Construct a confidence interval of the population proportion at the given level of confidence.

$x = 860$, $n = 1100$, 99% confidence

#1

The lower bound of the confidence interval is ☐.
(Round to the nearest thousandth as needed.)

The upper bound of the confidence interval is ☐.
(Round to the nearest thousandth as needed.)

In a trial of 182 patients who received 10-mg doses of a drug daily, 40 reported headache as a side effect. Use this information to complete parts (a) through (d) below.

(a) Obtain a point estimate for the population proportion of patients who received 10-mg doses of a drug daily and reported headache as a side effect.

$\hat{p} = \square$ (Round to two decimal places as needed.)

(b) Verify that the requirements for constructing a confidence interval about p are satisfied.

Are the requirements for constructing a confidence satisfied?

- A. Yes, the requirements for constructing a confidence interval are satisfied.
- B. No, the requirement that $n\hat{p}(1-\hat{p})$ is greater than 10 is not satisfied.
- C. No, the requirement that each trial be independent is not satisfied.
- D. No, the requirement that the sample size is no more than 5% of the population is not satisfied.

(c) Construct a 95% confidence interval for the population proportion of patients who receive the drug and report headache as a side effect.

The 95% confidence interval is $(\square, \square)$.
(Round to three decimal places as needed.)

(d) Interpret the confidence interval. Which statement below best interprets the interval?

- A. We are 95% confident that the interval contains the true value of p.
- B. There is a 95% chance that the true value of p will fall in the interval.
- C. We are 95% confident that the interval does not contain the true value of p.
- D. There is a 95% chance that the true value of p will not fall in the interval.

#2

An interactive poll found that 385 of 2,356 adults aged 18 or older have at least one tattoo.
(a) Obtain a point estimate for the proportion of adults who have at least one tattoo.
(b) Construct a 90% confidence interval for the proportion of adults with at least one tattoo.
(c) Construct a 99% confidence interval for the proportion of adults with at least one tattoo.
(d) What is the effect of increasing the level of confidence on the width of the interval?

(a) $\hat{p}$ = ☐ (Round to three decimal places as needed.)

(b) Construct the 90% confidence interval. Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

- A. Lower bound: ☐
  Upper bound: ☐
  (Round to three decimal places as needed.)
- B. The requirements for constructing a confidence interval are not satisfied.

(c) Construct the 99% confidence interval. Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

#3

- A. Lower bound: ☐
  Upper bound: ☐
  (Round to three decimal places as needed.)
- B. The requirements for constructing a confidence interval are not satisfied.

(d) Choose the correct answer below.

- A. Increasing the level of confidence widens the interval.
- B. Increasing the level of confidence has no effect on the interval.
- C. Increasing the level of confidence narrows the interval.
- D. It is not possible to tell the effect of increasing the level of confidence on the width of the interval since the requirements for constructing a confidence interval in parts (b) and (c) were not met.

A researcher wishes to estimate the percentage of adults who support abolishing the penny. What size sample should be obtained if he wishes the estimate to be within 2 percentage points with 95% confidence if
(a) he uses a previous estimate of 24%?
(b) he does not use any prior estimates?

(a) n = ☐ (Round up to the nearest integer.)

(b) n = ☐ (Round up to the nearest integer.)

#4

A nutritionist wants to determine how much time nationally people spend eating and drinking. Suppose for a random sample of 967 people age 15 or older, the mean amount of time spent eating or drinking per day is 1.33 hours with a standard deviation of 0.72 hour. Complete parts **(a)** through **(d)** below.

(a) A histogram of time spent eating and drinking each day is skewed right. Use this result to explain why a large sample size is needed to construct a confidence interval for the mean time spent eating and drinking each day.

- A. The distribution of the sample mean will never be approximately normal.
- B. Since the distribution of time spent eating and drinking each day is normally distributed, the sample must be large so that the distribution of the sample mean will be approximately normal.
- C. Since the distribution of time spent eating and drinking each day is not normally distributed (skewed right), the sample must be large so that the distribution of the sample mean will be approximately normal.
- D. The distribution of the sample mean will always be approximately normal.

(b) In 2010, there were over 200 million people nationally age 15 or older. Explain why this, along with the fact that the data were obtained using a random sample, satisfies the requirements for constructing a confidence interval.

#5

- A. The sample size is greater than 10% of the population.
- B. The sample size is less than 10% of the population.
- C. The sample size is greater than 5% of the population.
- D. The sample size is less than 5% of the population.

(c) Determine and interpret a 95% confidence interval for the mean amount of time Americans age 15 or older spend eating and drinking each day.

Select the correct choice below and fill in the answer boxes, if applicable, in your choice.
(Type integers or decimals rounded to three decimal places as needed. Use ascending order.)

- A. The nutritionist is 95% confident that the mean amount of time spent eating or drinking per day is between ☐ and ☐ hours.
- B. There is a 95% probability that the mean amount of time spent eating or drinking per day is between ☐ and ☐ hours.
- C. The nutritionist is 95% confident that the amount of time spent eating or drinking per day for any individual is between ☐ and ☐ hours.
- D. The requirements for constructing a confidence interval are not satisfied.

