

Question 1	A research engineer for a tire manufacturer is investigating tire life for a new rubber compound and has built 16 tires and tested them to end-of-life in a road test. The sample mean and standard deviation are 60,139.7 and 3645.94 kilometers. Find a 95% confidence interval on mean tire life. Assume that the population has a normal distribution and given $t_{0.025,15} = 2.131$; $t_{0.025,16} = 2.120$; $t_{0.05,15} = 1.753$; $t_{0.05,16} = 1.746$
Answer	(58197.33; 62082.07)

2	A major tire manufacturer wishes to estimate the mean tread life in miles for one of their tires. A pilot sample of $n = 50$ tires showed the sample mean and sample standard deviation equal to 69,500 and 4,000 miles. Find a 90% confidence interval on mean tread life. Let $z_{0.05} = 1.645$; $z_{0.01} = 2.33$; $z_{0.1} = 1.28$
	(68569.45; 70430.55)

3	20 packages are randomly selected from packages received by a parcel service. The sample has a mean weight of 15.3 pounds and a standard deviation of 1.9 pounds. What is the 95 percent confidence interval for the true mean weight of all packages received by the parcel service? Assume that the population has a normal distribution and given $t_{0.025, 19} = 2.093$; $t_{0.05, 19} = 1.729$; $t_{0.1, 19} = 1.33$
	(14.41,16.19)

4	The life in hours of a 75-watt light bulb is known to be normally distributed with the standard deviation is 20 hours. Suppose that we wanted to be 95% two-sided confident that the error in estimating the mean life is less than five hours. What sample size should be used? Given $z_{0.05} = 1.645$, $z_{0.025} = 1.96$
	n=62

5	Suppose that 500 parts are tested in manufacturing and 10 are rejected. Test the hypothesis $H_0: p = 0.03$ against $H_1: p < 0.03$ at $\alpha = 0.05$. Find the P -value. Let $P(Z < -1.31) = 0.095$; $P(Z < -2.33) = 0.01$
	0.095

6	Consider the test of $H_0: \sigma^2 = 5$ against $H_1: \sigma^2 < 5$. What are the critical values for the test statistic χ_0^2 the significance levels $\alpha = 0.01$ and sample sizes $n = 20$? Let $\chi_{0.01,19}^2 = 36.19$; $\chi_{0.99,19}^2 = 7.63$; $\chi_{0.01,20}^2 = 37.57$; $\chi_{0.99,20}^2 = 8.26$
	7.63

7	A researcher claims that more than 55% of voters favor gun control. Identify the null hypothesis and the alternative hypothesis. A. $H_0: p < 55\%$ B. $H_0: p = 55\%$ C. $H_0: p = 55\%$ D. $H_0: p > 55\%$ $H_1: p > 55\%$ $H_1: p > 55\%$ $H_1: p \neq 55\%$ $H_1: p = 55\%$
	B.

8	Assume that the data has a normal distribution and the number of observations is greater than fifty. Find the critical z value used to test a null hypothesis with $\alpha = 0.02$ for an upper-tailed test. Let $P(Z < -2.05) = 0.02$; $P(Z < -2.33) = 0.01$ A. -2.05 B. -2.33 C. 2.05 D. 2.33
	C.

9	The test statistic in a two-tailed test is $z=1.43$. Let $P(Z<1.43) = 0.9236$. Then the P-value is
	0.1528
10	Of 346 items tested, 12 are found to be defective. Construct a 98% confidence interval for the percentage of all such items that are defective.
	(1.18%; 5.76%)
11	Of 81 adults selected randomly from one town, 64 have health insurance. Find 90% low-confidence bound for the percentage of all adults in the town who have health insurance.
	0.73
12	A study involves 634 randomly selected deaths, 29 of them caused by accidents. Construct a 98% confidence interval for the percentage of all deaths that are caused by accidents.
	(2.6%, 6.5%)
13	Find 98% upper-confidence bound for the percentage of all deaths that are caused by accidents.
	6.28%
14	In a survey of 5100 T.V viewers, 40% said they watch network news programs. Using the point estimate of p obtained from this sample, find the necessary sample size if we want to be 96% confident that the sample proportion of T.V viewers. Who watch network news programs is within 0.01 of that proportion of population.
	10086 and 2048
15	Thirty randomly selected students took the calculus final. If the sample mean was 82 and the population standard deviation was 12.2. Assume that population has normal distribution. Construct a 99% confidence interval for the mean score of all students.
	(75.86; 88.14)
16	Thirty randomly selected students took the calculus final. If the sample mean was 82 and the population standard deviation was 12.2, Assume that population has normal distribution. Find a 98% upper-confidence bound for the mean score of all students.
	86.8
17	Among a sample of 65 students selected at random from one college, the mean number of siblings is 1.3 with a standard deviation of 1.1. Find a 95% confidence interval for the mean number of siblings for all students at this college.
	(1.03; 1.57)
18	Among a sample of 65 students selected at random from one college, the mean number of siblings is 1.3 with a standard deviation of 1.1. Find a 95% lower-confidence bound for the mean number of siblings for all students at this college.
	1.076
19	The yield of chemical process is being studied. From previous experience yield is known to be normally distributed. The past five days of plant operation have resulted in the following percent yields: 91.6; 88.75, 90.8, 89.95, and 91.3. Find a 98% two-side confidence interval on the true mean yield.
	(87.35; 93.61)

