

Student: _____
Date: _____
Time: _____

Instructor: John Blackburn
Course: Math 1121 A Fall 2011
Book: Triola: Elementary Statistics Using
the TI 83/84 Plus Calculator, 3e

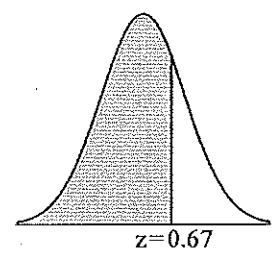
Assignment: Test 3

1. What requirements are necessary for a normal probability distribution to be a *standard* normal probability distribution?

Choose the correct answer below.

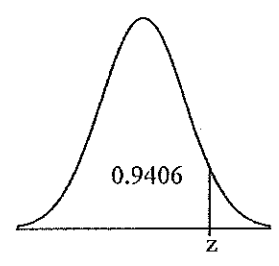
- A. The mean and standard deviation have the values of $\mu = 0$ and $\sigma = 0$.
- B. The mean and standard deviation have the values of $\mu = 1$ and $\sigma = 0$.
- C. The mean and standard deviation have the values of $\mu = 1$ and $\sigma = 1$.
- D. The mean and standard deviation have the values of $\mu = 0$ and $\sigma = 1$.

2. Find the area of the shaded region. The graph depicts the standard normal distribution with mean 0 and standard deviation 1.



The area of the shaded region is .
(Round to four decimal places as needed.)

3. Find the indicated z score. The graph depicts the standard normal distribution with mean 0 and standard deviation 1.



The indicated z score is .
(Round to two decimal places as needed.)

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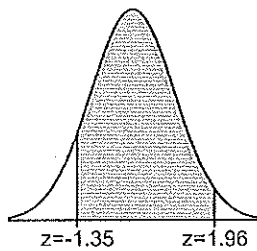
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4. Assume that thermometer readings are normally distributed with a mean of 0°C and a standard deviation of 1.00°C . A thermometer is randomly selected and tested. For the case below, draw a sketch, and find the probability of the reading. (The given values are in Celsius degrees.)

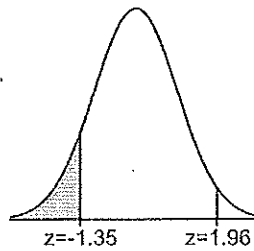
Between -1.35 and 1.96

Draw a sketch. Choose the correct graph below.

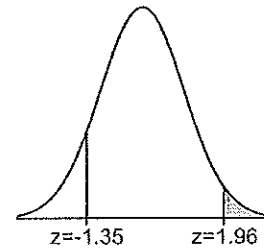
A.



B.



C.



The probability of getting a reading between -1.35°C and 1.96°C is .
 (Round to four decimal places as needed.)

5. Find the indicated critical value.

$z_{0.11}$

$z_{0.11} =$

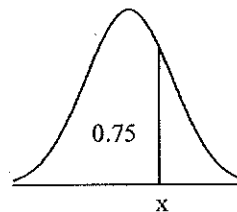
(Round to two decimal places as needed.)

6. Assume the readings on thermometers are normally distributed with a mean of 0°C and a standard deviation of 1.00°C . Find the probability $P(z < -1.59 \text{ or } z > 1.59)$, where z is the reading in degrees.

$P(z < -1.59 \text{ or } z > 1.59) =$.

(Round to four decimal places as needed.)

7. Find the indicated IQ score. The graph to the right depicts IQ scores of adults, and those scores are normally distributed with a mean of 100 and a standard deviation of 15.



The indicated IQ score, x , is . (Round to one decimal place as needed.)

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8. Assume that adults have IQ scores that are normally distributed with a mean of $\mu = 100$ and a standard deviation $\sigma = 15$. Find the probability that a randomly selected adult has an IQ less than 118.

The probability that a randomly selected adult has an IQ less than 118 is .
(Type an integer or decimal rounded to four decimal places as needed.)

9. Assume that adults have IQ scores that are normally distributed with a mean of $\mu = 105$ and a standard deviation $\sigma = 20$. Find the probability that a randomly selected adult has an IQ between 95 and 115.

