

Camden County College
Statistics Final Exam Sample Questions

YT/DB/FG/JD/2008

1. The collection, organization, summarization, and presentation of data is called:
 - a. Inferential statistics
 - b. A Population
 - c. Sampling
 - d. Descriptive statistics
- For problem #2 and #3 Identify as a) Discrete or b)Continuous**
2. Outdoor temperature at a randomly selected time of the day
3. The number of correct answers in a quiz consisting of 10 questions
4. Every seventh customer entering a shopping mall is asked to select his or her favorite store. The sampling technique this researcher is using is:
 - a. Random
 - b. Systematic
 - c. Stratified
 - d. Cluster
 - e. Convenience
5. News coverage includes exit polls of everyone from each of 80 randomly selected election precincts. The sampling technique used is:
 - a. Random
 - b. Systematic sampling
 - c. Stratified
 - d. Cluster
 - e. Convenience
6. Classifying each child in a day care center as infant, toddler, or preschool is an example of:
 - a. A quantitative variable
 - b. A qualitative variable
 - c. A discrete variable
 - d. A continuous variable
7. For the class 110 – 117 of a given frequency distribution, what is the upper class boundary?
 - a. 110
 - b. 109.5
 - c. 117
 - d. 117.5
8. For the classes 27 – 32, 33 – 38, 39 – 44, what is the class width?
 - a. 26.5
 - b. 44.5
 - c. 5
 - d. 6
9. A motorist recorded the number of gallons of gasoline he used for 8 weeks. The results are as follows: 11, 11, 11, 10, 9, 11, 9, and 10. The mean number of gallons used would be:
 - a. 9.5
 - b. 10.25
 - c. 11
 - d. 10.8

Use the following sample to answer questions 10 and 11:

102, 88, 102, 98, 41, 120

10. The sample mean is
 - a. 91.8
 - b. 24.6
 - c. 102
 - d. 100
11. The sample variance is
 - a. 27
 - b. 727.4
 - c. 24.6
 - d. none
12. P_{75} is the same as
 - a. Q_3
 - b. D_7
 - c. The first quartile
 - d. the median

13. If a statement is made that more people are buying red cars than any other color, which measure of central tendency is being used?
- a. Mode b. Population mean c. Median d. Sample mean

14. Generally, if a distribution is negatively skewed (skewed to the left), the mean is:
- a. to the left of the median
 b. to the right of the median
 c. equal to the median
 d. to the right of the mode

Use the following frequency distribution for problems 15 – 17.

Class Boundaries	Midpoint	Frequency	Cum-Freq
16.5 – 23.5	20	8	8
23.5 – 30.5	27	3	11
30.5 – 37.5	34	9	20
37.5 – 44.5	41	7	27
44.5 – 51.5	48	3	30

15. The mean is:
- a. 5.667 b. 32.6 c. 34 d. 33.6

16. The Variance is
- a. 9.45 b. 99.54 c. 89.21 d. 31.27

17. The Standard deviation is
- a. 34.5 b. 9.45 c. 89.21 d. 99.54

18. A sample has a mean of 95 and a standard deviation of 20. According to the empirical rule, about 68% of the data will fall between what values?
- a. 35 and 155 b. 94 and 96 c. 75 and 115 d. 55 and 135

19. In a survey, 42% of Americans said they own an answering machine. If 10 Americans are selected at random, find the probability that exactly 8 own an answering machine.
- a. 0.153 b. 0.015 c. 0.008 d. 0.021

USE THE PROBABILITY DISTRIBUTION BELOW TO ANSWER QUESTIONS #24-27

X	0	1	2	3	4	5
P(X)	0.1	0.2	0.2	0.1	0.3	0.1

20. The probability of exactly 4 is, $P(4)=$
- a. 0.2 b. 0.3 c. 0.4 d. 0.1
21. The probability of at least 3 is, $P(x \geq 3) =$
- a. 0.3 b. 0.4 c. 0.5 d. 1.0
22. The mean μ is
- a. 5.2 b. 1.0 c. 2.0 d. 2.6
23. The standard deviation σ is
- a. 1.56 b. 2.6 c. 1.2 d. 5.2

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS 24 - 28
Suppose x is a binomial random variable such that $n = 5$ and $p = 0.4$ then

24. Find $P\{x = 4\}$

- a. 0.680 b. 0.077 c. 0.770 d. 0.608

25. Find $P\{x \text{ at least } 4\}$

- a. 0.087 b. 0.690 c. 0.618 d. 0.780

26. Find $P\{x \text{ at most } 4\}$

- a. 0.8989 b. 0.7701 c. 0.9726 d. 0.9898

27. Find μ

- a. 2.0 b. 3.0 c. 1.2 d. 0.24

28. Find σ

- a. 1.73 b. 1.10 c. 1.41 d. 0.49

For questions 29 through 36, find the probabilities using the standard normal distribution.

