Ch 7.2 pg. 354 #11, 13, 15, 21, 23, 25

11. **Reading Scores**: A sample of the reading scores of 35 fifth-graders has a mean of 82. The standard deviation of the sample is 15.

**Note**: All values we calculated were rounded.

a) Find the best point estimate of the mean.

\[ \bar{X} \text{ is the best point estimate for } \mu, \text{ therefore, the best point estimate of the population mean is } \mu = 82 \]

b) Find the 95% confidence interval of the mean reading scores of all the fifth-graders.

\[ (Z_{a/2}) = \frac{0.95}{2} = 0.475 \]

To find \( Z_{a/2} \) go to table E and look for area = .4750, the corresponding \( z \) value for this area is 1.96.

\[ Z_{a/2} = 1.96 \]

\[ \bar{X} - [Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}] < \mu < \bar{X} + [Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}] \]

\[ 82 - [1.96 \cdot \frac{15}{\sqrt{35}}] < \mu < 82 + [1.96 \cdot \frac{15}{\sqrt{35}}] \]

\[ 77 < \mu < 87 \]

c) Find the 99% confidence interval of the mean reading scores of all fifth graders.

\[ (Z_{a/2}) = \frac{0.99}{2} = 0.495 \]

To find \( Z_{a/2} \) go to table E and look for area = .4950, the corresponding \( z \) value for this area is 2.58.

\[ Z_{a/2} = 2.58 \]

\[ \bar{X} - [Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}] < \mu < \bar{X} + [Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}] \]

\[ 82 - [2.58 \cdot \frac{15}{\sqrt{35}}] < \mu < 82 + [2.58 \cdot \frac{15}{\sqrt{35}}] \]

\[ 75 < \mu < 89 \]
d) Which interval is larger? Why?

*The 99% confidence interval is larger, because the confidence level is larger.*

13. **Time to Correct Term Papers:** A study of 40 English composition professors showed that they spent, on average, 12.6 minutes correcting a student’s term paper.

\[ n = 40 \quad \bar{X} = 12.6 \]

a. Find the best point estimate of the mean.

\[ \bar{X} = 12.6 \text{ is the best point estimate for the population mean } (\mu). \]

b. Find the 90% confidence interval of the mean time for all composition papers when \( \sigma = 2.5 \) minutes.

\[ Z_{\alpha/2} \text{ is the } z \text{ value corresponding to the area of } \frac{0.90}{2} = 0.4500, \text{ by table } E \text{ we found that } Z_{\alpha/2} = 1.65 \]

\[ 12.6 - [1.65 \frac{2.5}{\sqrt{40}}] < \mu < 12.6 + [1.65 \frac{2.5}{\sqrt{40}}] \]
\[ 12.6 - [1.65(.3953)] < \mu < 12.6 + [1.65(.3956)] \]
\[ 11.9 < \mu < 13.3 \]

The answers were rounded.

c. If a professor stated that he spent, on average, 30 minutes correcting a term paper, what would be your reaction?

*It would be unlikely since 30 minutes is outside of the confidence interval. That is to say, 30 is larger than 13.3.*

15) **Actuary Exams**  A survey of individuals who passed the seven exams and obtained the rank of Fellow in the actuarial field finds the average salary to be $150,000. If the standard deviation for the sample of 35 Fellows was $15,000, construct a 95% confidence interval for all Fellows.

\[ n=35, \quad \text{Confidence interval (C.I.)} = 0.95, \quad \bar{x} = 150,000, \quad \sigma = 15,000 \]

\[ Z_{\alpha/2} \text{ is the } z \text{ value that corresponds to the area of } \frac{0.95}{2} = 0.4750 \text{ in table } E. \]

Therefore \( Z_{\alpha/2} = 1.96 \)
\[ \bar{X} - (Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}) < \mu < \bar{X} + (Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}) \]

\[ 150,000 - (1.96 \cdot \frac{15,000}{\sqrt{35}}) < \mu < 150,000 + (1.96 \cdot \frac{15,000}{\sqrt{35}}) \]

145,030 < \mu < 154,970

17. **Television viewing** a study of 415 kindergarten students showed that they have seen on average 5000 hours of television. If the sample standard deviation is 900, find the 95% confidence level of the mean for all students. If a parent claimed that his children watched 4000 hours, would the claim be believable?

n=415,  Confidence interval (C.I.) = 0.95,  \( \bar{x} = 5,000, \ \sigma = 900 \)

\( Z_{a/2} \) is the z value that corresponds to the area of \( \frac{0.95}{2} = 0.4750 \) in table E.