The probability that a randomly selected adult has an IQ between 95 and 115 is .
(Type an integer or decimal rounded to four decimal places as needed.)

10. A survey found that women's heights are normally distributed with mean 63.6 in and standard deviation 2.3 in. A branch of the military requires women's heights to be between 58 in and 80 in.
- a. Find the percentage of women meeting the height requirement. Are many women being denied the opportunity to join this branch of the military because they are too short or too tall?
- b. If this branch of the military changes the height requirements so that all women are eligible except the shortest 1% and the tallest 2%, what are the new height requirements?

a. The percentage of women who meet the height requirement is %.
(Round to two decimal places as needed.)

Are many women being denied the opportunity to join this branch of the military because they are too short or too tall?

- A. Yes, because a large percentage of women are not allowed to join this branch of the military because of their height.
- B. Yes, because the percentage of women who meet the height requirement is fairly large.
- C. No, because the percentage of women who meet the height requirement is fairly small.
- D. No, because only a small percentage of women are not allowed to join this branch of the military because of their height.

b. For the new height requirements, this branch of the military requires women's heights to be at least in and at most in.
(Round to one decimal place as needed.)

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11. The lengths of pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days. a. Find the probability of a pregnancy lasting 309 days or longer. b. If the length of pregnancy is in the lowest 2%, then the baby is premature. Find the length that separates premature babies from those who are not premature.
- a. The probability that a pregnancy will last 309 days or longer is .
(Round to four decimal places as needed.)
- b. Babies who are born on or before days are considered premature.
(Round to the nearest integer as needed.)
-
12. Assume that women's heights are normally distributed with a mean given by $\mu = 63.5$ in, and a standard deviation given by $\sigma = 2.2$ in.
- a. If 1 woman is randomly selected, find the probability that her height is less than 64 in.
- b. If 33 women are randomly selected, find the probability that they have a mean height less than 64 in.
- a. The probability is approximately .
(Round to four decimal places as needed.)
- b. The probability is approximately .
(Round to four decimal places as needed.)
-

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13. The capacity of a lift is 8 people or 1272 pounds. The capacity will be exceeded if 8 people have weights with a mean greater than $1272 / 8 = 159$ pounds. Suppose the people have weights that are normally distributed with a mean of 169 lb and a standard deviation of 30 lb.

a. Find the probability that if a person is randomly selected, his weight will be greater than 159 pounds.

The probability is approximately . (Round to four decimal places as needed.)

b. Find the probability that 8 randomly selected people will have a mean that is greater than 159 pounds.

The probability is approximately . (Round to four decimal places as needed.)

c. Does the lift appear to have the correct weight limit? Why or why not?

- A. No, there is a good chance that 8 randomly selected people will exceed the lift capacity.
 B. Yes, 8 randomly selected people will always be under the weight limit.
 C. Yes, there is a good chance that 8 randomly selected people will not exceed the lift capacity.
 D. No, 8 randomly selected people will never be under the weight limit.

14. An engineer is going to redesign an ejection seat for an airplane. The seat was designed for pilots weighing between 130 lb and 171 lb. The new population of pilots has normally distributed weights with a mean of 140 lb and a standard deviation of 29.5 lb.

a. If a pilot is randomly selected, find the probability that his weight is between 130 lb and 171 lb.

The probability is approximately . (Round to four decimal places as needed.)

b. If 37 different pilots are randomly selected, find the probability that their mean weight is between 130 lb and 171 lb.

The probability is approximately . (Round to four decimal places as needed.)

c. When redesigning the ejection seat, which probability is more relevant?

- A. Part (b) because the seat performance for a single pilot is more important.
 B. Part (a) because the seat performance for a single pilot is more important.
 C. Part (a) because the seat performance for a sample of pilots is more important.
 D. Part (b) because the seat performance for a sample of pilots is more important.

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15. Find the critical value $z_{\alpha/2}$ that corresponds to the given confidence level.

92%

$z_{\alpha/2} = \square$ (Round to two decimal places as needed.)