29. $P\{z < 1.97\}$

- a. 0.9756 b. 0.9292 c. 0.9418 d. 0.8997

30. $P\{z > 1.02\}$

- a. 0.1539 b. 0.3461 c. 0.1628 d. 0.3508

31. $P\{z < -1.43\}$

- a. 0.0987 b. 0.0764 c. 0.4236 d. 0.4251

32. $P\{-0.87 < z < -0.21\}$

- a. 0.2247 b. 0.3078 c. 0.0832 d. 0.2566

33. $P\{-0.05 < z < 1.10\}$

- a. 0.0199 b. 0.3232 c. 0.3643 d. 0.3843

34. $P\{1.32 < z < 1.51\}$

- a. 0.0279 b. 0.0296 c. 0.4066 d. 0.4236

35. $P\{z > -1.39\}$

- a. 0.4177 b. 0.0823 c. 0.4345 d. 0.9177

36. What is the z-score that corresponds to the 85th percentile?

- a. 1.04 b. -1.04 c. 0.1368 d. 0.39

Questions 37 and 38 refer to the following paragraph.

The mean time it takes college freshmen to complete the Mason Basic Reasoning Test is 38.3 minutes. The standard deviation is 3.2 minutes. Assume that the times are normally distributed.

37. Find the probability that it will take a student between 35 and 42 minutes to complete the test.
- a. 0.3485 b. 0.3770 c. 0.285 d. 0.7250
38. Find the probability that it will take a student less than 35 minutes or more than 42 minutes to complete the test.
- a. 0.3485 b. 0.3770 c. 0.7255 d. 0.2750
39. A small publisher wishes to publish self-improvement books. After a survey of the market, the publisher finds that the mean cost of the type of book that she wishes to publish is \$15.00. If she wants to price her books to sell in the middle 34% range, what should the maximum and minimum prices of the books be? The standard deviation is \$0.25 and the self-improvement books are normally distributed.
- a. \$13.80 and \$16.20 b. \$14.05 and \$15.95
c. \$13.91 and \$16.09 d. \$14.89 and \$15.11
40. In order to qualify for letter sorting, applicants are given a speed-reading test. The scores are normally distributed, with a mean of 70 and a standard deviation of 5. The variable is also normally distributed. If only the top 10% are selected, find the cutoff score.
- a. 70.1 b. 76.4 c. 79.2 d. 79.8

Questions 41 and 42 refer to the following paragraph.

The mean annual salary of a certain group of wage earners in Pennsylvania was \$25,000 in 1992. Assume that salaries were normally distributed and the standard deviation of this group was \$3,000. Assume that the sample was taken from a large population and the correction factor can be ignored.

41. Find the probability that a randomly selected individual earned less than \$27,000.
- a. 0.2514 b. 0.2486 c. 0.7475 d. 0.7888
42. Find the probability that for a randomly selected sample of 10 individuals, the mean salary was less than \$27,000.
- a. 0.0174 b. 0.4826 c. 0.9825 d. 0.9266
43. *Prevention* magazine reports that 20 % of drivers use a car phone while driving. Find the probability that in a random sample of 80 drivers, exactly 16 will use a car phone while driving.
- a. 10.34 % b. 11.09 % c. 13 % d. 5.57 %

Use the following information for problems 44 and 45.

The mean waiting time for a drive-in window at a local bank is 9.2 minutes, with a standard deviation of 2.6 minutes. Assume the waiting times are normally distributed.

44. Find the probability that a customer will have to wait between 5 and 10 minutes.
- a. 0.4474 b. 0.5677 c.) 0.1217 d. 0.3257
45. Find the probability that a customer will have to wait less than 6 minutes or more than 9 minutes.
- a. 0.4226 b. 0.6399 c. -0.3907 d. 0.0319

46. What statistic best estimates the population mean (μ)?

- a. The population standard deviation (σ).
- b. The population variance (s^2).
- c. The sample standard deviation (s).
- d. The sample mean (\bar{x}).

Use the following information to answer questions 47- 50: IQs are normally distributed with a mean of 100 and a standard deviation of 15

47. What is the probability of randomly selecting an IQ of at least 85?

- a. 0.1587
- b. 85%
- c. 0.3413
- d. 0.8413

48. A job requires an IQ in the top 25%, find the lowest acceptable IQ.

- a. 90.75
- b. 110.12
- c. 125.75
- d. 118.02

49. If 10 subjects are randomly selected, what is the probability that their mean IQ is between 110 and 130?

- a. 0.5
- b. 0.0800
- c. 0.2297
- d. 0.0175

50. In the above question, the standard error of the mean $\sigma_{\bar{x}}$ is

- a. 4.7434
- b. 15
- c. 0.9487
- d. 0.06

51. A study found that the mean time it took a person to find a new job was 2.5 months. If a sample of 50 job seekers was surveyed, find the 80% confidence interval of the mean. σ is known to be 0.3 month.

