1. Determine whether the random variable is discrete or continuous.
   **a.** The number of free-throw attempts before the first shot is made.
   **b.** The square footage of a house.
   **c.** The time it takes to fly from City A to City B.
   **d.** The number of people with blood type A in a random sample of 49 people.
   **e.** The number of hits to a website in a day.

   **a.** Is the number of free-throw attempts before the first shot is made discrete or continuous?

   ○ A. The random variable is continuous.

   ○ B. The random variable is discrete.

   **b.** Is the square footage of a house discrete or continuous?

   ○ A. The random variable is discrete.

   ○ B. The random variable is continuous.

   **c.** Is the time it takes to fly from City A to City B discrete or continuous?

   ○ A. The random variable is continuous.

   ○ B. The random variable is discrete.

   **d.** Is the number of people with blood type A in a random sample of 49 people discrete or continuous?

   ○ A. The random variable is discrete.

   ○ B. The random variable is continuous.

   **e.** Is the number of hits to a website in a day discrete or continuous?

   ○ A. The random variable is discrete.

   ○ B. The random variable is continuous.

2.  Suppose a baseball player had 204 hits in a season. In the given probability distribution, the random variable X represents the number of hits the player obtained in a game.

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| P(x) | 0.1658 | 0.4377 | 0.2221 | 0.0802 | 0.0925 | 0.0017 |

(a) Compute and interpret the mean of the random variable X.

$\mu_x = \square$  (Round to one decimal place as needed.)

Which of the following interpretation of the mean is correct?

○A. As the number of trials n increases, the mean of the observations will approach the mean of the random variable.

○B. The observed value of the random variable will almost always be equal to the mean of the random variable.

○C. As the number of trials n decreases, the mean of the observations will approach the mean of the random variable.

○D. The observed value of the random variable will almost always be less than the mean of the random variable.

(b) Compute the standard deviation of the random variable X.

$\sigma_x = \square$  (Round to one decimal place as needed.)

3.  Determine whether the distribution is a discrete probability distribution.

| x | P(x) |
|---|---|
| 0 | 0.10 |
| 1 | 0.20 |
| 2 | 0.30 |
| 3 | 0.20 |
| 4 | 0.10 |

Is the probability distribution a discrete distribution? Why? Choose the correct answer below.

○A. No, because the total probability is not equal to 1.

○B. Yes, because the probabilities sum to 1 and are all between 0 and 1, inclusive.

○C. Yes, because the distribution is symmetric.

○D. No, because some of the probabilities have values greater than 1 or less than 0.

Unfiled Notes Page 2

4. In the accompanying table, the random variable x represents the number of televisions in a household in a certain country. Determine whether or not the table is a probability distribution. If it is a probability distribution, find its mean and standard deviation.

Click the icon to view the data.

Is the table a probability distribution?

○ Yes

○ No

If the table is a probability distribution, what is its mean? Select the correct choice below and fill in any answer boxes within your choice.

○ A. Its mean is ▨ .
(Round to the nearest tenth as needed.)

○ B. The table is not a probability distribution.

If the table is a probability distribution, what is its standard deviation? Select the correct choice below and fill in any answer boxes within your choice.

○ A. Its standard deviation is ▨ .
(Round to the nearest tenth as needed.)

○ B. The table is not a probability distribution.

More Info

| x | P(x) |
|---|------|
| 0 | 0.02 |
| 1 | 0.13 |
| 2 | 0.25 |
| 3 | 0.31 |
| 4 | 0.17 |
| 5 | 0.12 |

5. If we consider an experiment of generating 64 births and recording the genders of the babies, the mean number of girls is 32 and the standard deviation is 4 girls. Would it be unusual to get 30 girls in 64 births? Why or why not?

Choose the correct answer below.

○A. No, because 30 is below the minimum usual value.

○B. Yes, because 30 is within the range of usual values.

○C. No, because 30 is within the range of usual values.

○D. Yes, because 30 is greater than the maximum usual value.

6. The accompanying table describes results from eight offspring peas. The random variable x represents the number of offspring peas with green pods. Complete parts (a) through (d).

🔲 Click the icon to view the data.

**a.** Find the probability of getting exactly 7 peas with green pods.

☐ (Type an integer or a decimal.)

**b.** Find the probability of getting 7 or more peas with green pods.

☐ (Type an integer or a decimal.)

