq is less likely to make foul shots, one strategy is to foul him whenever he touches the ball. This strategy has been nicknamed the "hack-a-Shaq." Let's see if the hack-a-Shaq pays off.

- A. Calculate the expected value of the number of points Shaq scores on one regular shot (not foul shots) at the basket (i.e., he makes or misses the shot). Regular shots are the ones he has a 57.2% chance of making.

B. Assume that all foul shots are independent events (examinations of foul shooting records suggest this is approximately true). Calculate the expected value of the number of points Shaq gets when he shoots two foul shots.

C. Compare the EV for foul shots to the EV for regular shots. Based on these expected values, should opposing teams adopt the hack-a-Shaq?

3. Define:

A. A census

B. A Controlled Experiment

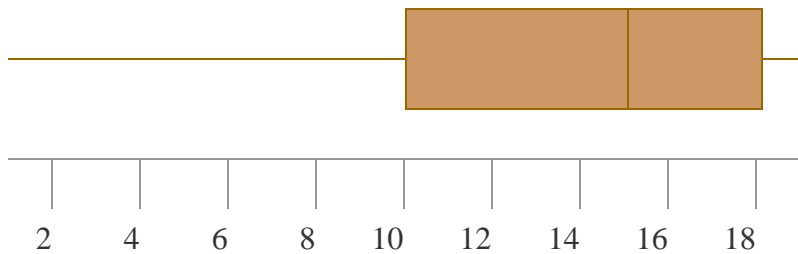
C. An Observational Study

D. A Sample Survey

4. A study finds that high school students who take the SAT, enroll in an SAT coaching course, and then take the SAT a second time rise their SAT mathematics scores from a mean of 521 to a mean of 561. What factors other than “taking the course causes higher scores” might explain the improvement?

5. Over the last 20 years there has developed a positive association between sales of television sets and the number of obese adolescents in the United States. Do more TVs cause more children to put on weight, or are there other factors involved? List some possible lurking variables.

6. Consider the boxplot below.



Which of the following statements are true?

- I. The distribution is skewed right.
- II. The interquartile range is about 8.
- III. The median is about 10.

- (A) I only
- (B) II only
- (C) III only
- (D) I and III
- (E) II and III

7. Simplify the preparation for statistics box plots exam 70, 71, 72, 73, 74, 75, 60, 61, 63, 64, 70, 71, 73. In addition, find the range.

8. David notes down the scores of his weekly tests in a diary. The scores of 21 tests are,

60, 61, 62, 63, 64, 65, 72, 74, 75, 77, 79, 80, 81, 87, 87, 88, 88, 89, 89, 89, 90.

Draw a Box and Whisker plot on his performance and find realistically what could be considered as his normal performance.

9. You buy one \$10 raffle ticket for a new car valued at \$15,000. Two thousand tickets are sold. What is the expected value of your gain?

10. Suppose you play a game of chance in which you choose 5 numbers from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. You may choose a number more than once. You pay \$2 to play and could profit \$100,000 if you match all 5 numbers in order (you get your \$2 back plus \$100,000). Over the long term, what is your *expected* profit of playing the game?

11. For a mean of 80 and a standard deviation of 10, find the 45th percentile and the 90th percentile.

12. For a mean of 25.3 and a standard deviation of 2.4, find the 3rd percentile and the 81st percentile.

13. Draw a standard normal curve with a mean of 50 and a standard deviation of 5.

14. Draw a standard normal curve with a mean of 93 and a standard deviation of 14.

15. Peter Piper Pizzas sold last Saturday.

	Small	Medium	Large
Pepperoni	52	36	80
Cheese	10	20	80

Were there more cheese or pepperoni pizzas sold?

What percent of the medium pizzas sold were pepperoni?

Were there proportionally more large pizzas sold amongst cheese pizzas, pepperoni pizzas, or are they the same?

16. Define standard deviation.

What is a Z-score? Define it with respect to standard deviation.

17. It is has been told that dark chocolate helps prevent heart disease due to the antioxidants within the product. From a group of 2,000 males over the age of 50, one group of 1000 were asked to eat 4 oz of dark chocolate each day. The remaining 1000 took nothing. After a period of time, it was determined that those who took the dark chocolate had significantly fewer heart attacks than those who didn't take it. It was concluded that all people should eat 4 oz of dark chocolate per day.

Describe some problems with the conclusion.

18. For a weekly game, the expected value of winning is \$18 with a standard deviation of 2.50. What is the expected value of winning 8 weeks in a row? What is the standard deviation?

19. For the previous problem, if a person plays 10 consecutive weeks, what is the probability of winning more than \$190?

20. For period 1, the average test score was 80% with a standard deviation of 5.
For period 2, the average test score was 85% with a standard deviation of 7.
For period 3, the average test score was 90% with a standard deviation of 9.

A. If a student in period 2 scores 92 and a student in period 3 scores 100, who did better with respect to his/her classmates?

B. If a student in period 1 scores 86 and a student in period 2 scores 89, who did better with respect to his/her classmates?

C. If a student in period 1 scores an 80% and a student in period 3 scores 99, who did better with respect to his/her classmates?

21. A school wants to know how students feel about the food in the cafeteria. Name a good method for sampling 200 students from the student body. Eliminate as much bias as possible.

22. There is a linear relationship between the number of guests (x) in a Venezia's restaurant in 1 day and the number of dollars earned that day (y). The least squared regression for this relationship is:

$$\hat{y} = 2.3x + 5$$

If Venezia's average 53 customers per night with a standard deviation of 6.4, find the mean and standard deviation for the average amount of dollars earned per day.

23. Solve.

A. $2x + 5y = -3$

$$3x - 7y = 10$$

B. $\frac{2x+12}{y} = 9$

$$\frac{4x+2}{y} = 7$$

24. Draw a symmetric curve. What is larger, the mean or median?

Draw a curve that is skewed left. What is larger, the mean or median?

Draw a curve that is skewed right. What is larger, the mean or median?

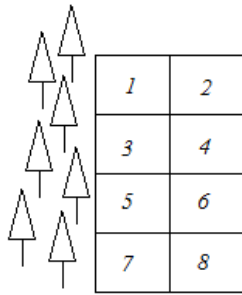
25. Flip a coin 10 times. Count the number of times you get heads. Repeat 100 times. Make a probability distribution table containing your results.

26. From the chart below, calculate the least squared regression line, the coefficient of determination, the correlation coefficient, the residuals.

x	Y
2	5
3	7
5	10
6	14
7	15

27. The probability that ASU wins Thursday's basketball game is .75. The probability that ASU wins Saturday's basketball game is .80. What is the probability that they win both? What is the probability they win neither? What is the probability they win only 1 of the games?

28. Students are designing an experiment to compare the productivity of two varieties of dwarf fruit trees. The site for the experiment is a field that is bordered by a densely forested area on the west (left) side. The field has been divided into eight plots of approximately the same area. The plots on the right side of the field and towards the edges receive more sunlight. Describe a design for this experiment that takes into account the location of the plots with respect to the forest and the amount of sunlight received.



29. A test to screen for the AIDS virus gives a positive result 1.5 percent of the time for people who do not have AIDS. The test gives a negative result 0.2 percent of the time for people who have the disease. It is known that 1 percent of the population carries the AIDS antibody.

a) What is the probability a person selected at random would test positive for AIDS?

b) What is the probability that a person selected at random who tests positive for AIDS does not have it?