

STA2023
FINAL EXAM REVIEW

1. Data that can be classified according to color are measured on what scale?
(a) Nominal (b) Ordinal (c) Interval (d) Ratio
2. The difference between a sample result and the true population result is known as:
(a) Population Error (b) Sampling Error (c) Non-sampling Error (d) Test Error
3. Data that provide information about relative comparisons, but not the magnitude of the differences is known as:
(a) Nominal (b) Ordinal (c) Interval (d) Ratio

The computer giant IBM has 329,373 employees and 637,133 stockholders. A vice-president plans to conduct a survey to study the numbers of shares held by individual stockholders.

4. Are the numbers of shares held by stockholders discrete or continuous?
(a) Discrete (b) Continuous
5. What is the level of measurement for the number of shares held by stockholders?
(a) Nominal (b) Ordinal (c) Interval (d) Ratio
6. If the survey is conducted by telephoning 50 randomly selected stockholders in each of the 50 United States, what type of sampling is being used?
(a) Random (b) Systematic (c) Convenience (d) Stratified (e) Cluster
7. In an experiment when the effects from two or more variables cannot be distinguished from each other, what is said to have occurred?
(a) Contrasting (b) Blinding (c) Commingling (d) Confounding
8. In a _____ sample, members from the population are selected in such a way that each individual member in the population has an equal chance of being selected.
(a) Systematic (b) Precise (c) Stratified (d) Random
9. Determine which of the four levels of measurement (nominal, ordinal, interval and ratio) is most appropriate for the data below:
The social security numbers of students in this class
(a) Nominal (b) Ordinal (c) Interval (d) Ratio
10. **True or False.** The interval level of measurement is like the ordinal level with the additional property that the difference between any two data values is meaningful. Moreover, data at this level have a natural zero starting point.
(a) True (b) False

11. Which of the following statements are true?
- I. All variables can be classified as quantitative or qualitative variables.
 - II. Qualitative variables can be continuous variables.
 - III. Quantitative variables can be discrete variables.
- (a) I Only (b) I and III Only (c) III Only (d) I and II Only (e) All correct

12. The variable that changes due to the manipulation of the independent variable is called the:
- (a) explanatory variable (b) outcome variable (c) manipulated variable

The test scores of 40 students are summarized in the frequency table below

Score	Students
50-59	14
60-69	6
70-79	5
80-89	9
90-99	6

13. What is the lower limit for the second class?
- (a) 59.5 (b) 69.5 (c) 50 (d) 60
14. What is the class width in the frequency table above?
- (a) 9 (b) 10 (c) 8 (d) 54.5
15. What is the class mid-point for the class 70 –79
- (a) 74.5 (b) 75.5 (c) 76.5 (d) 73
16. What are the upper limits for the last class?
- (a) 90 (b) 99 (c) 92 (d) 99.5
17. What are the upper and lower boundaries for the third class?
- (a) 59.5 – 69.5 (b) 69.5 – 70.5 (c) 79.5 – 89.5 (d) 69.5 - 79.5
18. What is the relative frequency corresponding to the frequency of 14 for the first class?
- (a) 14% (b) 65% (c) 45% (d) 35%
19. What values are represented in the stemplot below?
- | stem | leaves |
|------|--------|
| 4 | 0 7 |
| 5 | 4 4 |
| 6 | 8 9 |
- (a) 40, 47, 54, 59, 68, 60 (b) 41, 47, 54, 59, 68, 69
(c) 40, 47, 68, 61, 71, 76 (d) 40, 47, 54, 54, 68, 69

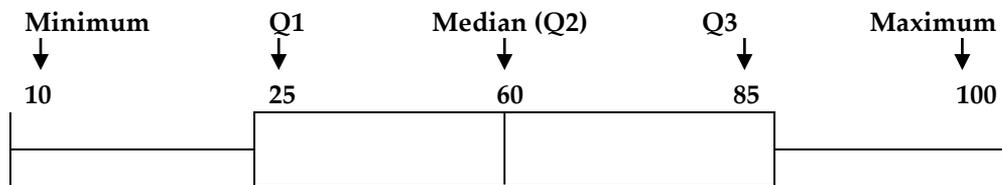
20. *True or False.* In a normal distribution, the frequencies start low, then increase to one or two high frequencies, then decrease to a low frequency.
- (a) True (b) False
21. A _____ is a graph consisting of bars of equal width drawn adjacent to each other (without gaps). The horizontal scale represents classes of quantitative data values and the vertical scale represents frequencies. The heights of the bars correspond to the frequency values.
- (a) Bar-Graph (b) Histogram (c) Frequency Polygon (d) Stemplot
22. *True or False.* When a die is rolled 600 times, each of the 6 possible outcomes occurs about 100 times as we normally expect, so the frequency distribution summarizing the results is an example of a normal distribution.
- (a) True (b) False
23. Which graph is best for paired data consisting of the shoe size and heights of 30 randomly selected students?
- (a) Histogram (b) dotplot (c) scatterplot (d) Pie Chart
24. Each of the following is a measure of center EXCEPT
- (a) Mean (b) Mode (c) Mid-Range (d) Variance
25. Which measure of center divides a data set equally, such that half of the data values are above the measure and half of the data values are below the measure?
- (a) Mean (b) Mode (c) Median (d) Mid-Range
26. Which measure of center should be used with nominal data?
- (a) Mean (b) Mode (c) Median (d) Mid-Range
27. Which measure of center takes every value into account but can be affected by outliers?
- (a) Mean (b) Mode (c) Median (d) Mid-Range
28. The ____ is the value that occurs with the greatest frequency
- (a) Mean (b) Median (c) Mode (d) Mid-Range

Questions 29 – 36 pertain to the following data below.