16. Express the confidence interval $0.333 < p < 0.555$ in the form $\hat{p} \pm E$.

$\hat{p} \pm E = \square \pm \square$

17. Use the given confidence interval limits to find the point estimate \hat{p} and the margin of error E.

$0.533 < p < 0.641$

$\hat{p} = \square$

$E = \square$

(Type an integer or a decimal.)

18. Assume that a random sample is used to estimate a population proportion p. Find the margin of error E that corresponds to the given statistics and confidence level.

$n = 550, x = 330, 90\%$ confidence

The margin of error $E = \square$. (Round to four decimal places as needed.)

19. Use the given data to find the minimum sample size required to estimate a population proportion or percentage.

Margin of error: six percentage points; confidence level 90%; from a prior study, \hat{p} is estimated by the decimal equivalent of 34%

$n = \square$ (Round up to the nearest integer.)

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20. A clinical trial tests a method designed to increase the probability of conceiving a girl. In the study 360 babies were born, and 324 of them were girls. Use the sample data to construct a 99% confidence interval estimate of the percentage of girls born. Based on the result, does the method appear to be effective?

< p < (Round to three decimal places as needed.)

Does the method appear to be effective?

- Yes, the proportion of girls is significantly different from 0.5.
 No, the proportion of girls is not significantly different from 0.5.

-
21. A study of 420,079 cell phone users found that 131 of them developed cancer of the brain or nervous system. Prior to this study of cell phone use, the rate of such cancer was found to be 0.0328% for those not using cell phones. Complete parts (a) and (b).

a. Use the sample data to construct a 90% confidence interval estimate of the percentage of cell phone users who develop cancer of the brain or nervous system.

% < p < %
(Round to four decimal places as needed.)

b. Do cell phone users appear to have a rate of cancer of the brain or nervous system that is different from the rate of such cancer among those not using cell phones? Why or why not?

- A. No, because 0.0328% is included in the confidence interval.
 B. No, because 0.0328% is not included in the confidence interval.
 C. Yes, because 0.0328% is included in the confidence interval.
 D. Yes, because 0.0328% is not included in the confidence interval.

-
22. Use the given information to find the minimum sample size required to estimate an unknown population mean μ .

How many adults must be randomly selected to estimate the mean FICO (credit rating) score of working adults in a country? We want 95% confidence that the sample mean is within 2 points of the population mean, and the population standard deviation is 64.

The minimum sample size required is adults.
(Round up to the nearest whole number.)

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23. Using the simple random sample of weights of women from a data set, we obtain these sample statistics: $n = 35$ and $\bar{x} = 150.86$ lb. Research from other sources suggests that the population of weights of women has a standard deviation given by $\sigma = 31.63$ lb.
- Find the best point estimate of the mean weight of all women.
 - Find a 99% confidence interval estimate of the mean weight of all women.

a. The best point estimate is lb.
(Type an integer or a decimal.)

b. The 99% confidence interval estimate is lb $< \mu <$ lb.
(Round to two decimal places as needed.)

24. Randomly selected students participated in an experiment to test their ability to determine when one minute (or sixty seconds) has passed. Forty students yielded a sample mean of 60.5 seconds. Assuming that $\sigma = 8.5$ seconds, construct and interpret a 90% confidence interval estimate of the population mean of all students.

What is the 90% confidence interval for the population mean μ ?

$< \mu <$

(Type integers or decimals rounded to one decimal place as needed.)

Based on the result, is it likely that the students' estimates have a mean that is reasonably close to sixty seconds?

- A. No, because the confidence interval includes sixty seconds.
- B. Yes, because the confidence interval does not include sixty seconds.
- C. No, because the confidence interval does not include sixty seconds.
- D. Yes, because the confidence interval includes sixty seconds.

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25. A study of the ages of motorcyclists killed in crashes involves the random selection of 137 drivers with a mean of 31.48 years. Assuming that $\sigma = 9.8$ years, construct and interpret a 95% confidence interval estimate of the mean age of all motorcyclists killed in crashes.

What is the 95% confidence interval for the population mean μ ?

$< \mu <$ (Round to two decimal places as needed.)

Notice that the confidence interval limits do not include ages below 20 years. What does this mean?