(d) Could the interval be used to estimate the mean amount of time a 9-year-old spends eating and drinking each day? Explain.

- A. Yes; the interval is about the mean amount of time spent eating or drinking per day for people people age 15 or older and can be used to find the mean amount of time spent eating or drinking per day for 9-year-olds.
- B. No; the interval is about people age 15 or older. The mean amount of time spent eating or drinking per day for 9-year-olds may differ.

A nutritionist wants to determine how much time nationally people spend eating and drinking. Suppose for a random sample of 967 people age 15 or older, the mean amount of time spent eating or drinking per day is 1.33 hours with a standard deviation of 0.72 hour. Complete parts (a) through (d) below.

- B. Since the distribution of time spent eating and drinking each day is normally distributed, the sample must be large so that the distribution of the sample mean will be approximately normal.
- C. Since the distribution of time spent eating and drinking each day is not normally distributed (skewed right), the sample must be large so that the distribution of the sample mean will be approximately normal.
- D. The distribution of the sample mean will always be approximately normal.

(b) In 2010, there were over 200 million people nationally age 15 or older. Explain why this, along with the fact that the data were obtained using a random sample, satisfies the requirements for constructing a confidence interval.

- A. The sample size is greater than 10% of the population.
- B. The sample size is less than 10% of the population.
- C. The sample size is greater than 5% of the population.
- D. The sample size is less than 5% of the population.

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#5

cont...

Select the correct choice below and fill in the answer boxes, if applicable, in your choice.
(Type integers or decimals rounded to three decimal places as needed. Use ascending order.)

- A. The nutritionist is 95% confident that the mean amount of time spent eating or drinking per day is between ☐ and ☐ hours.
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- D. The requirements for constructing a confidence interval are not satisfied.

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- A. Yes; the interval is about the mean amount of time spent eating or drinking per day for people people age 15 or older and can be used to find the mean amount of time spent eating or drinking per day for 9-year-olds.
- B. No; the interval is about people age 15 or older. The mean amount of time spent eating or drinking per day for 9-year-olds may differ.
- C. No; the interval is about individual time spent eating or drinking per day and cannot be used to find the mean time spent eating or drinking per day for specific age.
- D. Yes; the interval is about individual time spent eating or drinking per day and can be used to find the mean amount of time a 9-year-old spends eating and drinking each day.

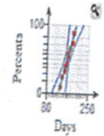
An agricultural researcher is interested in estimating the mean length of the growing season in a region. Treating the last 10 years as a simple random sample, he obtains the following data, which represent the number of days of the growing season.

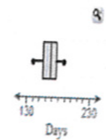
159	166	144	139	170	185	188	176	167	155

Click the icon to view the table of areas under the t-distribution.

(a) Because the sample size is small, we must verify that the data come from a population that is normally distributed and that the sample size does not contain any outliers. The normal probability plot and boxplot are shown below. Are the conditions for constructing a confidence interval about the mean satisfied?

- A. No, there are outliers.
- B. Yes, both conditions are met.
- C. No, neither condition is met.
- D. No, the population is not normal.





(b) Construct a 95% confidence interval for the mean length of the growing season in the region.

(,)

(Use ascending order. Round to two decimal places as needed.)

#6

(c) What can be done to decrease the margin of error, assuming the researcher does not have access to more data?

- A. The researcher could increase the sample mean.
- B. The researcher could increase the level of confidence.
- C. The researcher could decrease the level of confidence.
- D. The researcher could decrease the sample standard deviation.

An agricultural researcher is interested in estimating the mean length of the growing season in a region. Treating the last 10 years as a simple random sample, he obtains the following data, which represent the number of days of the growing season.

159	166	144	139	170	185	188	176	167	155

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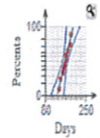

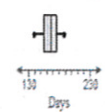

(b) Construct a 95% confidence interval for the mean length of the growing season in the region.

(,)

(Use ascending order. Round to two decimal places as needed.)

(c) What can be done to decrease the margin of error, assuming the researcher does not have access to more data?

#7

- A. The researcher could increase the sample mean.
- B. The researcher could increase the level of confidence.
- C. The researcher could decrease the level of confidence.
- D. The researcher could decrease the sample standard deviation.

The following data represent the asking price of a simple random sample of homes for sale. Construct a 99% confidence interval with and without the outlier included. Comment on the effect the outlier has on the confidence interval.

\$170,900	\$279,900	\$219,900
\$143,000	\$205,800	\$250,500
\$459,900	\$261,500	\$187,500
\$250,900	\$147,800	\$264,900

Click the icon to view the table of areas under the t-distribution.

(a) Construct a 99% confidence interval with the outlier included.

(\$☐, \$☐)
(Round to the nearest integer as needed.)

(b) Construct a 99% confidence interval with the outlier removed.

(\$☐, \$☐)
(Round to the nearest integer as needed.)

(c) Comment on the effect the outlier has on the confidence interval.

- ○ The outlier caused the width of the confidence interval to increase.
- ○ The outlier had no effect on the width of the confidence interval.
- ○ The outlier caused the width of the confidence interval to decrease.

