

8. Find the mean, standard deviation, and variance.

Test Score	Number of Students
50 – 59	7
60 – 69	15
70 – 79	5
80 – 89	6
90 – 99	7

9. Human body temperatures are normally distributed with a mean of 98.20° and a standard deviation of 0.62° . Find the z-score corresponding to a body temperature of 96.6° .

10. Student X scores a 92 on a test with a mean score of 71 and a standard deviation of 15. Student Y scores a 688 on a test with a mean score of 493 and a standard deviation of 150. Which student has performed better?

11. Human body temperatures are normally distributed with a mean of 98.20° and a standard deviation of 0.62° . Would a temperature of 99.38° be considered unusual?

12. Which of the following values may NOT be a probability?

- | | | |
|------------------|----------|------------------|
| a) $\frac{2}{3}$ | b) 0.006 | c) $\frac{5}{3}$ |
| d) 4.2% | e) -0.8 | f) 1.0 |

The set of digits $\{0,1,2,3,4,5,6,7\}$ will be used to create a five-digit code. How many five-digit codes can be created if...

13. there are no restrictions?
14. the digits may not be repeated?
15. the code must begin with a 3 and the digits may be repeated?
16. the code must not be divisible by 2 and digits may be repeated?

A basketball team has eight players. A five-player starting line-up can be formed from the eight players.

17. How many starting line-ups are possible?
18. If the players are assigned certain positions, how many starting line-ups are possible?
19. Approximately 17% of patients who take a certain drug experience side effects. If four patients take the drug, what is the probability that all four patients will experience side effects?
20. A student is taking a 12-question, multiple-choice exam. Each question has 4 possible answers, A, B, C, or D. Only one of the answers is correct. If the student guesses the answers to all of the questions, what is the probability of getting at least one question correct?

Two cards are drawn from a standard deck of 52 cards. What is the probability that...

21. the first card is a king and the second card is a queen?
22. the two cards form a pair (both have the same number or face value)?
23. One card is drawn from a standard deck of 52 cards. Find the probability of drawing a face card or a diamond.
24. Would any of the events in problems 21, 22, or 23 be considered unusual? If so, which ones?
25. A box of marbles has 3 yellow marbles, 2 green marbles, and 5 red marbles. Suppose that two marbles are selected without replacement. What is the probability that neither selected marble is green?
26. A box of marbles has 3 yellow marbles, 2 green marbles, and 5 red marbles. What are the odds of selecting a yellow marble?

During a certain week the number of late and on-time flights were counted for three airlines. The information is listed in the following table. Use the table to answer problems 27 – 30.

	Number of On-time Flights	Number of Late Flights	Total
Southern Airlines	34	11	45
Statewide Airlines	28	3	31
Westward Airlines	30	8	38
Total	92	22	114

If one of the 114 flights is randomly selected, what is the probability that...

27. the flight was on-time?
28. the flight was on Statewide Airlines and late?
29. the flight was on Southern Airlines or on-time?
30. What is the probability that the flight was late, given that the flight was on Westward Airlines?
31. Professor GQ must attend an important conference. He can choose his outfit from 3 different suits, 7 different shirts, and 12 different ties. Assuming he has no regard for color or style conflicts, how many different outfits can he form (he will only wear ONE of each item)?
32. A class has 9 girls and 12 boys. How many different groups of eight may be formed if there must be at least 6 boys in each group.
33. A box contains 6 white chips, 3 blue chips, 2 yellow chips, and 1 green chip. A player randomly selects one chip from the box. If the player selects a blue chip, he/she wins \$3. If the player selects any other color chip, he/she loses \$1. Find the player's expected value.
34. A die is rolled 14 times and the number of times a "3" appears is recorded. Does this procedure represent a binomial distribution? Why or why not?

For questions 35-37, an experiment has a sample space given by $S = \{1,2,3,4,5,6,7,8,9,10\}$. The events D, E, and F are defined as $D = \{1,2,3,4\}$, $E = \{2,4,6,8,10\}$, and $F = \{3,5,7\}$. Assume each outcome is equally likely.

- 35. Are events D and E disjoint (mutually exclusive)?
- 36. Are events D and F disjoint (mutually exclusive)?
- 37. Are events E and F disjoint (mutually exclusive)?

