8.11 $\sigma = 3$ $\bar{x} = \dfrac{91.6 + 88.75 + 90.8 + 89.95 + 91.3}{}$

$= \dfrac{452.4}{5} = 90.48$

$100(1-\alpha) = 95$

$(1-\alpha) = 0.95$

$\alpha = 0.05$ $\alpha/2 = 0.025$

Mean, standard deviation are known.
$n=5$ ($n<40$, but σ is known)

$$\bar{x} - z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \le \mu \le \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$90.48 - (1.96)(1.34) \le \mu \le 90.48 + 1.96(1.34)$$

$$87.85 \le \mu \le 93.10$$

8.15 $\sigma^2 = 1000 \text{ psi}^2$

$n = 12$ $\bar{x} = 3250$

$\sigma = 31.62$ CI $= 95\%$ $z_{\alpha/2} = 1.96$

a) $\bar{x} = 3250$

$$\bar{x} - z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \le \mu \le \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

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$$3250 - 1.96\left(\frac{31.62}{3.46}\right) \le \mu \le 3250 + 1.96\left(\frac{31.62}{3.46}\right)$$

$$3232.088 \le \mu \le 3267.911$$

b) $CI = 99\%$

$$z_{\alpha/2} = 2.58$$

$$3250 - 2.58\left(\frac{31.62}{3.46}\right) \le \mu \le 3250 + 2.58\left(\frac{31.62}{3.46}\right)$$

$$3250 - 23.577 \le \mu \le 3250 + 23.577$$

$$3226.423 \le \mu \le 3273.577$$

Scanned by CamScanner

8.29 $n = 16$

$\bar{x} = 60139.7$

$s = 3645.94$

$n - 1 = 15$

$CI = 95\%$ $100(1-\alpha) = 95$

$1 - \alpha = 0.95$

$\alpha = 0.05$ $\alpha/2 = \cancel{0.025}$ or

$= 0.025$

$$\bar{x} - t_{\alpha/2, n-1} \frac{s}{\sqrt{n}} \leq \mu \leq \bar{x} + t_{\alpha/2, n-1} \frac{s}{\sqrt{n}}$$

$$60139.7 - (2.131) \frac{3645.94}{\sqrt{16}} \leq \mu \leq$$

$$60139.7 + 2.131 \frac{3645.94}{\sqrt{16}}$$

$$58197.3254 \leq \mu \leq 62082.074$$

8.48 $n = 15$ $s = 0.008$

$n-1 = 14$ $CI = 99\%$ $\alpha = 0.01$

Lower bound:

$$\frac{(n-1)s^2}{\chi^2_{\alpha,n-1}} \le \sigma^2$$

$\chi^2_{\alpha,n-1} =$

$\chi^2_{0.01,14} = 29.14$

$$\frac{(14)(0.005)^2}{29.14} \le \sigma^2$$

$$10^{-5} \times 3.0768 \le \sigma^2$$

$$0.0000307 \le \sigma^2$$

8.66 $CI = 99\%$ $Z_{\alpha/2} = Z_{0.005} = 2.58$

$E = 0.017$

$p = 0.5 = \frac{1}{2}$ (Assume)

$$n = \left(\frac{Z_{\alpha/2}}{E}\right)^2 p(1-p) = \left(\frac{2.58}{0.017}\right)^2 0.25$$

$$= 5758.13$$

Sample size required $\rightarrow$ $n = 5759$