17 19 21 18 20 18 19 20 20 21

29. What is the mean?
- (a) 19.9 (b) 20.4 (c) 19.3 (d) 18.6
30. What is the median?
- (a) 19.0 (b) 19.5 (c) 20.0 (d) 18.7
31. What is the mode?
- (a) 18 (b) 19 (c) 21 (d) 20
32. What is the mid-range?
- (a) 20 (b) 21 (c) 19 (d) 18

33. What is the standard deviation?
 (a) 8 (b) 1.3 (c) 1.7 (d) 19.3
34. What is the variance?
 (a) 1.2 (b) 1.3 (c) 1.7 (d) 1.4
35. Find the value of Q1
 (a) 18 (b) 19 (c) 20 (d) 21
36. Find the value of Q3?
 (a) 18 (b) 19 (c) 20 (d) 21
37. The range, standard deviation, and variance are all measures of _____?
 (a) variation (b) center (c) position (d) distribution
38. *True or False.* For any data set, the median is always equal to the 50th percentile
 (a) True (b) False
39. If the standard deviation of a data set is 5.0, what is the variance?
 (a) 2.5 (b) 10.0 (c) 25.0 (d) 250.0
40. Consider the boxplot below.



Which of the following statements are true?

- I. The Interquartile range is 60
 - II. The maximum value is 110
 - III. The 50th percentile is equal to 60
- (a) I only
 (b) II only
 (c) III only
 (d) I and II only
 (e) I and III only
41. When the Final exam statistic test scores of 500 students were analyzed, a mean score of 82 was obtained with a standard deviation of 6. Assuming that the scores were normally distributed, how many students had scores between 76 and 88?
 (a) 340 (b) 350 (c) 360 (d) 370
42. Which score has a higher relative position, a score of 50 on a test for which the $\bar{x} = 30$ and $s = 8$, or a score of 375 on a test for which the $\bar{x} = 280$ and $s = 44$?

- (a) A score of 50 (b) A score of 375 (c) Both scores have the same relative position

43. A professor gives 3 tests and uses a weighted average to determine the final grades in his Psychology class. The weights are as follows: Test 1 = 30%, Test 2 = 20%, and test 3 = 50%. If a student scores 95 on the first test, 70 on the second test, and 80 on the third test, what would be her final score?
(a) 82.5 (b) 83.7 (c) 80.5 (d) 81.5 (e) 78.8
44. On a multiple choice test with five possible answers for each question, what is the probability of answering a question correctly if you make a guess?
(a) $4/5$ (b) $1/4$ (c) $5/10$ (d) $1/5$ (e) $5/1$
45. The probability of an event that is certain to occur will have a value of:
(a) 0.00 (b) 0.050 (c) 0.100 (d) 1.00 (e) 0.999
46. Which of the following cannot be a probability value?
(a) .999 (b) square root of 4 (c) $3/5$ (d) 1.000 (e) $589/589$
47. A study of 400 randomly selected American Airlines flights showed that 344 arrived on time. What is the estimated probability of an American Airlines flight arriving late?
(a) 0.86 (b) 0.68 (c) 0.14 (d) 0.162 (e) 1.16
48. In a survey of college students, 1,162 stated that they cheated on an exam and 2,468 stated that they did not. If one of these college students is randomly selected find the probability that he or she cheated on an exam?
(a) .471 (b) .320 (c) 2.12 (d) .679
49. In a survey of consumers aged 12 and older, respondents were asked how many cell phones were in use by the household. Among the respondents, 211 answered "none", 288 said "one", 366 said "two", 144 said "three", and 89 responded with "four or more". Find the probability that a randomly selected household has four or more cell phones in use?
(a) 0.13 (b) 0.33 (c) 0.081 (d) 0.919
50. What is the probability of getting all three tails when a coin is flipped three times?
(a) $1/6$ (b) 0.167 (c) 0.500 (d) 0.125
51. A sample of 4 different calculators is randomly selected from a group containing 41 that are defective and 22 that have no defects. What is the probability that all four calculators selected are defective? Assume the selections are made with replacement.
(a) 0.1794 (b) 0.1700 (c) 13.8442 (d) 0.0829
52. Find the complement of A, given that $P(A) = 0.175$
(a) 0.8250 (b) 0.5741 (c) 0.9373 (d) 0.9285
53. Which approach to probability requires "equally likely outcomes"?
(a) Relative Frequency Approach (b) Classical Approach
54. On an ACT or SAT test, a typical multiple-choice question has 4 possible answers. If you make a random guess on one such question what is the probability that your response is wrong?
(a) .20 (b) 0.25 (c) 0.80 (d) 0.75
55. Based on recent data from the U.S. National Center for Health Statistics, the probability of a baby being a boy is 0.523. What is the probability of a baby being a girl?
(a) 0.487 (b) 0.497 (c) 0.477 (d) 0.587