**c.** Which probability is relevant for determining whether 7 is an unusually high number of peas with green pods, the result from part (a) or part (b)?

○ The result from part (b)

○ The result from part (a)

**d.** Is 7 an unusually high number of peas with green pods? Why or why not?

○A. Yes, because the probability of 7 or more peas with green pods is low.

○B. Yes, because the range of peas with green pods is from 0 to 8.

○C. No, because the probability of 7 peas is high.

○D. No, because the probability of 7 or more peas with green pods is high.

More Info
_____

**Probabilities of Numbers of Peas with Green Pods Among 8 Offspring Peas**

| x (Number of Peas with Green Pods) | P(x) |
|---|---|
| 0 | 0+ |
| 1 | 0+ |
| 2 | 0.004 |
| 3 | 0.025 |
| 4 | 0.075 |
| 5 | 0.169 |
| 6 | 0.354 |
| 7 | 0.262 |
| 8 | 0.111 |

6.

(cont.)

7.　Based on data from a car bumper sticker study, when a car is randomly selected, the number of bumper stickers and the corresponding probabilities are as shown below.
Complete parts (a) through (d).

　　0 (0.794); 1 (0.087); 2 (0.038); 3 (0.029); 4 (0.015); 5 (0.011); 6 (0.008); 7 (0.008); 8 (0.005); 9 (0.005) 🖿

**a.** Does the given information describe a probability distribution?

○　Yes

○　No

**b.** Assuming that a probability distribution is described, find its mean and standard deviation.

The mean is ☐. (Round to the nearest tenth as needed.)

The standard deviation is ☐. (Round to the nearest tenth as needed.)

**c.** Use the range rule of thumb to identify the range of values for usual numbers of bumper stickers.

The maximum usual value is ☐. (Round to the nearest tenth as needed.)

The minimum usual value is ☐. (Round to the nearest tenth as needed.)

**d.** Is it unusual for a car to have more than one bumper sticker? Explain.

○A.　Yes, because the probabilities for random variable x from 2 to 9 are all less than 0.05.

○B.　No, because the probability of more than 1 bumper sticker is 0.119, which is greater than 0.05.

○C.　No, because the probability of having 1 bumper sticker is 0.087, which is greater than 0.05.

○D.　Not enough information is given.

8. Let the random variable x represent the number of girls in a family with three children. The probability of a child being a girl is 0.32. Construct a table describing the probability distribution, then find the mean and standard deviation. Is it unusual for a family of three children to consist of three girls?

Find the probability of a family having x girls out of 3 children.

| x | P(x) |
|---|------|
| 0 | ☐ |
| 1 | ☐ |
| 2 | ☐ |
| 3 | ☐ |

(Round to three decimal places as needed.)

Find the mean of the random variable.

$\mu = \Box$

(Round to two decimal places as needed.)

Find the standard deviation of the random variable.

$\sigma = \Box$

(Use the answers from above to find this answer. Round to two decimal places as needed.)

Is it unusual for a family with three children to have only girls?

○A. Yes, because the probability of having 3 girls is less than or equal to 0.05.

○B. No, because the probability of having 3 girls is less than or equal to 0.05.

○C. No, because the probability of having 3 girls is greater than 0.05.

○D. Yes, because the probability of having 3 girls is greater than 0.05.

9. In a state's Pick 3 lottery game, you pay $1.38 to select a sequence of three digits, such as 177. If you select the same sequence of three digits that are drawn, you win and collect $430.31. Complete parts (a) through (e).

**a.** How many different selections are possible?

☐

**b.** What is the probability of winning?

☐ (Type an integer or a decimal.)

**c.** If you win, what is your net profit?

$☐ (Type an integer or a decimal.)

**d.** Find the expected value.

$☐ (Round to the nearest hundredth as needed.)

**e.** If you bet $1.38 in a certain state's Pick 4 game, the expected value is − $0.95. Which bet is better, a $1.38 bet in the Pick 3 game or a $1.38 bet in the Pick 4 game? Explain.

○A. Neither bet is better because both games have the same expected value.

○B. The Pick 4 game is a better bet because it has a larger expected value.

○C. The Pick 3 game is a better bet because it has a larger expected value.