Therefore \( Z_{a/2} = 1.96 \)

\[ \bar{X} - (Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}) < \mu < \bar{X} + (Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}) \]

\[ 5000 - (1.96 \cdot \frac{900}{\sqrt{415}}) < \mu < 5000 + (1.96 \cdot \frac{900}{\sqrt{415}}) \]

4913 < \mu < 5087

Since 4000 hours is not within a 95% confidence interval, we can say that the claim is not believable.

19. **Hospital Noise Levels** Noise levels at various areas urban hospitals were measured in decibels. The mean of the noise levels in 84 corridors was 61.2 decibels, and the standard deviation was 7.9. Find the 95% confidence interval of the true mean.

n=84,  Confidence interval (C.I.) = 0.95,  \( \bar{x} = 61.2, \ \sigma = 7.9 \)

\( Z_{a/2} \) is the z value that corresponds to the area of \( \frac{0.95}{2} = 0.4750 \) in table E.

Therefore \( Z_{a/2} = 1.96 \)

\[ \bar{X} - (Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}) < \mu < \bar{X} + (Z_{a/2} \cdot \frac{\sigma}{\sqrt{n}}) \]
21) **Time on Homework**  A university dean of students wishes to estimate the average number of hours students spend doing homework per week. The standard deviation from a previous study is 6.2 hours. How large a sample must be selected if he wants to be 99% confident of finding whether the true mean differs from the sample mean by 1.5 hours?

\[ Z_{\alpha/2} \text{ is the z value that corresponds to the area of } \frac{0.99}{2} = 0.495 \]

Therefore \( Z_{\alpha/2} = 2.58 \)

\[ \frac{z_{\alpha/2}}{\sigma} = 2.58, \quad \sigma = 6.2, \quad E = 1.5 \]

\[ n = \left( \frac{z_{\alpha/2}}{E} \right)^2 = \left( \frac{2.58(6.2)}{1.5} \right)^2 = 113.72 \approx 114 \]

Therefore, to be 99% confident that the estimate is within 1.5 hours of the true mean homework hours per week, the university dean of students needs a sample size of at least 114 university students.

23) **Sick Days**  An insurance company is trying to estimate the average number of sick days that full-time food service workers use per year. A pilot study found the standard deviation to be 2.5 days. How large a sample must be selected if the company wants to be 95% confident of getting an interval that contains the true mean with a maximum error of 1 day?

\[ Z_{\alpha/2} \text{ is the z value that corresponds to the area of } \frac{0.95}{2} = 0.4750 \text{ in table } E. \]

Therefore \( Z_{\alpha/2} = 1.96 \)

\[ \frac{z_{\alpha/2}}{\sigma} = 1.96, \quad \sigma = 2.5, \quad E = 1 \]

\[ n = \left( \frac{z_{\alpha/2}}{E} \right)^2 = \left( \frac{1.96(2.5)}{1} \right)^2 = 24.01 \approx 25 \]

Thus, to be 95% confident that the estimate is within 1 day of the true mean of sick days, the company needs a sample size of at least 25 full-time food service workers.
24. **Cost of Pizzas** a pizza shop owner wishes to find the 95% confidence interval of the true mean cost of a large plain pizza. How large should the sample be if she wishes to be accurate to within $0.15? A previous study showed that the standard deviation of the price was $0.26.

\[ Z_{\alpha/2} \text{ is the } z \text{ value that corresponds to the area of } \frac{0.95}{2} = 0.4750 \text{ in table } E. \]

Therefore \( Z_{\alpha/2} = 1.96 \)

\[ z_{\frac{\alpha}{2}} = 1.96, \quad \sigma = 0.26, \quad E = 0.15 \]

\[ n = \left( \frac{z_{\frac{\alpha}{2}} \sigma}{E} \right)^2 = \left( \frac{1.96(0.26)}{0.15} \right)^2 = 11.5 \approx 12 \]

The pizza shop owner needs about 12 pizzas.