56. A couple plans to have 4 children, what is the probability that all four will be girls? (Assume that boys and girls are equally likely)
 (a) 0.938 (b) 0.0625 (c) 0.500 (d) 0.125
57. Refer to the question 44 above. What is the probability that at least one will be a boy?
 (a) 0.938 (b) 0.125 (c) 0.0625 (d) 0.945
58. Two six-sided dice are rolled. What is the probability that the sum of the two numbers on the dice will be three?
 (a) $1/18$ (b) $1/2$ (c) $2/12$ (d) $3/36$

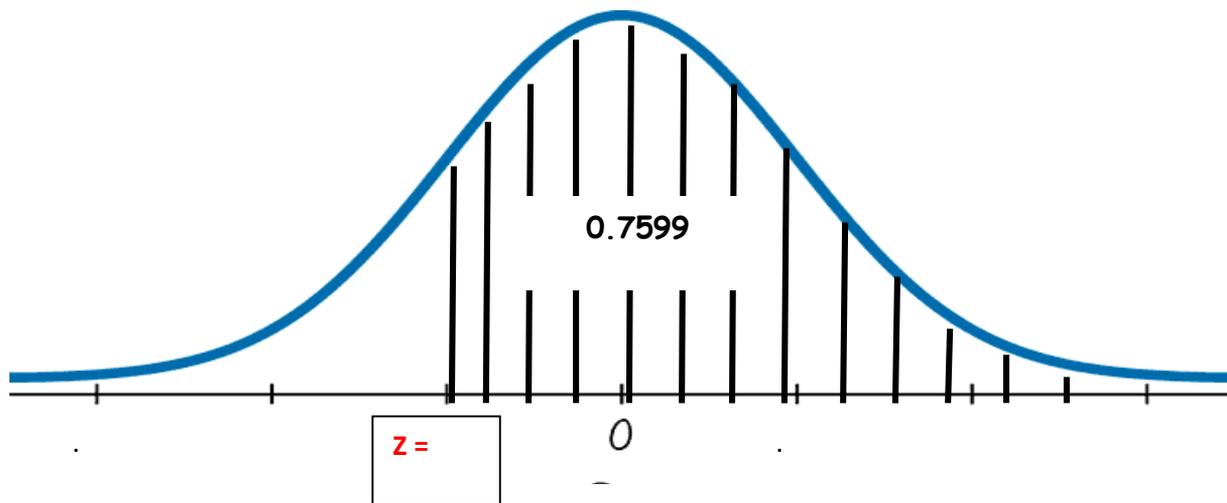
Questions 58 – 63 pertain to the table below which describes the smoking habits of a group of students.

	Non Smoker	Occasional Smoker	Regular Smoker	Heavy Smoker	Total
Men	382	37	60	34	513
Women	403	31	74	37	545
Total	785	68	134	71	1058

59. If one person is randomly selected, find the probability that the person would be a heavy smoker.
 (a) 0.067 (b) 0.478 (c) 0.484 (d) 0.671
60. If one person is randomly selected, find the probability that the person would be a non-smoker OR a regular smoker?
 (a) 0.0868 (b) 0.869 (c) 0.742 (d) 1.868
61. If one person is randomly selected, find the probability that the person would be a non-smoker OR a woman?
 (a) 0.382 (b) 0.742 (c) 0.876 (d) 0.515
62. If one person is randomly selected, what is the probability that the person would be a woman, given that a regular smoker is selected?
 (a) 0.552 (b) 0.515 (c) 0.127 (d) 0.136
63. If **two** persons are randomly selected, what is the probability that they are both men who are heavy smokers? Assume the selections are made with replacement.
 (a) 0.235 (b) 0.005 (c) 0.229 (d) 0.001

64. If **two** persons are randomly selected, what is the probability of getting a woman who is a regular smoker and a man who is a non-smoker? Assume the selections are made with replacement.
(a) 0.025 (b) 0.101 (c) 0.269 (d) 0.614
65. A student experiences difficulties with malfunctioning alarm clocks. Instead of using 1 alarm clock, he decides to use 3. What is the probability that at least 1 alarm clock works correctly if each individual alarm clock has a 90% chance of working correctly?
(a) 0.729 (b) 0.271 (c) 0.001 (d) 0.999
66. Approximately 5% of American high school students drop out of high school before graduation. If 10 high school students are randomly selected, find the probability that 2 or fewer will drop out.
(a) .086 (b) .055 (c) .989 (d) .945 (e) .914
67. Refer to question 66 above. Find the probability that at least 6 students will graduate
(a) .000 (b) .377 (c) 1.000 (d) .623 (e) .957
68. Refer to question 66 above. Find the probability that 3 or more students will drop out
(a) .989 (b) .945 (c) .011 (d) .110 (e) .001
69. Refer to question 66 above. Would it be unusual to find that among the 10 randomly selected students, 3 or more drop out?
(a) Yes (b) No
70. Refer to question 66 above. Find the probability that all 10 students stay in school and graduate.
(a) .000 (b) 1.000 (c) .995 (d) .959 (e) .599
71. Each of the following is a requirement for a binomial distribution EXCEPT:
(a) A fixed number of trials
(b) Trials must be independent
(c) All outcomes must be classified into 2 or more categories
(d) Probabilities must remain constant for each trial
72. A question on a proficiency test is multiple choice with five possible answers, one of which is correct. Assuming that all responses are random guesses, find the probability that among 13 test subjects, at least five answer the question correctly.
(a) .027 (b) .099 (c) .103 (d) .053
73. Rates of on-time flights for commercial jets are continuously tracked by the U.S Department of Transportation. Recently, Southwest Air had the best rate with 80% of its flights arriving on time. A test is conducted by randomly selecting 15 Southwest flights and observing whether they arrive on time. Find the probability that exactly 10 flights arrive on time.
(a) .206 (b) .103 (c) .010 (d) .188
74. Refer to question 73. Find the probability that at least 10 flights arrive on time.
(a) .939 (b) .061 (c) .854 (d) .759
75. Refer to question 73. Find the probability that at least 5 flights arrive late.
(a) 1.00 (b) .836 (c) .939 (d) .164
76. Identify whether the given random variable is discrete or continuous:
"The weight of the gold stored in Fort Knox"
(a) Discrete (b) Continuous