- a. $2.45 < \mu < 2.55$
- b. $2.15 < \mu < 2.97$
- c. $1.83 < \mu < 3.22$
- d. $1.74 < \mu < 3.38$

52. A sample of 25 adult elephants had a mean weight of 9,500 pounds, with a sample standard deviation of 150 pounds. Find the 99% confidence interval of the true population mean. Assume that the weights are normally distributed.

- a. $1576.61 < \mu < 1609.39$
- b. $9416.09 < \mu < 9583.91$
- c. $9314.06 < \mu < 9685.94$
- d. $9214.03 < \mu < 9785.97$

53. A survey of 100 recent fatal traffic accidents showed that 60 were alcohol-related. Find the 98% confidence interval of the true proportion of people who die in alcohol-related accidents.

- a. $0.434 < p < 0.766$
- b. $0.410 < p < 0.790$
- c. $0.486 < p < 0.714$
- d. $0.505 < p < 0.695$

54. Find the 90% confidence interval for the standard deviation for the sugar content in sherbet (in milligrams) if a sample of ten servings has a variance of 2.5. Assume the sugar contents are normally distributed.

- a. $1.0 < \sigma < 2.4$
- b. $1.3 < \sigma < 2.7$
- c. $0.8 < \sigma < 3.0$
- d. $1.2 < \sigma < 2.6$

55. A trial is repeated 2000 times with 300 successes. Use a 95 % degree of confidence and find the margin of error **E** of the proportion p of successes.

- a. 0.156
- b. 1.56
- c. 0.0156
- d. none of the above

56. Evaluate $t_{\alpha/2}$ for $\alpha = 0.01$ and a sample of 25 scores.

- a. 2.797
- b. 2.492
- c. 1.711
- d. 2.787

62. A team of eye surgeons has developed a new technique for a risky eye operation to restore the sight of people blinded from certain disease. Under the old method, it is known that only 30 % of the patients who undergo this operation recover their eyesight. Suppose that surgeons in various hospitals have performed a total of 225 operations using the new method and that 88 have been successful (the patients fully recovered their sight). Can we justify the claim that the new method is better than the old one? (Use a 1% level of significance).

H_0 :

H_1 :

Critical Value(s):

Test Statistic:

P-value:

Decision:

63. A machine is designed to fill 32-ounce milk containers. The actual measurements of milk will vary somewhat from 32-ounces; it is said that for this machine the standard deviation is 0.1 ounce. To test this claim, 28 containers are randomly selected and the actual amount of milk in each is measured. This results in a sample standard deviation of $s = 0.13$ ounce. The population has a normal distribution. Complete the test of the claim at 5 % level of significance.

H_0 :

H_1 :

Critical Value(s):

Test Statistic:

p -value : (optional)

Decision:

64. The Hill of Tara in Ireland is a place of great archaeological importance. This region has been occupied by people for over 4,000 years. Geomagnetic surveys detect subsurface anomalies in the earth's magnetic field. These surveys have lead to many significant archeological discoveries. The following data measure magnetic susceptibility (centimeter-gram-second $\times 10^{-6}$) on two of the main grids on the Hill of Tara

Grid E: x variable

13.20	5.60	19.80	15.05	21.40	17.25	27.45
16.95	23.90	32.40	40.75	5.10	17.75	28.35

Grid H: y variable

11.85	15.25	21.30	17.30	27.50	10.35	14.90	48.70
25.40	25.95	57.60	34.35	38.80	41.00	31.25	

Compute a 75% Chebyshev interval around the mean for x -values and also for y -values. Higher numbers indicate higher magnetic susceptibility. However, extreme values could mean an anomaly and possible archeological treasure. Use the intervals to compare the magnetic susceptibility on the two grids.

65. Compute the sample coefficient of variation for each grid in question 64 above. Use the CV's to compare the two grids. The coefficient of variation can be thought of as a measure of the variability per unit of expected signal. A considerable variability in the signal (above or below average) might indicate buried artifacts. Why, in this case, would a large CV be better, or at least more exciting?

66. According to the U.S. Census Bureau, the mean commute time to work for a resident of Boston, MA is 27.3 minutes with a standard deviation of 8.1 minutes. Use Chebychev's Inequality to find the percentage of commuters in Boston having a commute time within 1.5 standard deviations of the mean. What are these commute times?