20	The breaking strength of yarn used in manufacturing drapery material is required to be at least 100 psi. Past experience has indicated that breaking strength is normally distributed and that $\sigma = 2$ psi. A random sample of nine specimens is tested and the average breaking strength is found to be 98 psi. Find a 95% two-sided confidence interval on the true mean breaking strength.
	(96.69; 99.31)
21	The percentage of titanium in an alloy used in aerospace castings is measured in 51 randomly selected parts. The sample standard deviation is $s = 0.37$. Construct a 95% two-sided confidence interval for σ .
	(0.31; 0.46)
22	In an Accountemps survey of 150 senior executives, 47% said that the most common job interview mistake is to have little or no knowledge of the company. Construct a 99% confidence interval estimate of the proportions of all senior executives who have that same opinion.
	(0.365, 0.575)
23	In an Accountemps survey of 150 senior executives, 47% said that the most common job interview mistake is to have little or no knowledge of the company. Construct a 95% lower confidence bound for the proportions of all senior executives who have that same opinion.
	(0.4029)
24	What sample size is needed to estimate the mean white blood cell count for the population of adults in the United States? Assume that you want 99% confidence that the sample mean is within 0.2 of the population mean. The population standard deviation is 2.5.
	1037
25	A sociologist develops a test to measure attitudes about public transportation, and 27 randomly selected subjects are given the test. Their mean score is 76.2 and their standard deviation is 21.4. Construct the 95% confidence interval for the mean score of all such subjects. Assume that the population has a normal distribution.
	(67.73, 84.66)
26	A random sample of 23 movies with ratings of PG or PG-13 have lengths (in minutes) with a mean of 120,8 min and a standard deviation of 22,9 min. Construct a 95% confidence interval estimate of the standard deviation of the lengths of all movies.
	(17.71, 32.4)
27	A random sample of 23 movies with ratings of PG or PG-13 have lengths (in minutes) with a mean of 120,8 min and a standard deviation of 22,9 min. Construct a 90% lower confidence bound for the standard deviation of the lengths of all movies.
	19.35
28	A major tire manufacturer wishes to estimate the mean tread life in miles for one of their tires. They wish to develop a confidence interval estimate that would have a maximum sampling error of 500 miles with 90 percent confidence. Let population standard deviation equal to 4,000 miles. Based on this information and let $z_{0.05} = 1.645$ the required sample size is:
	174.

29	Given $\bar{x} = 15.3$, $s = 4.7$, and $n = 18$, form a 99% confidence interval for σ^2 . Let $\chi^2_{0.005,17} = 35.72$; $\chi^2_{0.995,17} = 5.70$
	(10.51, 65.88)

30	In an application to estimate the mean number of miles that downtown employees commute to work roundtrip each day, the following information is given: $n = 20$; $\bar{x} = 4.33$; $s = 3.50$. Based on this information and let $t_{0.025,19} = 2.09$, the upper limit for a 95 percent confidence interval estimate for the true population mean is:
	about 5.97 miles

31	A survey of 865 voters in one state reveals that 408 favor approval of an issue before the legislature. Construct the 95% confidence interval for the true proportion of all voters in the state who favor approval. A) $0.444 < p < 0.500$ B) $0.435 < p < 0.508$ C) $0.438 < p < 0.505$ D) $0.471 < p < 0.472$
	C)

32	In an application to estimate the mean number of miles that downtown employees commute to work roundtrip each day, the following information is given: $n = 20$; $\bar{x} = 4.33$; $s = 3.50$; the population is normally distributed. The Confidence Interval on the true population mean with the confident level of 94% is:
	(2.76; 5.90)