77. Assume that readings on thermometers are normally distributed with a mean of 0 degrees and a standard deviation of 1.00. A thermometer is randomly selected and tested. Find the probability that the reading on the thermometer is **less than .81**
 (a) .2090 (b) .7910 (c) .2910 (d) .2119
78. Assume that readings on thermometers are normally distributed with a mean of 0 degrees and a standard deviation of 1.00. A thermometer is randomly selected and tested. Find the probability that the reading on the thermometer is **between -1.20 and 1.95**
 (a) .8593 (b) .9744 (c) .1151 (d) .1895
79. Assume that readings on thermometers are normally distributed with a mean of 0 degrees and a standard deviation of 1.00. A thermometer is randomly selected and tested. Find the probability that the reading on the thermometer is **greater than -1.75**
 (a) .9364 (b) .0401 (c) .1151 (d) .9599
80. Assume that adults have IQ scores that are normally distributed with a mean of 100 and a standard deviation of 15. Find the probability that a randomly selected adult has an IQ between 110 and 120.
 (a) .6700 (b) .7486 (c) .9082 (d) .1596
81. Refer to question 80 above. Find the IQ score at Q1 or the 25th percentile. This is the score which separates the bottom 25% from the top 75%.
 (a) 89.95 (b) 110.05 (c) 84.95 (d) .2514 (e) .7486
82. The graph below depicts the standard normal distribution with a mean of 0 and standard deviation of 1. Find the indicated z-score in the graph below. **The shaded area is 0.7599.**



- (a) -1.08 (b) 0.71 (c) 1.08 (d) -0.71 (e) -0.70
83. Assume that weight of newborn babies is normally distributed with a mean of 10 lbs and a standard deviation of 2 lbs. Find the probability that a randomly selected newborn baby is **greater than** 7 lbs.
 (a) .0668 (b) .9332 (c) -1.5 (d) .1587

84. *Assume that men heights are normally distributed with a mean 69.0 inches and a standard deviation of 2.8 inches.* In order to join the U.S. Marine Corp, the requirement is that men should have heights between 64 inches and 80 inches. Find the percentage of men who meet the height requirement.
(a) 68% (b) 93% (c) 96% (d) 85%

85. Refer to question 84 above. If the height requirements for the U.S. Marine Corp are changed so that all men are eligible EXCEPT the shortest 2% and the tallest 5%, what are the new height requirements?
(a) 63 - 74 (b) 68 - 84 (c) 67 - 76 (d) 64 - 77

Assume that IQ scores are normally distributed with a mean of 100 and a standard deviation of 15.

86. Find the probability that a randomly selected person has an IQ score between 88 and 112.
(a) .7881 (b) .2119 (c) .5762 (d) 0.8000
87. If 25 people are randomly selected, find the probability that their mean IQ score is less than 103.
(a) .1587 (b) .8413 (c) 1.000 (d) .9938
88. If 100 people are randomly selected, find the probability that their mean IQ is greater than 103.
(a) .8413 (b) 2.000 (c) .9772 (d) .0228
89. A teacher gives a test and gets normally distributed results with a mean of 50 and a standard deviation of 10. The letter grade A is assigned only to those in the top 10%. What score will a student need to receive an A?
(a) > 62.8 (b) > 66.8 (c) > 68.8 (d) > 52.5
90. *True or False.* A Z-score must be negative whenever it is located in the left half of the normal distribution.
(a) True (b) False
91. The Genetics and IVF Institute conducted a clinical trial of the XSORT method designed to increase the probability of conceiving a girl. In the clinical trial 574 babies were born to parents using the XSORT method, and 525 of them were girls. What is the best point estimate of the population proportion of girls born to parents using the XSORT method?
(a) .525 (b) .574 (c) .915 (d) 1.09 (e) .0915
92. Refer to question 90. Construct a 95% confidence interval estimate of the percentage of girls born to parents using the XSORT method.
(a) $0.819 < p < 0.865$ (b) $0.865 < p < 0.916$
(c) $0.838 < p < 0.882$ (d) $0.892 < p < 0.937$
93. Refer to question 91. What is the correct interpretation of the confidence interval estimate for the percentage of girls born to parents using the XSORT method?
(a) We are 95% confident that the true percentage of girls born to parents using the XSORT method will fall between 0.892 and 0.937.
(b) We are 95% confident that the interval estimate of the percentage of girls born to parents using the XSORT method will fall between 0.838 and 0.882.
(c) We are 95% confident that the interval from 0.838 to 0.882 contains the true value of the percentage of girls born to parents using the XSORT method.
(d) We are 95% confident that the interval from 0.892 to 0.937 contains the true percentage of girls born to parents using the XSORT method.
94. The use of the Internet is constantly growing. How many randomly selected adults must be surveyed to estimate the percentage of adults in the United States who now use the Internet? Assume that we want to be 99% confident that the sample percentage is within two percentage points of the true population percentage. Also assume that nothing is known about the percentage of adults using the Internet.