25) **Salaries of Sports Reporters** A researcher is interested in estimating the average monthly salary of sports reporters in a large city. He wants to be 90% confident that his estimate is correct. If the standard deviation is $1100, how large a sample is needed to get the desired information and to be accurate to within $150?

\[ Z_{\alpha/2} \text{ is the } z \text{ value that corresponds to the area of } \frac{0.90}{2} = 0.4500 \text{ in table } E. \]

Therefore \( Z_{\alpha/2} = 1.65 \)

\[ z_{\frac{\alpha}{2}} = 1.65, \quad \sigma = $1,100, \quad E = $150 \]

\[ n = \left( \frac{z_{\frac{\alpha}{2}} \sigma}{E} \right)^2 = \left( \frac{1.65(1100)}{150} \right)^2 = 146.41 \approx 147 \]

Therefore, to be 90% confident that the estimate is within $150 of the true mean monthly salary, the researcher needs a sample size of at least 147 sports reporters.

Section 7-3 pg 362 #’s 4 (a, b, d), 5, 7, 10, 13, 17

4. Find the values for each.
a) \( t_{\alpha/2} \) and \( n = 18 \) for the 99% confidence interval (C.I.) for the mean
\[ \text{d.f.} = 17 \]
From table F, confidence interval=99\% and d.f. =17 \( \rightarrow t_{\alpha/2} = 2.898 \)

b) \( t_{\alpha/2} \) and \( n = 23 \) for the 95\% confidence interval (C.I.) for the mean
\[ \text{d.f.} = 22 \]
From table F, confidence interval=95\% (C.I.) and d.f. =22 \( \rightarrow t_{\alpha/2} = 2.074 \)

c) \( t_{\alpha/2} \) and \( n = 15 \) for the 98\% confidence interval (C.I.) for the mean
\[ \text{d.f.} = 14 \]
From table F, confidence interval=98\% (C.I.) and d.f. =14 \( \rightarrow t_{\alpha/2} = 2.624 \)

d) \( t_{\alpha/2} \) and \( n = 10 \) for the 90\% confidence interval (C.I.) for the mean
\[ \text{d.f.} = 9 \]
From table F, confidence interval=90\% (C.I.) and d.f. =9 \( \rightarrow t_{\alpha/2} = 1.833 \)

e) \( t_{\alpha/2} \) and \( n = 20 \) for the 95\% confidence interval (C.I.) for the mean
\[ \text{d.f.} = 19 \]
From table F, confidence interval=95\% (C.I.) and d.f. =19 \( \rightarrow t_{\alpha/2} = 2.093 \)

5. **Hemoglobin** The average hemoglobin reading for a sample of 20 teachers was 16 grams per 100 milliliters, with a sample standard deviation of 2 grams. Find the 99\% confidence interval of the true mean.

\[ \overline{X} = 16 \quad s = 2 \]
\[ 16 - (2.861 \cdot \frac{2}{\sqrt{20}}) < \mu < 16 + (2.861 \cdot \frac{2}{\sqrt{20}}) \]
\[ n = 20 \quad \text{C.I. 99\%} \rightarrow t_{\alpha/2} = 2.861 \quad 16 - 1.28 < \mu < 16 + 1.28 \]

Degrees of freedom = 20 - 1 = 19
\[ 15 < \mu < 17 \]

6. **Cigarette Taxes** A sample of 17 states had these cigarette taxes (in cents):

<table>
<thead>
<tr>
<th>112</th>
<th>120</th>
<th>98</th>
<th>55</th>
<th>71</th>
<th>35</th>
<th>99</th>
<th>124</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>150</td>
<td>55</td>
<td>100</td>
<td>132</td>
<td>20</td>
<td>70</td>
<td>93</td>
<td></td>
</tr>
</tbody>
</table>