10. A Gallup poll of 1236 adults showed that 12% of the respondents believe that it is bad luck to walk under a ladder. Consider the probability that among 30 randomly selected people from the 1236 who were polled, there are at least 2 who have that belief. Given that the subjects surveyed were selected without replacement, the events are not independent. Can the probability be found by using the binomial probability formula? Why or why not?

Choose the correct answer below.

○A. No. The selections are not independent.

○B. No. The selections are not independent, and the 5% guideline is not met.

○C. Yes. Although the selections are not independent, they can be treated as being independent by applying the 5% guideline.

○D. Yes. There are a fixed number of selections that are independent, can be classified into two categories, and the probability of success remains the same.

11. Determine whether the following probability experiment represents a binomial experiment and explain the reason for your answer.

An experimental drug is administered to 40 randomly selected individuals, with the number of individuals responding favorably recorded.

Does the probability experiment represent a biniomial experiment?

○A. Yes, because the experiment satisfies all the criteria for a binomial experiment.

○B. No, because the trials of the experiment are not independent.

○C. No, because there are more than two mutually exclusive outcomes for each trial.

○D. No, because the probability of success differs from trial to trial.

12. Determine whether the given procedure results in a binomial distribution. If it is not binomial, identify the requirements that are not satisfied.

Recording the genders of 100 people in a statistics class

Choose the correct answer below.

○A. Yes, because all 4 requirements are satisfied.

○B. No, because there are more than two possible outcomes.

○C. No, because the probability of success does not remain the same in all trials.

○D. No, because there are more than two possible outcomes and the trials are not independent.

13. Assume that a procedure yields a binomial distribution with a trial repeated n times. Use the binomial probability formula to find the probability of x successes given the probability p of success on a single trial.

$n = 9$, $x = 7$, $p = 0.55$

$P(7) = \boxed{\phantom{xx}}$ (Round to three decimal places as needed.)

14. Assume that a procedure yields a binomial distribution with a trial repeated n times. Use the binomial probability formula to find the probability of x successes given the probability p of success on a single trial.

$n = 15$, $x = 12$, $p = 0.75$

$P(12) = \boxed{\phantom{xx}}$ (Round to three decimal places as needed.)

15. Refer to the Minitab display to the right. The probabilities were obtained by entering the values of n = 5 and p = 0.186. In a clinical test of a drug, 18.6% of the subjects treated with 10 mg of the drug experienced headaches. In each case, assume that 5 subjects are randomly selected and treated with 10 mg of the drug. Find the probability that at least four of the subjects experience headaches.

Binomial with n = 5 and p = 0.186

| x | P(X = x) |
|---|----------|
| 0 | 0.3574 |
| 1 | 0.4083 |
| 2 | 0.1866 |
| 3 | 0.0426 |
| 4 | 0.0049 |
| 5 | 0.0002 |

The probability that at least four of the subjects experience headaches is ☐.
(Round to four decimal places as needed.)

16. A brand name has a 40% recognition rate. If the owner of the brand wants to verify that rate by beginning with a small sample of 10 randomly selected consumers, find the probability that exactly 4 of the 10 consumers recognize the brand name. Also find the probability that the number who recognize the brand name is not 4.

The probability that exactly 4 of the 10 consumers recognize the brand name is ☐.
(Round to three decimal places as needed.)

The probability that the number who recognize the brand name is not 4 is ☐.
(Round to three decimal places as needed.)

17. Researchers conducted a study to determine whether there were significant differences in graduation rates between medical students admitted through special programs and medical students admitted through the regular admissions criteria. It was found that the graduation rate was 94% for the medical students admitted through special programs. Complete parts (a) and (b) below.

**a.** If 13 of the students from the special programs are randomly selected, find the probability that at least 12 of them graduated.

The probability that at least 12 of the 13 students graduated is ☐.
(Round to three decimal places as needed.)

**b.** Would it be unusual to randomly select 13 students from the special programs and get only 10 or fewer that graduate? Why or why not? Note that a small probability is one that is less than 0.05.

○A. No, because the probability of this occurring is very small.

○B. Yes, because the probability of this occurring is very small.

○C. No, because the probability of this occurring is not small.

○D. Yes, because the probability of this occurring is not small.

18. A pharmaceutical company receives large shipments of aspirin tablets. The acceptance sampling plan is to randomly select and test 10 tablets, then accept the whole batch if there is only one or none that doesn't meet the required specifications. If a particular shipment of thousands of aspirin tablets actually has a 6% rate of defects, what is the probability that this whole shipment will be accepted?