- (a) 4,145 (b) 2,401 (c) 3,268 (d) 4,415

95. A simple random sample of 125 SAT scores has a **mean** of 1522. Assume that SAT scores have a standard deviation of 333. Construct a 99% confidence interval estimate of the **mean** SAT score.
(a) $1464 < \mu < 1580$ (b) $1445 < \mu < 1599$
(c) $1480 < \mu < 1591$ (d) $1510 < \mu < 1652$
96. How many adults must be randomly selected to estimate the mean FICO (credit rating) score of working adults in the United States? We want to be 95% confidence that the sample mean is within 3 points of the population mean, and the population standard deviation is 68.
(a) 1974 (b) 3407 (c) 1390 (d) 842
97. True or false. If the confidence level decreases, the margin of error increases.
(a) True (b) False
98. True or False. If the sample size increases, the margin of error also increases, resulting in a wider confidence interval.
(a) True (b) False

NOTE: Replace greater than/less than or equal to signs with just equal if that is what was taught by the instructor.

Questions 98 – 104 are based on the following:

A recent study showed that 53% of college applications were submitted online. Assume that this result is based on a simple random sample of 1,000 college applications, with 530 submitted online. Use a 0.01 significance level to test the claim that among all college applications the percentage submitted online is equal to 50%.

99. State the claim in symbolic form.
(a) $P \leq .50$ (b) $P \geq .50$ (c) $p > .50$ (d) $p < .50$ (e) $p = .50$
100. Identify the null and alternative hypotheses:
(a) $H_0: p \geq .50$ $H_1: p < .50$ (b) $H_0: p = .50$ $H_1: p \neq .50$
(c) $H_0: p > .50$ $H_1: p \leq .50$ (d) $H_0: p \leq .50$ $H_1: p > .50$
101. What type of hypothesis test is this?
(a) left-tail (b) right-tailed (c) two-tailed
102. What is the value of the test statistic?
(a) -1.90 (b) 0.9999 (c) 1.90 (d) .016 (e) 1.86
103. What is the P-value?
(a) 0.9713 (b) 0.0574 (c) 1.90 (d) 0.574 (e) 0.0287
104. What is your conclusion?
(a) Reject the null (b) Fail to reject the null
105. State the final conclusion in simple non-technical terms. Be sure to address the original claim (hint: see figure 8-7 on page 403):

- (a) There is not sufficient sample evidence to support the claim that the percentage of college applications submitted online is equal to 50%.
- (b) The sample data support the claim that the percentage of college applications submitted online is equal to 50%.
- (c) There is not sufficient evidence to warrant rejection of the claim that the percentage of college applications submitted online is equal to 50%.
- (d) There is sufficient evidence to warrant rejection of the claim that the percentage of college applications submitted online is equal to 50%.
- (e) There is not sufficient evidence to warrant rejection of the claim that the percentage of college applications submitted online is greater than 50%.

Questions 105 – 111 are based on the following:

In a survey, 1,865 out of 2,246 randomly selected adults in the United States said that texting while driving should be illegal. Using these results, conduct a hypothesis test at the 95% confidence level to test the claim that more than 80% of adults believe that texting while driving should be illegal.

106. State the claim in symbolic form.
 (a) $P \leq .80$ (b) $P \geq .80$ (c) $p > .80$ (d) $p < .80$
107. Identify the null and alternative hypotheses:
 (a) $H_0: p \geq .80$ $H_1: p < .80$ (b) $H_0: p < .80$ $H_1: p \geq .80$
 (c) $H_0: p > .80$ $H_1: p \leq .80$ (d) $H_0: p \leq .80$ $H_1: p > .80$
108. What type of hypothesis test is it?
 (a) left-tail (b) right-tailed (c) two-tailed
109. What is the value of the test statistic?
 (a) 3.55 (b) 0.830 (c) 0.170 (d) 1.96 (e) -3.55
110. What is the P-value?
 (a) 0.9999 (b) 0.0001 (c) 3.55 (d) 1.96 (e) -3.55
111. What is your conclusion?
 (a) Reject the null (b) Fail to reject the null
112. State the final conclusion in simple non-technical terms. Be sure to address the original claim (hint: see figure 8-7 on page 403)
 (a) There is not sufficient sample evidence to support the claim that more than 80% of adults believe that texting while driving should be illegal.
 (b) There is sufficient sample evidence to warrant rejection of the claim that more than 80% of adults believe that texting while driving should be illegal.
 (c) There is not sufficient evidence to warrant rejection of the claim that more than 80% of adults believe that texting while driving should be illegal.
 (d) The sample data support the claim that more than 80% of adults believe that texting while driving should be illegal.