33	Find the minimum sample size you should use to assure that your estimate of \hat{p} will be within the required margin of error around the population p . 5) Margin of error: 0.002; confidence level: 93%; \hat{p} and \hat{q} unknown A) 204,757 B) 410 C) 204,750 D) 405
	C)

34	Your statistics instructor claims that 60 percent of the students who take her Elementary Statistics class go through life feeling more enriched. For some reason that she can't quite figure out, most people don't believe her. You decide to check this out on your own. You randomly survey 64 of her past Elementary Statistics students and find that 34 feel more enriched as a result of her class. Assume that significance level of 0.05 ($z_{0.025} = 1.96$, $z_{0.05} = 1.65$). Which of the following states is true?
	The value of the test statistic is -1.123. There is sufficient evidence to support your statistic instructor's claim

35	According to an article in Newsweek, the natural ratio of girls to boys is 100:105. In Vietnam, the birth ratio is 100: 114 (46.7% girls). Suppose you don't believe the reported figures of the percent of girls born in Vietnam. You think that the percent of girls born in Vietnam is less than 46.7%. You conduct a study. In this study, you count the number of girls and boys born in 150 randomly chosen recent births. There are 60 girls and 90 boys born of the 150. Use $\alpha = 2\%$ ($z_{0.01} = 2.33$ and $z_{0.02} = 2.05$). Based on the results, draw your conclusion.
	The percent of girls born in Vietnam is more than 46.7%

36	When a new drug is created, the pharmaceutical company must subject it to testing before receiving the necessary permission from the Food and Drug Administration (FDA) to market the drug. Suppose the null hypothesis is "the drug is unsafe." What is the Type II Error?																				
	To claim the drug is unsafe when, in fact, it is safe.																				
37	An assembly line produces widgets with a mean weight of 10 and a standard deviation of 0.2. A new process supposedly will produce widgets with the same mean and a smaller standard deviation. A sample of 20 widgets produced by the new method has a sample standard deviation of 0.126. At a significance level of 10%, what is the value of the test statistic χ_0^2 ?																				
	7.54																				
38	The cost of a college education has increased at a much faster rate than costs in general over the past twenty years. In order to compensate for this, many students work part- or full-time in addition to attending classes. At one university, it is believed that the average hours students work per week exceeds 20. To test this at a significance level of 0.05 ($t_{0.025,19} = 2.09$ and $t_{0.05,19} = 1.73$), a random sample of $n = 20$ students was selected and the following values were observed: <table><tr><td>26</td><td>15</td><td>10</td><td>40</td></tr><tr><td>10</td><td>20</td><td>30</td><td>36</td></tr><tr><td>40</td><td>0</td><td>5</td><td>10</td></tr><tr><td>20</td><td>32</td><td>16</td><td>12</td></tr><tr><td>40</td><td>36</td><td>10</td><td>0</td></tr></table> Based on these sample data, the critical value:	26	15	10	40	10	20	30	36	40	0	5	10	20	32	16	12	40	36	10	0
26	15	10	40																		
10	20	30	36																		
40	0	5	10																		
20	32	16	12																		
40	36	10	0																		
	is equal to 1.73.																				
39	A soft drink company has a filling machine that can be set at different levels to produce different average fill amounts. The company sets the machine to provide a mean fill of 15 ounces. The standard deviation on the machine is known to be 0.20 ounces. Assuming that the hypothesis test is to be performed using a random sample of $n = 100$ cans, which of the following would be the correct formulation of the null and alternative? A) $H_0: \mu = 15$ $H_1: \mu \neq 15$ ounces B) $H_0: \bar{x} \neq 15$ $H_1: \bar{x} > 15$ ounces C) $H_0: \mu \neq 15$ $H_1: \mu = 15$ ounces D) None of the others.																				
	A)																				
40	A bank is interested in determining whether their customers' checking balances are linearly related to their savings balances. A sample of $n = 20$ customers was selected and the correlation was calculated to be +0.40. If the bank is interested in testing to see whether there is a significant linear relationship between the two variables using a significance level of 0.05, what is the value of the test statistic?																				
	1.8516																				
41	A major department store chain is interested in estimating the average amount its credit card customers spent on their first visit to the chain's new store in the mall. Fifteen credit card accounts were randomly sampled and analyzed with the following results. Construct a 95% confidence interval for the average amount its credit card customers spent on their first visit to the chain's new store in the mall assuming that the amount spent follows a normal distribution.																				