The probability that this whole shipment will be accepted is ☐.
(Round to three decimal places as needed.)

19. Excel is used to find the mean and standard deviation of a discrete probability distribution and the results are as follows: $\mu = 2.0$ and $\sigma = -3.5$. Can these results be correct? Explain.

Choose the correct answer below.

○ A. Yes. The results can be correct.

○ B. No. The standard deviation cannot be negative.

○ C. No. The mean must be negative if the standard deviation is negative.

○ D. No. The standard deviation is too large.

20. Assume that a procedure yields a binomial distribution with n trials and the probability of success for one trial is p. Use the given values of n and p to find the mean $\mu$ and standard deviation $\sigma$. Also, use the range rule of thumb to find the minimum usual value $\mu - 2\sigma$ and the maximum usual value $\mu + 2\sigma$.

$n = 50, p = 0.7$

$\mu = $ ☐

$\sigma = $ ☐ (Round to one decimal place as needed.)

$\mu - 2\sigma = $ ☐ (Round to one decimal place as needed.)

$\mu + 2\sigma = $ ☐ (Round to one decimal place as needed.)

21. Several psychology students are unprepared for a surprise true/false test with 13 questions, and all of their answers are guesses.
**a.** Find the mean and standard deviation for the number of correct answers for such students.
**b.** Would it be unusual for a student to pass by guessing and getting at least 2 correct answers? Why or why not?

**a.** $\mu = \boxed{\phantom{xx}}$

$\sigma = \boxed{\phantom{xx}}$ (Round to one decimal place as needed.)

**b.** Choose the correct answer below.

○A. Yes, because 2 is below the minimum usual value.

○B. Yes, because 2 is within the range of usual values.

○C. No, because 2 is within the range of usual values.

○D. Yes, because 2 is greater than the maximum usual value.

22. A candy company claims that 21% of its plain candies are orange, and a sample of 200 such candies is randomly selected.

**a.** Find the mean and standard deviation for the number of orange candies in such groups of 200.

$\mu = \boxed{\phantom{xx}}$

$\sigma = \boxed{\phantom{xx}}$ (Round to one decimal place as needed.)

**b.** A random sample of 200 candies contains 29 orange candies. Is this result unusual? Does it seem that the claimed rate of 21% is wrong?

○A. Yes, because 29 is within the range of usual values. Thus, the claimed rate of 21% is probably wrong.

○B. Yes, because 29 is greater than the maximum usual value. Thus, the claimed rate of 21% is probably wrong.

○C. Yes, because 29 is below the minimum usual value. Thus, the claimed rate of 21% is probably wrong.

○D. No, because 29 is within the range of usual values. Thus, the claimed rate of 21% is probably wrong.

23.  A headline in a certain newspaper states that "most stay at first job less than 2 years." That headline is based on an online poll of 400 college graduates. Among those polled, 83% stayed at their first full-time job less than 2 years. Complete parts (a) through (d).

**a.** Assuming that 50% is the true percentage of graduates who stay at their first job less than two years, find the mean and standard deviation of the numbers of such graduates in randomly selected groups of 400 graduates.

The mean is ☐ graduates.
(Simplify your answer.)

The standard deviation is ☐ graduates.
(Round to one decimal place as needed.)

**b.** Assuming that the 50% rate in part (a) is correct, find the range of usual values for the numbers of graduates among 400 who stay at their first job less than two years.

The numbers of graduates among 400 who stay at their first job less than two years should usually fall between ☐ and ☐.
(Use ascending order. Round to one decimal place as needed.)

**c.** Find the actual number of surveyed graduates who stayed at their first job less than two years. Use the range of values from part (b) to determine whether that number is unusual. Does the result suggest that the headline is not justified?

The actual number of surveyed graduates who stayed at their first job less than two years is ☐.
(Round to the nearest whole number as needed.)

Is the actual number of surveyed graduates who stayed at their first job less than two years unusual?

○A.  Since the actual number is inside of the range of usual values found in part (b), it is unusual.

○B.  Since the actual number is outside of the range of usual values found in part (b), it is unusual.

○C.  Since the actual number is inside of the range of usual values found in part (b), it is not unusual.

○D.  Since the actual number is outside of the range of usual values found in part (b), it is not unusual.

Does the result suggest that the headline is not justified?

○A.  The result suggests that the headline is not justified.

