

# ANSWER KEY - PROBLEM SET 9

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

$$\bar{x} = \frac{114.4 + 115.6}{2} = 115$$
$$\bar{x} = \frac{114.1 + 115.9}{2} = 115$$

b. - (114.4, 115.6) is the 90% CI because this interval is not as wide as the other.

5.) a. -  $4.85 \pm 1.96 \frac{0.75}{\sqrt{20}} = (4.52, 5.18)$

b. -  $4.50 \pm 2.33 \frac{0.75}{\sqrt{16}} = (4.12, 5)$

c. -  $n = \left( \frac{2(1.96)(0.75)}{0.4} \right)^2 = 54.02 \approx 55$

d. -  $n = \left( \frac{2(2.58)(0.75)}{0.20} \right)^2 = 374.42 \approx 375$

8.)  $P\left(-z_{\alpha_1} < \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} < z_{\alpha_2}\right) = 1 - \alpha$

$$-z_{\alpha_1} \frac{\sigma}{\sqrt{n}} < \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} < z_{\alpha_2} \frac{\sigma}{\sqrt{n}}$$
$$-z_{\alpha_1} \frac{\sigma}{\sqrt{n}} - \bar{x} < -\mu < z_{\alpha_2} \frac{\sigma}{\sqrt{n}} - \bar{x}$$
$$\bar{x} + z_{\alpha_1} \frac{\sigma}{\sqrt{n}} > \mu > \bar{x} - z_{\alpha_2} \frac{\sigma}{\sqrt{n}} \quad \checkmark$$

c. - The CI in part (b) is shorter.

$$\max(x_i) = x_1 = 42 \quad n = 5 \quad \alpha = 0.05$$

$$(4.2, \frac{4.2}{(0.05)^{1/5}}) = (4.2, 7.65)$$