For questions 38-40, determine whether events G and H are independent or dependent.

- 38. G: Joe forgets to set his alarm clock.
H: Joe is late for work the next day.
- 39. G: Milk is on sale.
H: Notebook paper is on sale.
- 40. G: A student earns an "A" in English 1.
H: A student in English 1 is a girl.

41. A procedure yields a binomial distribution with a trial repeated 30 times. Find the probability of 5 successes given that the probability of success for a single trial is 0.20.

42. The Acme Candy Company claims that 70% of the jawbreakers it produces weigh over 0.4 ounces. Suppose that 800 jawbreakers are selected at random from the production lines. Would it be unusual for this sample of 800 to contain no more than 540 jawbreakers that weigh over 0.4 ounces?

43. On a multiple-choice test with 20 questions, each question has four possible answers, one of which is correct. For a student who guesses at all answers, find the expected value for the number of correct answers.

For the standard normal curve, find the probability that...

- 44. $-0.7 < z < 1.98$
- 45. $z > -1.82$

46. The random variable x has a normal distribution. Find the probability that x is less than 53.0 if the mean is $\mu = 60.0$ and the standard deviation is $\sigma = 4.0$.

47. The random variable x has a normal distribution. Find the probability that x is greater than 16.3 if the mean is $\mu = 15.2$ and the standard deviation is $\sigma = 0.9$.

48. A certain vegetable is marketed in weights that are uniformly distributed between 22 and 36 ounces. Find the probability that a randomly selected vegetable will weigh less than 25 ounces.

49. Scores on a Math test are normally distributed with a mean of 48.3 and a standard deviation of 8.1. Find the score which represents the 60th percentile.

50. A coin is tossed 8 times. A person who claims to have extrasensory perception is asked to predict the outcome of each toss. She predicts correctly on 6 tosses. Find the probability of guessing correctly 6 or more times.

51. A study of the amount of time it takes a mechanic to rebuild the transmission for a 1992 Chevrolet Cavalier shows that the mean is 8.4 hours and the standard deviation is 1.8 hours. If 40 mechanics are randomly selected, find the probability that their mean rebuild time exceeds 7.7 hours.

52. Find the critical value $t_{\frac{\alpha}{2}}$ for a confidence interval with $\alpha = 0.10$ and $n = 42$.

53. Find the point estimate and error in the confidence interval given by $33.61 < \mu < 45.23$.

A researcher for the FAA wants to estimate the average flight time (in minutes) from Albuquerque, NM to Dallas, TX for flights with American Airlines. He randomly selects 40 flights between the two cities and finds the mean to be 103.4 minutes with a standard deviation of 8.2 minutes.

54. Construct a 90% confidence interval to estimate the true mean flight time between Albuquerque and Dallas.

55. If the researcher wants to construct a 94% confidence interval estimate of the mean flight time between Albuquerque and Dallas to within 1.5 minutes, how large a sample must be obtained?

56. A 95% confidence interval is constructed from a sample of size 100. If the sample size is increased to 200, but the confidence level, mean, and standard deviation remain unchanged, will the margin of error increase, decrease, or remain the same? Explain your answer.

57. A 95% confidence interval is constructed. If the sample size, mean, and standard deviation remain unchanged, but the confidence level is increased to 99%, will the margin of error increase, decrease, or remain the same? Explain your answer.

58. The drug Minchol is meant to lower cholesterol levels. In a clinical trial of 863 patients who received 10 mg doses of Minchol daily, 61 reported a headache as a side effect. Construct a 90% confidence interval for the population proportion of Minchol users who will report a headache as a side effect. (Round the margin of error to 3 decimal places.)

59. A pilot study of 220 people showed that 25% agreed with the new motorcycle helmet law in Florida. Using $\hat{p} = 0.25$, determine the sample size necessary for the researcher to be 95% confident that the estimated proportion is within 2% of the true population proportion of people who agree with the new helmet law.

For questions 60-62, determine whether the hypothesis test is 2-tailed, left-tailed, or right-tailed. What parameter is being tested?

60. A dietician believes that the mean consumption of fruit has increased from the 2004 amount of 99.2 pounds per person.