○B.  The result suggests that the headline is justified.

**d.** The statement, "Alumni who opted-in to receive communications from the website were invited to participate in the online poll, and 400 of them completed the survey," was given as part of the description of the survey methods used. What does that statement suggest about the results?

23.
(cont.)

Since the sample of 400 respondents is a [ ▼ ] sample, the results are [ ▼ ].

24.

In a clinical trial of a drug used to help subjects stop smoking, 787 subjects were treated with 1 mg doses of the drug. That group consisted of 35 subjects who experienced nausea. The probability of nausea for subjects not receiving the treatment was 0.0139. Complete parts (a) through (c).

**a.** Assuming that the drug has no effect, so that the probability of nausea was 0.0139, find the mean and standard deviation for the numbers of people in groups of 787 that can be expected to experience nausea.

The mean is ☐ people.
(Round to one decimal place as needed.)

The standard deviation is ☐ people.
(Round to one decimal place as needed.)

**b.** Based on the result from part (a), is it unusual to find that among 787 people, there are 35 who experience nausea? Why or why not?

○ A. It is unusual because 35 is within the range of usual values.

○ B. It is unusual because 35 is outside the range of usual values.

○ C. It is not unusual because 35 is outside the range of usual values.

○ D. It is not unusual because 35 is within the range of usual values.

**c.** Based on the preceding results, does nausea appear to be an adverse reaction that should be of concern to those who use the drug?

○ A. The drug does not appear to be the cause of any nausea.

○ B. The drug does appear to be the cause of some nausea. Since the nausea rate is still quite low, it appears to be an adverse reaction that does not occur very often.

○ C. The drug does appear to be the cause of some nausea. Since the nausea rate is quite high, it appears to be an adverse reaction that occurs often.

25.

Given that x has a Poisson distribution with $\mu = 8$, what is the probability that $x = 0$?

$P(0) \approx$ ☐ (Round to four decimal places as needed.)

26.  A county has been experiencing a mean of 34.8 motor vehicle deaths each year. Use the Poisson distribution to answer the following.

**a.** Find the mean number of deaths per day.
**b.** Find the probability that on a given day, there are more than 2 motor vehicle deaths.
**c.** Is it unusual to have more than 2 motor vehicle deaths on the same day? Why or why not?

**a.** The mean number of deaths per day is ☐ .
(Round to three decimal places as needed.)

**b.** The probability of more than two motor vehicle deaths on a given day is ☐ .
(Round to six decimal places as needed.)

**c.** Choose the correct answer below.

○A.  Yes, it is unusual. The probability of there being more than two motor vehicle deaths on the same day is very small.

○B.  No, it is not unusual. The probability of there being more than two motor vehicle deaths on the same day is very small.

○C.  No, it is not unusual. The probability of there being more than two motor vehicle deaths on the same day is greater than 0.

○D.  Yes, it is unusual. The probability of there being more than two motor vehicle deaths on the same day is less than 1.

27.  In one year, there were 148 homicide deaths in a certain city. For a randomly selected day, use the Poisson distribution to find the probability of the following numbers of homicide deaths.

**a.** 0    **b.** 1    **c.** 2    **d.** 3    **e.** 4

**a.** $P(0) \approx$ ☐
(Round to four decimal places as needed.)

**b.** $P(1) \approx$ ☐
(Round to four decimal places as needed.)

**c.** $P(2) \approx$ ☐
(Round to four decimal places as needed.)

**d.** $P(3) \approx$ ☐
(Round to four decimal places as needed.)

**e.** $P(4) \approx$ ☐
(Round to four decimal places as needed.)

28.     An insurance company charges $230 for a $50,000 life insurance policy for a 50-year-old female. The probability that such a female survives the year is 0.9966. Assume that the company sells 750 such policies to 50-year-old females, so it collects $172,500 in policy payments. The company will make a profit if fewer than four of the 750 women die during the year.

**a.** What is the mean number of deaths in such groups of 750 females?
**b.** Using a Poisson distribution, find the probability that the company makes a profit from the 750 policies. Is that probability high enough so that the company is almost sure to make a profit?

**a.** The mean number of deaths is ☐.
(Type an integer or a decimal.)

**b.** The probability that the company will make a profit is ☐.
(Round to three decimal places as needed.)

This probability ☐▾ high enough so that the company is almost sure to make a profit.