#8

Construct a confidence interval of the population proportion at the given level of confidence.

$x = 105$, $n = 150$, 95% confidence

The 95% confidence interval is (,).

(Use ascending order. Round to three decimal places as needed.)

#9

A researcher wishes to estimate the proportion of adults who have high-speed Internet access. What size sample should be obtained if she wishes the estimate to be within 0.02 with 90% confidence if
(a) she uses a previous estimate of 0.32?
(b) she does not use any prior estimates?

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

#10

In a poll, 51% of the people polled answered yes to the question "Are you in favor of the death penalty for a person convicted of murder?" The margin of error in the poll was 2%, and the estimate was made with 94% confidence. At least how many people were surveyed?

The minimum number of surveyed people was ☐. (Round up to the nearest integer.)

#11

By how many times does the sample size have to be increased to decrease the margin of error by a factor of $\frac{1}{2}$?

The sample size must be increased by a factor of $\square$ to decrease the margin of error by a factor of $\frac{1}{2}$.

#12

The following data represent the asking price of a simple random sample of homes for sale. Construct a 99% confidence interval with and without the outlier included. Comment on the effect the outlier has on the confidence interval.

\$225,000	\$279,900	\$219,900
\$143,000	\$205,800	\$294,900
\$459,900	\$208,900	\$187,500
\$183,900	\$147,800	\$264,900

Click the icon to view the table of areas under the t-distribution.

(a) Construct a 99% confidence interval with the outlier included.

(\$☐, \$☐)

(Round to the nearest integer as needed.)

b. Construct a 99% confidence interval the outlier removed

\$ ☐ , \$ ☐

#13

Table for #13

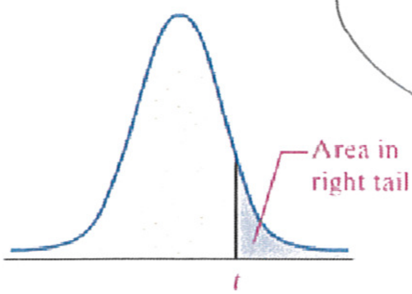

Table VI

t-Distribution

Area in Right Tail

df	0.25	0.20	0.15	0.10	0.05	0.025	0.02	0.01	0.005	0.0025	0.(
1	1.000	1.376	1.963	3.078	6.314	12.706	15.894	31.821	63.657	127.321	318
2	0.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.089	22
3	0.765	0.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10
4	0.741	0.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7
5	0.727	0.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5
6	0.718	0.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5
7	0.711	0.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4
8	0.706	0.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4
9	0.703	0.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4
10	0.700	0.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4
11	0.697	0.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4
12	0.695	0.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3
13	0.694	0.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3
14	0.692	0.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3
15	0.691	0.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3
16	0.690	0.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3
17	0.689	0.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3
18	0.688	0.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3
19	0.688	0.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3
20	0.687	0.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3
21	0.686	0.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3
22	0.686	0.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3
23	0.685	0.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3
24	0.685	0.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3
25	0.684	0.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3
26	0.684	0.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3
27	0.684	0.855	1.057	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3
28	0.683	0.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3
29	0.683	0.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3
30	0.683	0.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3
31	0.682	0.853	1.054	1.309	1.696	2.040	2.144	2.453	2.744	3.022	3
32	0.682	0.853	1.054	1.309	1.694	2.037	2.141	2.449	2.738	3.015	3
33	0.682	0.853	1.053	1.308	1.692	2.035	2.138	2.445	2.733	3.008	3
34	0.682	0.852	1.052	1.307	1.691	2.032	2.136	2.441	2.728	3.002	3
35	0.682	0.852	1.052	1.306	1.690	2.030	2.133	2.438	2.724	2.996	3

36	0.681	0.852	1.052	1.306	1.688	2.028	2.131	2.434	2.719	2.990	3
37	0.681	0.851	1.051	1.305	1.687	2.026	2.129	2.431	2.715	2.985	3
38	0.681	0.851	1.051	1.304	1.686	2.024	2.127	2.429	2.712	2.980	3
39	0.681	0.851	1.050	1.304	1.685	2.023	2.125	2.426	2.708	2.976	3
40	0.681	0.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3
50	0.679	0.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3
60	0.679	0.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3
70	0.678	0.847	1.044	1.294	1.667	1.994	2.093	2.381	2.648	2.899	3
80	0.678	0.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3
90	0.677	0.846	1.042	1.291	1.662	1.987	2.084	2.368	2.632	2.878	3
100	0.677	0.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3
1000	0.675	0.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3
z	0.674	0.842	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3
df	**0.25**	**0.20**	**0.15**	**0.10**	**0.05**	**0.025**	**0.02**	**0.01**	**0.005**	**0.0025**	**0.**

Area in Right Tail

Based on interviews with 87 SARS patients, researchers found that the mean incubation period was 4.2 days, with a standard deviation of 14.8 days. Based on this information, construct a 95% confidence interval for the mean incubation period of the SARS virus. Interpret the interval.

A. The lower bound is ☐ days. (Round to two decimal places as needed.)

B. The upper band is ☐ days

C. Interpret the confidence interval

☐

#14