	$\bar{X} = \$50.50$ and $s^2 = 400$. a) $\$50.50 \pm \9.09 b) $\$50.50 \pm \10.12 c) $\$50.50 \pm \11.00 d) $\$50.50 \pm \11.08
	d)

42	<p>Private colleges and universities rely on money contributed by individuals and corporations for their operating expenses. Much of this money is put into a fund called an endowment, and the college spends only the interest earned by the fund. A recent survey of 8 private colleges in the United States revealed the following endowments (in millions of dollars): 60.2, 47.0, 235.1, 490.0, 122.6, 177.5, 95.4, and 220.0.</p> <p>Summary statistics yield $\bar{X} = 180.975$ and $s = 143.042$. Calculate a 95% confidence interval for the mean endowment of all the private colleges in the United States assuming a normal distribution for the endowments.</p> $\bar{X} \pm t_{\alpha/2} \frac{S}{\sqrt{n}}$ a) $\$180.975 \pm \94.066 b) $\$180.975 \pm \99.123 c) $\$180.975 \pm \116.621 d) $\$180.975 \pm \119.586
	d)

43	<p>A university dean is interested in determining the proportion of students who receive some sort of financial aid. Rather than examine the records for all students, the dean randomly selects 200 students and finds that 118 of them are receiving financial aid. If the dean wanted to estimate the proportion of all students receiving financial aid to within 3% with 99% reliability, how many students would need to be sampled?</p> $n = \frac{Z^2 p(1-p)}{e^2}$ a) $n = 1,844$ b) $n = 1,784$ c) $n = 1,503$ d) $n = 1,435$
	b)

44	<p>An economist is interested in studying the incomes of consumers in a particular region. The population standard deviation is known to be \$1,000. A random sample of 50 individuals resulted in an average income of \$15,000. What is the width of the 90% confidence interval?</p> $L = 2 * Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$ a) \$232.60 b) \$364.30 c) \$465.23 d) \$728.60
	c)

45	<p>The head librarian at the Library of Congress has asked her assistant for an interval estimate of the mean number of books checked out each day. The assistant provides the following interval estimate: from 740 to 920 books per day. If the head librarian knows that the population standard deviation is 150 books checked out per day, and she asked her assistant to use 25 days of data to construct the interval estimate, what confidence level can she attach to the interval estimate?</p>
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	$e = Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}, \quad 90 = Z \frac{150}{\sqrt{25}}, \quad Z = 3 \quad C.I = 99.87$ <p>a) 99.7% b) 99.0% c) 98.0% d) 95.4%</p>
	a)

46	<p>A quality control engineer is interested in the mean length of sheet insulation being cut automatically by machine. The desired length of the insulation is 12 feet. It is known that the standard deviation in the cutting length is 0.15 feet. A sample of 70 cut sheets yields a mean length of 12.14 feet. This sample will be used to obtain a 99% confidence interval for the mean length cut by machine.</p> <p>The confidence interval goes from _____ to _____.</p>
	12.09 to 12.19

47	<p>A quality control engineer is interested in the mean length of sheet insulation being cut automatically by machine. The desired length of the insulation is 12 feet. It is known that the standard deviation in the cutting length is 0.15 feet. A sample of 70 cut sheets yields a mean length of 12.14 feet. This sample will be used to obtain a 99% confidence interval for the mean length cut by machine.</p> <p>Suppose the engineer had decided to estimate the mean length to within 0.03 with 99% confidence. Then the sample size would be _____.</p>
	1.664.41 rounds up to 167

48	<p>The actual voltages of power packs labeled as 12 volts are as follows: 11.77, 11.90, 11.64, 11.84, 12.13, 11.99, and 11.77.</p> <p>The critical value for a 99% confidence interval for this sample is _____.</p>
	3.7074

49	<p>The actual voltages of power packs labeled as 12 volts are as follows: 11.77, 11.90, 11.64, 11.84, 12.13, 11.99, and 11.77.</p> <p>A 99% confidence interval for the mean voltage of the power packs is from _____ to _____.</p>
	11.6367 to 12.0891

50	<p>A hotel chain wants to estimate the average number of rooms rented daily in each month. The population of rooms rented daily is assumed to be normally distributed for each month with a standard deviation of 24 rooms.</p> <p>During February, a sample of 25 days has a sample mean of 37 rooms. Use this information to calculate a 92% confidence interval for the population mean.</p>
a.	28.60 to 45.40