Find a 98\% confidence interval for the cigarette tax in all 50 states.
C.I. = 0.99, \( \bar{x} = 91.06 \), \( s = 38.37 \), \( n = 17 \), \( d.f = 17 - 1 = 16 \)

From table F, \( t_{a} = 2.583 \)

\[
\bar{x} - t_{\frac{a}{2}} \left( \frac{s}{\sqrt{n}} \right) < \mu < \bar{x} + t_{\frac{a}{2}} \left( \frac{s}{\sqrt{n}} \right)
\]

\[
91.6 - 2.583 \left( \frac{38.37}{\sqrt{17}} \right) < \mu < 91.6 + 2.583 \left( \frac{38.37}{\sqrt{17}} \right)
\]

\[
67.0 < \mu < 115.1
\]

7. **Women Representatives in State Legislature**  
A state representative wishes to estimate the mean number of women representatives per state legislature. A random sample of 17 states is selected, and the number of women representatives is shown. Based on the sample, what is the point estimate of the mean? Find the 90% confidence interval of the mean population. *(Note: The population mean is actually 31.72, or about 32.)* Compare this value to the point estimate and the confidence interval. There is something unusual about the data. Describe it and state how it would affect the confidence interval.

5 33 35 37 24 31 16 45 19 13 18 29 15 39 18 58 132

C.I. = 0.90, \( \bar{x} = 33.4 \), \( s = 28.7 \), \( n = 17 \), \( d.f = 17 - 1 = 16 \)

From table F, \( t_{a} = 1.746 \)

\[
\bar{x} - t_{\frac{a}{2}} \left( \frac{s}{\sqrt{n}} \right) < \mu < \bar{x} + t_{\frac{a}{2}} \left( \frac{s}{\sqrt{n}} \right)
\]

\[
33.4 - 1.746 \left( \frac{28.7}{\sqrt{17}} \right) < \mu < 33.4 + 1.746 \left( \frac{28.7}{\sqrt{17}} \right)
\]

\[
21.2 < \mu < 45.6
\]

The 90% confidence interval for the mean population is \( 21.2 < \mu < 45.6 \).

Based on the data from the sample, the point estimate of the mean is 33.4 which is close to the actual population mean of 32. Notice that a mean of 32 is within the 90% confidence interval. What is unusual about the data is that 132 is too large compared to the other values. Therefore this value affects the sample mean and for this reason the mean is not the best point estimate.

8. **Oil Production**  
A random sample of the number of barrels (in millions) of oil produced per day by world oil-producing countries is listed here. Estimate the mean oil production with 95% confidence.

3.56 1.90 7.83 2.83 1.91 5.88 2.91 6.08
C.I. = 0.95, \( \bar{x} = 4.1125 \) \quad s = 2.2025 \quad n = 8 \quad d.f = 8 - 1 = 7

From table F, \( t_{a \over 2} = 2.365 \)

\[
\frac{\bar{x} - t_a}{\frac{s}{\sqrt{n}}} < \mu < \frac{\bar{x} + t_a}{\frac{s}{\sqrt{n}}}
\]

\[
4.1125 - 2.365 \left( \frac{2.2025}{\sqrt{8}} \right) < \mu < 4.1125 + 2.365 \left( \frac{2.2025}{\sqrt{8}} \right)
\]

2.271 < \mu < 5.954

10. **Substitute Teacher Salaries**  

The daily salaries of substitute teachers for eight local school districts is shown. What is the point estimate for the mean? Find the 90% confidence interval of the mean for the salaries of substitute teachers in the region.

<table>
<thead>
<tr>
<th>60</th>
<th>56</th>
<th>60</th>
<th>55</th>
<th>70</th>
<th>55</th>
<th>60</th>
<th>55</th>
</tr>
</thead>
</table>

\( \bar{x} = 58.875 \approx 58.9 \) \quad s = 5.083 \approx 5.1 \quad n = 8 \quad d.f = 8 - 1 = 7

C.I. = 90%

From table F, \( t_{a \over 2} = 1.895 \)

\[
\frac{\bar{x} - t_a}{\frac{s}{\sqrt{n}}} < \mu < \frac{\bar{x} + t_a}{\frac{s}{\sqrt{n}}}
\]

\[
58.9 - 1.895 \left( \frac{5.1}{\sqrt{8}} \right) < \mu < 58.9 + 1.895 \left( \frac{5.1}{\sqrt{8}} \right)
\]

55.5 < \mu < 62.3

The point estimate of the mean is \( \bar{x} = 58.9 \).

