[redacted]

7.8 z critical value in the large-sample two-sided confidence interval for μ should be used to obtain:

a 98%
z critical = 2.33

b 85%
z critical = 1.44

c 75%
z critical = 1.15

d 99.9%
z critical = 3.27

7.10 a What is the value of the sample mean resonance frequency?

$\bar{x} \pm 1.96 \frac{s}{\sqrt{n}}$

sample mean = 115 for both

b The confidence level for (114.4, 115.6) is 90%, and the confidence level for (114.1, 115.9) is 99%. The larger confidence level covers more, so the larger interval will have a larger confidence level (99%).

7.12 a Calculate a 95% 2-sided CI for the population mean concentration for species 1.

$9.15 \pm 1.96 \frac{1.27}{\sqrt{56}}$ (8.82, 9.48)

b Calculate a 99% 2-sided CI for population mean concentration for species 2.

$3.08 \pm 2.575 \frac{1.71}{\sqrt{61}}$ (2.52, 3.64)

The interval is wider than that for part a because the confidence level and sample standard deviation both increased

$\boxed{7.16}$ $\mu_s \approx \sigma$ $\quad \sigma_s \approx \frac{\sigma}{\sqrt{2n}}$

$$S \sim N\left(\sigma, \frac{\sigma}{\sqrt{2n}}\right) \qquad N(0,1)$$

$$z = \frac{S-\sigma}{\frac{\sigma}{\sqrt{2n}}} \sim N(0,1) \qquad s = 3.73 \quad n = 169$$

$$-1.96 \leq \frac{3.73-\sigma}{\frac{\sigma}{\sqrt{2(169)}}} \leq 1.96$$

$$-1.96 \frac{\sigma}{18.38} \leq 3.73-\sigma \leq 1.96 \frac{\sigma}{18.38}$$

$$-.10661\sigma \leq 3.73-\sigma \leq .10661\sigma$$

$$\sigma(-.10661+1) \leq 3.73 \leq \sigma(.10661+1)$$

$$.89\sigma \leq 3.73 \leq 1.10661\sigma \qquad (3.37, 4.18$$

$\boxed{7.22}$ Calculate a 2-sided CI using a 99% confidence level for the proportion that got it correct.

$$p = 142/507 = .280079 \qquad n = 507$$

$$.28 \pm 2.575\sqrt{\frac{.28(1-.28)}{507}}$$

$$(.23, .33)$$

$\boxed{7.24}$ Calculate an upper confidence bound using a confidence level of 99% for the proportion of all such births that result in children of low birth weight.

$$\frac{7.2}{100} = \frac{x}{487} \qquad 3.5064 \qquad n = 487$$

$$p = \frac{3.5064}{487} = .0072$$

$$p \pm (\text{critical z value}) \sqrt{\frac{p(1-p)}{n}}$$

$$.0072 \pm 2.575 \sqrt{\frac{.0072(1-.0072)}{487}} = .017065$$

$\boxed{7.30}$ Use data to estimate with CI 95% the difference between true average compressive strength for both data sets.

$$\bar{x}_1 - \bar{x}_2 \pm (1.96) \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$26.99 - 35.76 \pm 1.96 \sqrt{\frac{4.89^2}{68} + \frac{6.43^2}{74}}$$

$$-8.77 \pm 1.87009 \Rightarrow (-6.89, -10.64)$$

$\boxed{7.32}$ Calculate a CI based on the following data to estimate the true mean difference btwn scores.

$$\bar{X}_1 - \bar{X}_2 \pm 1.96 \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$143.7 - 131.7 \pm 1.96 \sqrt{\frac{21.2^2}{40} + \frac{20.9^2}{40}}$$

(2.7742, 21.2258)

using a 95% confidence level

$n = 20$

$\boxed{7.46}$ $\bar{x} = 8.74$ $s = .66$ 0 days

$n = 20$ $\bar{x} = 4.96$ $s = .39$ 20 days

$$8.74 - 4.96 \pm 1.96\sqrt{\frac{.66^2}{20} + \frac{.39^2}{20}}$$

$$(3.444,\ 4.116)$$

Confidence interval for the difference between true average firmness for the different sets of apples using CI = 95%. The interval describes that the apples with a shelf life of 0 days will be less firm than the apples with a shelf life of 20 days.

$\boxed{7.50}$ $\boxed{a}$ Calculate a 99% CI for the difference

$$33.4 - 42.8 \pm 2.575\sqrt{\frac{2.2^2}{26} + \frac{4.3^2}{26}}$$

$$-9.4 \pm 2.43$$

$$= (-11.84,\ -6.96)$$

The true average load for carbon beams is higher than that for the fiberglass beams

$\boxed{b}$ Yes, it suggests that true average load for the carbon beams is more than that for the fiberglass beams. (Because the CI is negative)

BUT THE UPPER 2-SIDED CI LIMIT IS NOT THE SAME AS AN UPPER ONE-SIDED CONF LIMIT.