Day: Chapter 7 Date: / /20

Example 7.3

(a)

$\mu = 34, \sigma = 15, n = 100$

$\mu = \mu_{\bar{x}} = 34$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

$\sigma_{\bar{x}} = \frac{15}{\sqrt{100}} \rightarrow \frac{15}{10}$

$\boxed{\sigma_{\bar{x}} = 1.5}$

(b) The central limit theorem states that for large sample size(n), the sampling distribution will be approximately normal

(C)

$P(x > 30) = 1 - P(\bar{x} < a)$

$Z = P\ \frac{\bar{x} - \mu_{\bar{x}}}{\sigma/\sqrt{n}}$

$\bar{x} = 30, \mu_{\bar{x}} = 34, \sigma = 15, n = 100$

$Z = \frac{30 - 34}{15/\sqrt{100}}$

$Z = \frac{-4}{1.5}$

$\boxed{Z = -2.667}$

$P(x > 30) = 1 - .00379$

$\boxed{P(x > 30) = 0.9962}$

(d) Find 95 percentile

$P(x < k) = 0.95$

Date: / /20

$$P\left(\frac{\bar{x}-\mu}{\sigma/\sqrt{n}} < \frac{k-34}{15/\sqrt{100}}\right) = 0.95$$

$$P\left(Z < \frac{k-34}{1.5}\right) = 0.95$$

$$\phi\left(\frac{k-34}{1.5}\right) = 0.95$$

$$\frac{k-34}{1.5} = \phi 0.95$$

$$\frac{k-34}{1.5} = 1.65$$

$$k-34 = 1.65 \times 1.5$$

$$k-34 = 2.475$$

$$k = 2.475+34$$

$$\boxed{k = 36.5}$$

Try 9 of 7.4.

$\bar{x} = 16.01$, $n = 34$, $\mu = 16.00$

$\sigma = 0.143$

$(P\ \bar{x} > 16.01)\ 1 - P(\bar{x} < a)$

$$Z = \frac{\bar{x}-\mu}{\sigma/\sqrt{n}}$$

$$Z = \frac{16.01-16.00}{0.143/\sqrt{34}}$$

$$Z = \frac{0.01}{0.0245}$$

$$\boxed{Z = 0.4081}$$

$P(\bar{x} > 16.01) = 1-.65542$

$\boxed{P(\bar{x} > 16.01) = 0.34}$

Day:_____ Date: 1/120

Example 7.1

$\mu = 90, \sigma = 15, n = 25$

Find Sample mean is between 85 and 92.

Solution:

$$P(a \leq \bar{x} \leq b) = \phi(b) - \phi(a)$$

$$P(85 \leq \bar{x} \leq 92) = P\left(\frac{85-90}{15/\sqrt{25}} \leq Z \leq \frac{92-90}{15/\sqrt{25}}\right)$$

$$= P\left(\frac{-5}{3\cancel{15}/\cancel{5}} \leq Z \leq \frac{2}{3\cancel{15}/\cancel{5}}\right)$$

$$P(-5/3 \leq Z \leq 2/3)$$

$$P(-1.67 \leq Z \leq 0.67)$$

Z Table

$-1.67 = .4746$, $0.67 = .74857$

$P(-1.67 \leq z \leq 0.67) = .74857 - .4746$

$P(-1.67 \leq Z \leq 0.67) = 0.2739$

Example 7.2

$\mu = 2, \sigma = 0.5, n = 50$

between 1.8 and 2.3

Solution:

$$P(a \leq \bar{x} \leq b) = \phi(b) - \phi(a)$$

$$P(1.8 \leq z \leq 2.3) = P\left(\frac{1.8-2}{0.5/\sqrt{50}} \leq Z \leq \frac{2.3-2}{0.9/\sqrt{50}}\right)$$

$$= P\left(\frac{-0.2}{0.0707} \leq Z \leq \frac{0.3}{0.0707}\right)$$

Date: __/__/20__

Try it 7.1

$\mu = 45, \sigma = 8, n = 30$

between 42 and 50

Solution:

$$P(a < \bar{x} < b) = \Phi(b) - \Phi(a)$$

$$P(42 < \bar{x} < 50) = P\left(\frac{42-45}{8/\sqrt{30}} < z < \frac{50-45}{8/\sqrt{30}}\right)$$

$$P\left(\frac{-3}{1.4606} < z < \frac{5}{1.4606}\right)$$