The 90% confidence interval of the mean for the salaries of substitute teachers in the region is 55.5 < \mu < 62.3

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13. **Gasoline Costs**  

A recent study of 25 students showed that they spent an average of $18.53 for gasoline per week. The standard deviation of the sample was $3.00. Find the 95% confidence interval of the true mean.
The 95% confidence interval of the true mean is $17.29 < \mu < 19.77$.

17. **Carbohydrates in Soft Drinks**  the number of grams of carbohydrates in a 12-ounce serving of a regular soft drink is listed here for a random sample of sodas. Estimate the mean number of carbohydrates in all brands of soda with 95% confidence.

48   37   52   40   43   46   41   38
41   45   45   33   35   52   45   41
30   34   46   40

C.I. $= 0.95$,  $\bar{x} = 18.53$  $s = 3$  $n = 25$  $d.f = 25 - 1 = 24

From table $F$,  $t_{\frac{a}{2}} = 2.064$

$\bar{x} - [t_{\frac{a}{2}} \left( \frac{s}{\sqrt{n}} \right)] < \mu < \bar{x} + [t_{\frac{a}{2}} \left( \frac{s}{\sqrt{n}} \right)]$

$18.53 - [2.064 \left( \frac{3}{\sqrt{25}} \right)] < \mu < 18.53 + [2.064 \left( \frac{3}{\sqrt{25}} \right)]$

$17.29 < \mu < 19.77$

Therefore, we can be 95% confident that the estimate mean number of carbohydrates in all brands of sodas is within the following interval: $38.8 < \mu < 44.4$. 
Exercises 7-4  1(b,c,d),2(a,b),7,8,13,16,17   P.370-371

1. In each case, find $\hat{p}$ and $\hat{q}$.

b) $n=200$ and $X=90$

$$\hat{p} = \frac{X}{n} = \frac{90}{200} = 0.45$$
$$\hat{q} = 1 - \hat{p} = 0.55$$

c) $n=130$ and $X=60$

$$\hat{p} = \frac{X}{n} = \frac{60}{130} = 0.46$$
$$\hat{q} = 1 - \hat{p} = 0.54$$

d) $n=60$ and $X=35$

$$\hat{p} = \frac{X}{n} = \frac{35}{60} = 0.58$$
$$\hat{q} = 1 - \hat{p} = 0.42$$

2. (ans) Find $\hat{p}$ and $\hat{q}$ for each percentage. (Use each percentage for $\hat{p}$.)

a) 15%

$$\hat{p} = 0.15$$
$$\hat{q} = 1 - \hat{p} = 0.85$$

b) 37%

$$\hat{p} = 0.37$$
$$\hat{q} = 1 - \hat{p} = 0.63$$

7. Work Interruptions  A survey found that out of 200 workers, 168 said they were interrupted three or more times an hour by phone messages, faxes, etc. Find the 90% confidence interval of the population proportion of workers who are interrupted three or more times an hour.

$$X = 168, \quad n = 200$$

$$\hat{p} = \frac{X}{n} = \frac{168}{200} = 0.84$$

Confidence Interval for a proportion: $\hat{p} - (z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}}) < p < \hat{p} + (z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}})$

$$\hat{q} = 1 - \hat{p} = 0.16$$
1. $z_{\alpha/2} = 1.65 \text{ for } 90\%$

$$0.84 - (1.65 \sqrt{\frac{0.84(0.16)}{200}}) < p < 0.84 + (1.65 \sqrt{\frac{0.84(0.16)}{200}})$$

$$0.797 < p < 0.883$$

The 90% confidence interval of the population proportion of workers who are interrupted three or more times an hour is: $0.797 < p < 0.883$

8. **Travel Outer Space** A CBS News/New York Times poll found that 329 out of 763 adults said they would travel to outer space in their lifetime, given the chance. Estimate the true proportion of adults who would like to travel to outer space with 92% confidence.

