§7.1

(1) a). Find the confidence level for the interval

$$\bar{x} \pm 2.81 \frac{\sigma}{\sqrt{n}}$$

Soln:

$z_{\frac{\alpha}{2}} = 2.81 \Rightarrow \frac{\alpha}{2} = 1 - \phi(2.81) = 0.0025.$

So $\alpha = 0.005$ and the confidence level is $100(1-\alpha)\% = \boxed{99.5\%}$

b). Find the confidence level for the interval

$$\bar{x} \pm 1.44 \frac{\sigma}{\sqrt{n}}$$

$z_{\frac{\alpha}{2}} = 1.44 \Rightarrow \frac{\alpha}{2} = 1 - \phi(1.44) = 0.075$

So $\alpha = 0.015$ and the confidence level is $100(1-\alpha)\% = \boxed{85\%}$

c). $CL = 99.7 \Rightarrow \alpha = 0.003 \Rightarrow \frac{\alpha}{2} = 0.0015.$

From the table, $\boxed{z_{\frac{\alpha}{2}} = 2.96}$

d). $CL = 75\% \Rightarrow \alpha = 0.25$

$\Rightarrow \frac{\alpha}{2} = 0.125$

from the table, $\boxed{Z_{\frac{\alpha}{2}} = 1.15}$

(2.) (114.4, 115.6) (114.1, 115.9)

a). for both intervals, $\bar{x}$ must be in the center.

$115.6 - 114.4 = 1.2$

$\Rightarrow \frac{1.2}{2} = 0.6$

$114.4 + 0.6 = \boxed{115 = \bar{x}}$

Check: $115.9 - 114.1 = 1.8$

$\Rightarrow \frac{1.8}{2} = 0.9$

$114.1 + 0.9 = \boxed{115 = \bar{x}}$

b). The first interval (114.4, 115.6) has confidence level 90% while the second interval (114.1, 115.9) has confidence level 99%. we know this because to increase confidence we must increase width of the interval, so the wider interval must have the higher confidence.

§7.2 HW8

(12.) Since $n = 110 \geq 30$, we can approximate the distribution with the normal distribution by CLT.

99% CL $\Rightarrow$ $\alpha = 0.01$ $\Rightarrow$ $\frac{\alpha}{2} = 0.005$

$n = 110$

$\bar{x} = 0.81$

$s = 0.34$

$$\bar{x} \pm z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} = 0.81 \pm 2.58 \cdot \frac{0.34}{\sqrt{110}}$$

$$= \boxed{(0.726, 0.894)}$$

(24.) Since $n = 56 \geq 30$, we may approximate the distribution with the normal distribution by CLT.

95% CL $\Rightarrow$ $\alpha = 0.05$ $\Rightarrow$ $\frac{\alpha}{2} = 0.025$

$n = 56$

$\bar{x} = 8.17$

$s = 1.42$

$$\bar{x} \pm z_{\frac{\alpha}{2}} \cdot \frac{s}{\sqrt{n}} = 8.17 \pm 1.96 \cdot \frac{1.42}{\sqrt{56}}$$

$$= \boxed{(7.798, 8.542)}$$