61. A researcher believes that no more than 34% of American adults believe in haunted houses.

62. A consumer product tester believes that a particular tire has a life of 48,000 miles.

63. For a set of 10 paired values, the linear correlation coefficient is calculated to be $r = -0.804$. Does a linear relationship exist between the two variables?

64. A set of paired values has a linear correlation coefficient of $r = -0.804$. If there is a linear relationship, would the regression equation have positive or negative slope?

For questions 65 – 67, perform a test of the hypothesis showing all steps.

65. A cereal company claims that the mean weight of the cereal in its packages is at least 14 oz. A consumer research company chose 45 boxes at random and found a mean weight of 13.6 oz. with a standard deviation of 1.8 oz. Test the claim with a significance level of 0.05.

66. A researcher claims that 62% of voters favor gun control. An exit poll after a recent election showed that 311 of the 550 surveyed voters favored gun control. Test the claim with a significance level of 0.01.

67. Carter Motor Company claims that its new sedan will average better than 22 miles per gallon in the city. A study of 40 test drives showed a mean of 23.1 miles per gallon for city driving. Previous studies of a similar vehicle showed $\sigma = 2.4$. Test the claim with a significance level of 0.04.

Solutions

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|----|---|------------------|-----|----------------|
| 1. | a) The population is people who buy groceries. | 0.0714 | 19. | $p = 0.000835$ |
| | b) The sample is the first 25 people for 7 days in a row who shop at a major grocery store. | 0.0357 | 20. | $p = 0.968$ |
| | | 7. | 21. | $p = 0.00603$ |
| | | 8. | 22. | $p = 0.0588$ |
| 2. | a) discrete | $\bar{x} = 72.3$ | 23. | $p = 0.423$ |
| | b) continuous | $s = 13.9$ | 24. | #21 |
| | | $s^2 = 192.2$ | 25. | $p = 0.622$ |
| 3. | $s \approx 6.5$ | 9. | 26. | 3 : 7 |
| | | 10. | 27. | $p = 0.807$ |
| 4. | a) 6.2 | 11. | 28. | $p = 0.0263$ |
| | b) 5.5 | 12. | 29. | $p = 0.904$ |
| | c) 9 | 13. | 30. | $p = 0.211$ |
| | d) 15 | 14. | 31. | 252 |
| | e) 7.5 | 15. | 32. | 40,887 |
| | f) right-skewed | 16. | 33. | $E = \$0$ |
| 5. | a) 142.0-172.9 | 17. | | |
| | b) 31 | 18. | | |
| | c) 173.0-203.9 | | | |
| 6. | rel. freq. | | | |
| | 0.0714 | | | |
| | 0.214 | | | |
| | 0.250 | | | |
| | 0.357 | | | |

Statistics Summary Exercises

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|------------------|-------------------------------------|---------------------------|
| 34. yes | 45. $p = 0.9656$ | 55. $n = 106$ |
| 35. no | 46. $p = 0.0401$ | 56. E will decrease |
| 36. no | 47. $p = 0.1112$ | 57. E will increase |
| 37. yes | 48. $p = 0.214$ | 58. $0.0563 < p < 0.0851$ |
| 38. dependent | 49. $x = 50.3$ | 59. $n = 1801$ |
| 39. independent | 50. $P(x \geq 6) = 0.145$ | 60. right-tailed; μ |
| 40. independent | 51. $p = 0.9931$ | 61. right-tailed; p |
| 41. $p = 0.172$ | 52. $t_{\frac{\alpha}{2}} = 1.684$ | 62. 2-tailed; μ |
| 42. no | | 63. yes |
| 43. $E = 5$ | 53. $\bar{x} = 39.42$
$E = 5.81$ | 64. negative slope |
| 44. $p = 0.7341$ | 54. $101.2 < \mu < 105.6$ | |

65. $cv = -1.684$; $t = -1.49$; There is not sufficient evidence to warrant rejection of the claim that the mean weight is at least 14 oz.

66. $cv = \pm 2.575$; $z = -2.66$; There is sufficient evidence to warrant rejection of the claim that 62% of voters favor gun control.

67. $cv = 1.75$; $z = 2.90$; The sample data support the claim that the mileage in the city is better than 22 mpg.