Questions 112– 117 are based on the following:

The health of the bear population in Yellowstone National Park is monitored by periodic measurements taken from anesthetized bears. In a sample of 100 bears, the mean weight was found to be 185 lbs. Assume that σ (population standard deviation) is known to be 125 lbs., use a 0.03 significance level to test the claim that the population mean weight of bears is equal to 210 lbs.

113. State the claim in symbolic form.
 (a) $\mu \leq .210$ (b) $\mu \geq .185$ (c) $\mu = 185$ (d) $\mu = 210$ (e) $\mu \geq 210$
114. Identify the null and alternative hypotheses:
 (a) $H_0: \mu \geq 210$ $H_1: \mu < 210$ (b) $H_0: \mu = 210$ $H_1: \mu \neq 210$
 (c) $H_0: \mu \neq 210$ $H_1: \mu = 210$ (d) $H_0: \mu \leq 185$ $H_1: \mu > 185$
115. What type of hypothesis test is this?
 (a) left-tail (b) right-tailed (c) two-tailed
116. What is the value of the test statistic?
 (a) 2.00 (b) 0.0228 (c) -2.00 (d) .0456 (e) 12.5
117. What is the P-value?
 (a) 0.0228 (b) 0.456 (c) -2.00 (d) 0.0456 (e) .9772
118. State the final conclusion in simple non-technical terms. Be sure to address the original claim (hint: see figure 8-7 on page 403):
 (a) There is not sufficient sample evidence to support the claim that the population mean weight of bears is equal to 210 lbs.
 (b) There is sufficient sample evidence to warrant rejection of the claim that the population mean weight of bears is equal to 210 lbs.
 (c) There is not sufficient evidence to warrant rejection of the claim that the population mean weight of bears is equal to 210 lbs.
 (d) The sample data support the claim that more than 80% of adults believe that the population mean weight of bears is equal to 210 lbs.
119. **Find the number of successes x suggested by the given statement.**
 A computer manufacturer randomly selects 2880 of its computers for quality assurance and finds that 2.43% of these computers are found to be defective.
 (a) 68 (b) 70 (c) 75 (d) 73
120. **Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the pooled estimate \bar{p} . Round your answer to the nearest thousandth.**
 $n_1 = 382$ $n_2 = 183$
 $x_1 = 72$ $x_2 = 69$
 (a) 0.125 (b) 0.225 (c) 0.250 (d) 0.175
121. **Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the z test statistic for the hypothesis test.**
 $n_1 = 124$ $n_2 = 119$
 $x_1 = 51$ $x_2 = 43$
 (a) $z = 0.395$ (b) $z = 0.799$ (c) $z = 8.951$ (d) $z = 16.623$

122. In a vote on the Clean Water bill, 48% of the 205 Democrats voted for the bill while 42% of the 230 Republicans voted for it.

- (a) $z = 1.256$ (b) $z = 1.068$ (c) $z = 0.754$ (d) $z = 1.382$

123. The table shows the number of households burglarized in a sample of households with dogs and in a sample of households without dogs. Assume that you plan to use a significance level of $\alpha = 0.01$ to test the claim that $p_1 < p_2$. Find the critical value(s) for this hypothesis test. Do the data support the claim that a smaller proportion of households with pet dogs are burglarized?

	Household with Dog	Household without Dog
Number of households in sample	225	137
Number of households burglarized	25	10

- (a) $z = -2.575$; no (b) $z = 2.33$; yes (c) $z = -1.96$; yes (d) $z = -2.33$; no

124. Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the P-value for the hypothesis test.

$n_1 = 50$ $n_2 = 75$
 $x_1 = 20$ $x_2 = 15$

- (a) 0.0032 (b) 0.0001 (c) 0.0146 (d) 0.1201

125. Find the test statistic for the following data. Assume that the samples are independent and that they have been randomly selected.

Use the hypothesis that $p_1 > p_2$. Use a significance level of 0.01.

Sample 1 Sample 2

$n_1 = 85$ $n_2 = 90$
 $x_1 = 38$ $x_2 = 23$

- (a) $z = 2.66$ (b) $z = -2.66$ (c) $t = -2.38$ (d) $t = 2.38$

126. In a random sample of 500 people aged 20-24, 22% were smokers. In a random sample of 450 people aged 25-29, 14% were smokers. State both the null and alternative hypothesis for the claim that the proportion of smokers in the two age groups is the same. Use a significance level of 0.01.

- (a) $H_0: P_1 \geq P_2$ $H_1: P_1 < P_2$ (b) $H_0: P_1 < P_2$ $H_1: P_1 \geq P_2$
(c) $H_0: P_1 > P_2$ $H_1: P_1 \leq P_2$ (d) $H_0: P_1 = P_2$ $H_1: P_1 \neq P_2$

127. Construct the indicated confidence interval for the difference between population proportions $p_1 - p_2$. Assume that the samples are independent and that they have been randomly selected.

