8.1: Finding μ when we know σ

Conditions:

1. Know σ.
2. $n \geq 30$ or normal

Confidence Interval:

$$\bar{x} - E < \mu < \bar{x} + E$$

Margin of Error $= E = z_c \frac{\sigma}{\sqrt{n}}$

12) $\bar{x} = 5.35$
$\sigma = 1.85$
$n = 8$
normal

b) I know σ & told normal.

a) 95% Confidence Interval:

$z_{.95} = 1.96$

$E = z_c \frac{\sigma}{\sqrt{n}} = 1.96 \times \frac{1.85}{\sqrt{8}} = 1.28$

$\bar{x} - E < \mu < \bar{x} + E$

$5.35 - 1.28 < \mu < 5.35 + 1.28$

$4.07 < \mu < 6.63$

d) $E = 1.10$

$E = z_c \cdot \frac{\sigma}{\sqrt{n}}$

$1.10 = 1.96 \cdot \frac{1.85}{\sqrt{n}}$

$1.10 = \frac{3.626}{\sqrt{n}}$

$1.10\sqrt{n} = 3.626$

$\sqrt{n} = \frac{3.626}{1.10}$

$n = \left(\frac{3.626}{1.10}\right)^2 = 10.86\ldots$

≈ 11

14) $n = 40$ $n \geq 30$

$\bar{x} = \$6.88$ per 100 lbs

$\sigma = \$1.92$ per 100 lbs

a) 90% CI: $z_c = 1.645$

$$E = 1.645\left(\frac{\$1.92}{\sqrt{40}}\right) = \$.50 \text{ per 100 lbs}$$

$\$6.88 - .50 < \mu < \$6.88 + .50$

$\$6.38 < \mu < \$7.38$ per 100 lbs

b) $E = .30$

$E = z_c \frac{\sigma}{\sqrt{n}}$

$.30 = 1.645\frac{(1.92)}{\sqrt{n}}$

$.30\sqrt{n} = (1.64)(1.92)$

$\sqrt{n} = \frac{(1.64)(1.92)}{.3}$

$n = \left(\frac{(1.64)(1.92)}{.3}\right)^2$

$= 110.16...$

≈ 111

c) 90% CI for 15 tons:

$15(2000) = 30000$ lbs

$\frac{30000}{100} = 300$

$\$6.38(300) < \mu < \$7.38(300)$

$\$1914 < \mu < \$2214$

$E = \frac{2214 - 1914}{2} = \$150$