$$X = 329, \quad n = 763$$

$$\hat{p} = \frac{X}{n} = \frac{329}{763} = 0.43$$

Confidence Interval for a proportion:

$$\hat{p} - z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}} < p < \hat{p} + z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

$$\hat{q} = 1 - \hat{p} = 0.57$$

$$z_{\alpha/2} = 1.75 \text{ for } 92\%$$

$$0.43 - 1.75 \sqrt{\frac{0.43(0.57)}{763}} < p < 0.43 + 1.75 \sqrt{\frac{0.43(0.57)}{763}}$$

$$0.400 < p < 0.463$$

The 92% confidence interval of the true proportion of adults who would like to travel to outer space is: $0.400 < p < 0.463$

13. **Financial Well-being** in a Gallup poll of 1005 individuals, 452 thought they were worse off financially than a year ago. Find the 95% confidence interval for the true proportion of individuals that feel they are worse off financially.

$$X = 452, \quad n = 1005$$

$$\hat{p} = \frac{X}{n} = \frac{452}{1005} = 0.45$$

Confidence Interval for a proportion:

$$\hat{p} - z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}} < p < \hat{p} + z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

$$\hat{q} = 1 - \hat{p} = 0.55$$

$$z_{\alpha/2} = 1.96 \text{ for } 95\%$$
The 95% confidence interval for the true proportion of individuals that feel they are worse off financially is $0.419 < p < 0.481$.

15. **Vitamins for Women** a medical researcher wishes to determine the percentage of females who take vitamins. He wishes to be 99% confident that the estimate is within 2 percentage points of the true proportion. A recent study of 180 females showed that 25% took vitamins.

a) How large should the sample size be?

$\hat{p} = 0.25; \hat{q} = 1 - \hat{p} = 0.75$

Formula to find the sample size: $n = \frac{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}$

$n = 0.25(0.75)(\frac{2.58}{0.02})^2 = 3121$

b) If no estimate of the sample proportion is available, how large should the sample be?

$n = \frac{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}$ Formula to find the sample size

Since the $\hat{p}$ is not available, use $\hat{p} = 0.5$

$n = 0.5(0.5)(\frac{2.58}{0.02})^2 = 4161$

16. **Windows** a recent study indicated that 29% of the 100 women over age 55 in the study were widows.

a) How large a sample must one take to be 90% confident that the estimate is within 0.05 of the true proportion of women over ages 55 who are widows?

$\hat{p} = 0.29; \hat{q} = 1 - \hat{p} = 0.71$

Formula to find the sample size: $n = \frac{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}$

$n = 0.29(0.71)(\frac{1.65}{0.05})^2 = 225$
b) If no estimate of the sample proportion is available, how large should the sample be?

Formula to find the sample size:  \( n = \frac{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}{2} \)

Since the sample proportion \( \hat{p} \) is not available, use \( \hat{p} = 0.5 \)

\[ n = 0.5(0.5)(\frac{1.65}{0.05})^2 = 273 \]

17. **Heights of Men** a researcher wishes to estimate the proportion of adult males who are less than 5 feet 5 inches tall. She wants to be 90% confident that her estimate is within 5% of the true proportion.

a) How large a sample should be taken if in a sample of 300 males, 30 were less than 5 feet 5 inches tall?

\( X = 300, n = 30 \)

\[ \hat{p} = \frac{X}{n} = \frac{30}{300} = 0.1 \]

\[ \hat{q} = 1 - \hat{p} = 0.9 \]

Formula to find the sample size:  \( n = \frac{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}{2} \)

\[ n = 0.1(0.9)(\frac{1.65}{0.05})^2 = 99 \]

b) If no estimate of the sample proportion is available, how large should the sample be?

Formula to find the sample size:  \( n = \frac{\hat{p}\hat{q}(\frac{z_{\alpha/2}}{E})^2}{2} \)

Since the sample proportion is not provided, use \( \hat{p} = 0.5 \)

\[ n = 0.5(0.5)(\frac{1.65}{0.05})^2 = 273 \]