$x_1 = 68, n_1 = 93$ and $x_2 = 78, n_2 = 111$; Construct a 98% confidence interval for the difference between population proportions $p_1 - p_2$.

- (a) $-0.095 < p_1 - p_2 < 0.855$ (b) $-0.119 < p_1 - p_2 < 0.176$
(c) $0.607 < p_1 - p_2 < 0.855$ (d) $0.584 < p_1 - p_2 < 0.879$

128. Assume that the two samples are independent simple random samples selected from normally distributed

populations. Do not assume that the population standard deviations are equal.

Two types of flares are tested and their burning times (in minutes) are recorded. The summary statistics are given below.

<u>Brand X</u>	<u>Brand Y</u>
n = 35	n = 40
x = 19.4min	x = 15.1min
s = 1.4 min	s = 0.8 min

Use a 0.05 significance level to test the claim that the two samples are from populations with the same mean. **State your final conclusion along with the test statistic.**

- | | |
|---|--|
| (a) Fail to reject the null hypothesis; $t = -16.025$ | (b) Reject the null hypothesis; $t = 16.025$ |
| (c) Reject the null hypothesis; $t = -16.025$ | (d) Fail to reject the null hypothesis; $t = 16.025$ |

129. Construct the indicated confidence interval for the difference between the two population means. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal.

Independent samples from two different populations yield the following data: $x_1 = 677$, $x_2 = 211$, $s_1 = 30$, $s_2 = 30$. The sample size is 245 for both samples. Find the 80% confidence interval for $\mu_1 - \mu_2$.

- (a) $463 < \mu_1 - \mu_2 < 469$ (b) $460 < \mu_1 - \mu_2 < 472$
 (c) $466 < \mu_1 - \mu_2 < 466$ (d) $462 < \mu_1 - \mu_2 < 470$

129. The two data sets are dependent. Find d to the nearest tenth.

A	59	58	60	63	51
B	21	30	20	25	22

- (a) 43.3 (b) 34.6 (c) 45.0 (d) 20.8

130. Find s_d .

The differences between two sets of dependent data are 21, 21, 15, 18, 15. Round to the nearest tenth.

- (a) 3.0 (b) 2.4 (c) 6.0 (d) 3.9

131. Assume that you want to test the claim that the paired sample data come from a population for which the mean difference is $\mu_d = 0$. Compute the value of the t test statistic. Round intermediate calculations to four decimal places as needed and final answers to three decimal places as needed.

x	9	1	7	7	11
y	6	3	3	8	6

- (a) $t = 2.890$ (b) $t = 0.415$ (c) $t = 0.578$ (d) $t = 1.292$

132. Determine the decision criterion for rejecting the null hypothesis in the given hypothesis test; i.e., describe the values of the test statistic that would result in rejection of the null hypothesis.

Suppose you wish to test the claim that μ_d , the mean value of the differences d for a population of paired data, is greater than 0. Given a sample of $n = 15$ and a significance level of $\alpha = 0.01$, what criterion would be used for rejecting the null hypothesis?

- (a) Reject null hypothesis if test statistic > 2.602 .
 (b) Reject null hypothesis if test statistic > 2.977 or < -2.977 .
 (c) Reject null hypothesis if test statistic > 2.624 .
 (d) Reject null hypothesis if test statistic < 2.624 .

133. Construct a confidence interval for μ_d , the mean of the differences d for the population of paired data. Assume that the population of paired differences is normally distributed.

Using the sample paired data below, construct a 90% confidence interval for the population mean of all differences $x - y$.

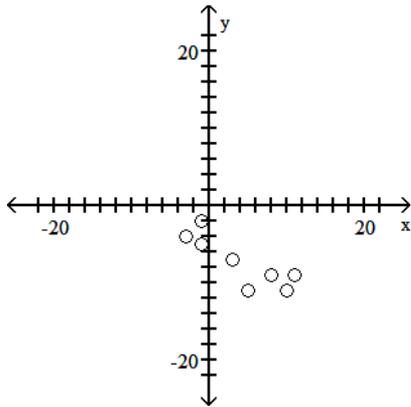
x	3.3	6.8	5.9	4.3	7.6
y	3.0	5.6	5.5	5.0	5.3

- (a) $-0.37 < \mu_d < 1.77$ (b) $-0.07 < \mu_d < 1.47$ (c) $0.22 < \mu_d < 7.48$ (d) $-0.31 < \mu_d < 1.71$

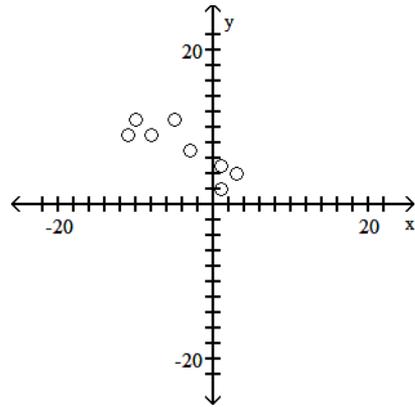
137. Construct a scatterplot for the given data.