- A. The mean of the population will most likely not be less than 20 years.
 B. Motorcyclists under the age of 20 rarely die in crashes.
 C. There is a 95% chance that the population mean will not be less than 20 years.
 D. The mean of the population will never be less than 20 years.
-
26. A simple random sample of size $n = 5$ is obtained from the population of drivers living in New York City, and the braking reaction time of each driver is measured. The results are to be used for constructing a 95% confidence interval. What is the number of degrees of freedom that should be used for finding the critical value $t_{\alpha/2}$?

Choose the correct answer below.

- A. The number of degrees of freedom is 5.
 B. The number of degrees of freedom is 4.
 C. The number of degrees of freedom is 1.
 D. The number of degrees of freedom is 6.
-
27. Use the given confidence level and sample data to find (a) the margin of error and (b) the confidence interval for the population mean μ . Assume that the population has a normal distribution.

Weight lost on a diet: 99% confidence; $n = 61$, $\bar{x} = 2.0$ kg, $s = 3.3$ kg.

(a) $E =$ kg (Round to one decimal place as needed.)

(b) What is the confidence interval for the population mean μ ?

kg $< \mu <$ kg (Round to one decimal place as needed.)

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28. A random sample of the birth weights of 186 babies has a mean of 3103 g and a standard deviation of 692 g. Construct a 99% confidence interval estimate of the mean birth weight for all such babies.

What is the confidence interval estimate of the mean birth weight for all such babies?

g < μ < g (Round to the nearest integer as needed.)

29. In a study designed to test the effectiveness of magnets for treating back pain, 35 patients were given a treatment with magnets and also a sham treatment without magnets. Pain was measured using a scale from 0 (no pain) to 100 (extreme pain). After given the magnet treatments, the 35 patients had pain scores with a mean of 7.0 and a standard deviation of 2.4. After being given the sham treatments, the 35 patients had pain scores with a mean of 7.3 and a standard deviation of 2.7. Complete parts (a) through (c) below.

- a. Construct the 90% confidence interval estimate of the mean pain score for patients given the magnet treatment.

What is the confidence interval estimate of the population mean μ ?

< μ <

(Round to one decimal place as needed.)

- b. Construct the 90% confidence interval estimate of the mean pain score for patients given the sham treatment.

What is the confidence interval estimate of the population mean μ ?

< μ <

(Round to one decimal place as needed.)

- c. Compare the results. Does the treatment with magnets appear to be effective?

- A. Since the confidence intervals do not overlap, it appears that the magnet treatments are more effective than the sham treatments.
- B. Since the confidence intervals overlap, it appears that the magnet treatments are no more effective than the sham treatments.
- C. Since the confidence intervals overlap, it appears that the magnet treatments are more effective than the sham treatments.
- D. Since the confidence intervals do not overlap, it appears that the magnet treatments are less effective than the sham treatments.

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30. Twelve different video games showing substance use were observed and the duration times of game play (in seconds) are listed below. The design of the study justifies the assumption that the sample can be treated as a simple random sample. Use the data to construct a 90% confidence interval estimate of μ , the mean duration of game play.

4058 3884 3863 4037 4308 4815 4656 4038 5009 4831 4326 4315 ☐

What is the confidence interval estimate of the population mean μ ?

$$\square < \mu < \square$$

(Round to one decimal place as needed.)

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1. D

2. 0.7486

3. 1.56

4. A
0.8865

5. 1.23

6. 0.1118

7. 110.1

8. 0.8849

9. 0.3830

10. 99.25
D
58.2
68.3

11. 0.0032
237

12. 0.5910
0.9049

13. 0.6306
0.8271
A

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14. 0.4860
0.9804
B

15. 1.75

16. 0.444
0.111

17. 0.587
0.054

18. 0.0344

19. 169

20. 0.859
0.941
the first choice

21. 0.0267
0.0357
A

22. 3,934

23. 150.86
137.09
164.63

24. 58.3
62.7
D

25. 29.84
33.12
A

26. B

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27. 1.1
0.9
3.1

28. 2971
3235

29. 6.3
7.7
6.5
8.1
B

30. 4140.4
4549.6