**Statistics Final Review Answer Key
Fall 2008**

1. d 2. b 3. a 4. b 5. d 6. b 7. d 8. d 9. b 10. a 11. b 12. a
13. a 14. a 15. b 16. c 17. b 18. c 19. b 20. b 21. c 22. d 23. a
24. b binompdf (5, 0.4, 4) 25. a 1-binomcdf (5, 0.4, 3) 26. d binomcdf (5, 0.4, 4)
27. a 28. b 29. a normalcdf(-E99, 1.97) 30. a normalcdf (1.02, E99)
31. b normalcdf (-E99, -1.43) 32. a normalcdf (-0.87, -0.21)
33. d normalcdf (-0.05, 1.10) 34. a normalcdf (1.32, 1.51)
35. d normalcdf (-1.39, E99) 36. a invnorm (0.85) 37. d normalcdf (35, 42, 38.3, 3.2)
38. d 1-normalcdf (35, 42, 38.3, 3.2) 39. d 40. b invnorm (0.90, 70, 5)
41. c normalcdf (-E99, 27000, 25000, 3000)
42. c normalcdf (-E99, 27000, 25000, $\frac{3000}{\sqrt{10}}$) 43. b binompdf (80, 0.20, 16)
44. b normalcdf (5, 10, 9.2, 2.6) 45. b 1-normalcdf (6, 9, 9.2, 2.6) 46. d
47. d normalcdf (85, E99, 100, 15) 48. b invnorm (0.75, 100, 15)
49. d normalcdf (110, 130, 100, $\frac{15}{\sqrt{10}}$) 50. a 51. a 52. b STAT>>TESTS 8
53. c STAT>>TESTS A 54. d 55. c 56. a 57. c

58. STAT>>TESTS 1

$H_0 : \mu = 480$ claim

$H_1 : \mu \neq 480$

CV : $z = \pm 2.575$

TS : $z = 2.36$

p -value : 0.0184

Fail to Reject H_0

At the 1% level of significance, there is insufficient evidence to warrant rejection of the travel agent's claim that the mean cost of a three day trip to Atlantic City is \$480.

59. STAT>>TESTS 2

$H_0 : \mu = 50,000$ claim

$H_1 : \mu > 50,000$

CV : $t = 1.292$

TS : $t = 1.59$

p -value : 0.0580

Reject H_0

At the 10% level of significance, there is sufficient evidence to warrant rejection of the real estate agent's claim that the average price of a condo in Naples, FL is at most \$50,000.

60. STAT>>TESTS 2

$H_0 : \mu = 35$ claim

$H_1 : \mu \neq 35$

CV : $t = \pm 2.093$

TS : $t = -8.94$

p -value : 0.0

Reject H_0

At the 5% level of significance, there is sufficient evidence to conclude that the average completion time of the newly designed test differs from its intended duration.

61. STAT>>TESTS 5

$H_0 : p = 0.70$ claim

$H_1 : \mu \neq 0.70$

CV : $z = \pm 1.96$

TS : $z = -1.9499$

p -value : 0.0512

Fail to Reject H_0

At the 5% level of significance, there is insufficient evidence to warrant rejection of the association's claim that 70% of Americans believe that the government is inefficient and wasteful.

62. STAT>>TESTS 5

$H_0 : p = 0.30$

$H_1 : \mu > 0.30$ claim

CV : $z = 2.33$

TS : $z = 2.98$

p -value : 0.0014

Reject H_0

At the 1% level of significance, there is sufficient evidence to support the claim that the new method is better than the old one.

63.

$H_0 : \sigma = 0.1$ claim

$H_1 : \sigma \neq 0.1$

CV : $\chi_L^2 = 14.573$, $\chi_R^2 = 43.194$

TS : $\chi^2 = 45.63$

p -value : 0.028 $2(\chi^2 \text{cdf}(45.63, E99, 27))$

Reject H_0

At the 5% level of significance, there is sufficient evidence to reject the claim that the standard deviation for this machine is 0.1 ounce.

64. $\bar{x} - 2s = 20.35 - 2(9.80) = 0.75$

$$\bar{x} + 2s = 20.35 + 2(9.80) = 39.95$$

For Grid E, at least 75% of the data fall in the interval 0.75–39.95.

$$\bar{y} - 2s = 28.1 - 2(13.93) = 0.24$$

$$\bar{y} + 2s = 28.1 + 2(13.93) = 55.96$$

For Grid H, at least 75% of the data fall in the interval 0.24–39.95. Grid H shows a wider 75% range of values.

65. Grid E: $CV = \frac{s}{\bar{x}} \cdot 100 = \frac{9.80}{20.35} \cdot 100 \approx 48\%$

Grid H: $CV = \frac{s}{\bar{y}} \cdot 100 = \frac{13.93}{28.1} \cdot 100 \approx 49\%$

Grid H demonstrates slightly greater variability per expected signal. The *CV*, together with the Chebychev interval, indicates that Grid H might have more buried artifacts.

66. Approximately 55.6 % of commuters in Boston have a commute time between 15.15 minutes and 39.45 minutes.