x	-1	3	8	5	11	10	-1	-3	-1
y	2	7	9	11	9	11	5	4	2

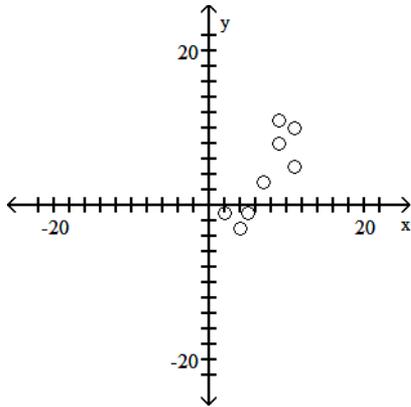
a)



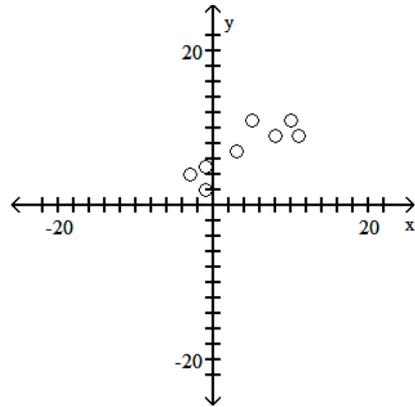
b)



c)



d)



138. Suppose you will perform a test to determine whether there is sufficient evidence to support a claim of a linear correlation between two variables. Find the critical values of r given the number of pairs of data n and the significance level α :

$$n = 25, \alpha = 0.05$$

- (a) $r = \pm 0.505$ (b) $r = 0.396$ (c) $r = 0.444$ (d) $r = \pm 0.396$

139. Use the given data to find the best predicted value of the response variable. Ten pairs of data yield $r = 0.003$ and the regression equation $\hat{y} = 2 + 3x$. Also, $\bar{y} = 5.0$. What is the best predicted value of \hat{y} for $x = 2$?

- (a) 5.0 (b) 17.0 (c) 7.0 (d) 8.0

140. Use the given data to find the equation of the regression line. Round the final values to three significant digits, if necessary.

x	6	8	20	28	36
y	2	4	13	20	30

- (a) $\hat{y} = -2.79 + 0.950x$ (b) $\hat{y} = -2.79 + 0.897x$ (c) $\hat{y} = -3.79 + 0.801x$ (d) $\hat{y} = -3.79 + 0.897x$

141. Use a χ^2 test to test the claim that in the given contingency table, the row variable and the column variable are independent. State the test statistic and critical value.

160 students who were majoring in either math or English were asked a test question, and the researcher recorded whether they answered the question correctly. The sample results are given below. At the 0.10 significance level, test the claim that response and major are independent.

	Correct	Incorrect
Math	27	53
English	43	37

- (a) Test statistic: $\chi^2 = -6.502$; Critical value: $\chi^2 = -2.706$
 (b) Test statistic: $\chi^2 = 4.735$; Critical value: $\chi^2 = 1.905$
 (c) Test statistic: $\chi^2 = 6.502$; Critical value: $\chi^2 = 2.706$
 (d) Test statistic: $\chi^2 = -4.735$; Critical value: $\chi^2 = -1.905$

142. Solve the problem. State your final conclusion and the test statistic.

Use a 0.01 significance level to test the claim that the proportion of men who plan to vote in the next election is the same as the proportion of women who plan to vote. 300 men and 300 women were randomly selected and asked whether they planned to vote in the next election. The results are shown below.

	Men	Women
Plan to vote	170	185
Do not plan to vote	130	115

- (a) Fail to reject the null hypothesis; $\chi^2 = 1.552$ (b) Reject the null hypothesis; $\chi^2 = -1.552$
 (c) Reject the null hypothesis; $\chi^2 = -6.635$ (d) Fail to reject the null hypothesis; $\chi^2 = 6.635$

ANSWER KEY

1. A	41. A	81. A	121. A
2. B	42. A	82. D	122. D
3. B	43. A	83. B	123. C
4. A	44. D	84. C	124. A
5. D	45. D	85. A	125. D
6. D	46. B	86. C	126. B
7. D	47. C	87. B	127. B
8. D	48. B	88. D	128. A
9. A	49. C	89. A	129. B
10. B	50. D	90. A	130. A
11. B	51. A	91. C	131. D
12. B	52. A	92. D	132. C
13. D	53. B	93. D	133. A
14. B	54. D	94. A	134. A
15. A	55. C	95. B	135. C
16. B	56. B	96. A	136. A
17. D	57. A	97. B	137. D
18. D	58. A	98. B	138. D
19. D	59. A	99. E	139. A
20. A	60. B	100. B	140. D
21. B	61. C	101. C	141. C
22. B	62. A	102. C	142. A
23. C	63. D	103. B	
24. D	64. A	104. B	
25. C	65. D	105. C	
26. B	66. C	106. C	
27. A	67. C	107. D	
28. C	68. C	108. B	
29. C	69. A	109. A	
30. B	70. E	110. B	
31. D	71. C	111. A	
32. C	72. B	112. D	
33. B	73. B	113. D	
34. C	74. A	114. B	
35. A	75. D	115. C	
36. C	76. B	116. C	
37. A	77. B	117. D	
38. A	78. A	118. B	
39. C	79. D	119. C	
40. E	80. D	120. B	