MATH 1550 HW8 FALL 2018

Section 5.4

#12 spreadsheet posted online

#16 Given: $n=100$, $\mu=24$, $\sigma=1.25$

population parameters

Find: $P(\bar{x} < 24.3)$

sample mean of a sample of 100 from the population

Soln: Note that $\mu_{\bar{x}} = \mu = 24$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{1.25}{10} = 0.125$$

Thus convert

$$\bar{x} < 24.3$$

into a z-score by computing

$$\frac{\bar{x}-\mu_{\bar{x}}}{\sigma_{\bar{x}}} < \frac{24.3-\mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{24.3-24}{0.125}$$

$$z < 2.4$$

Therefore

$$P(\bar{x}<24.3) = P(z<2.4) \overset{\text{TABLE}}{=} 0.9918$$

#17 Given: $n=45$, $\mu=550$, $\sigma=3.7$

Find: $P(\bar{x} > 551)$

Soln: $\mu_{\bar{x}} = \mu = 550$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{3.7}{\sqrt{45}} = 0.551$$

So, $$P(\bar{x}>551) \overset{\text{convert to z-score}}{=} P\left(z > \frac{551-\mu_{\bar{x}}}{\sigma_{\bar{x}}}\right)$$

$$= P(z > 1.81)$$

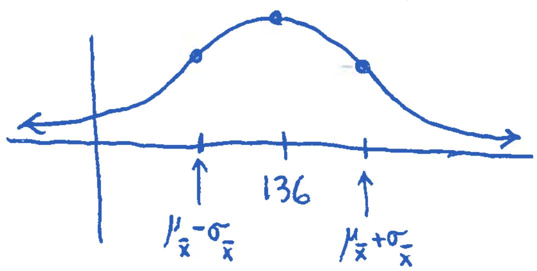
$$= 1 - P(z<1.81)$$

$$\overset{\text{TABLE}}{=} 1 - 0.9649 = 0.0351$$

#20) Given: $\mu = 136$, $\sigma = 4.66$, $n = 15$

$\downarrow$

$\mu_{\bar{x}} = 136 \quad \sigma_{\bar{x}} = \frac{4.66}{\sqrt{15}} = 1.203$



#28) $\mu = 65{,}700$, $\sigma = 14{,}500$, $n = 48$

Find: $P(\bar{x} < 63{,}400)$

Soln; Here: $\mu_{\bar{x}} = 65{,}700$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = 2092.89$

$$P(\bar{x} < 63{,}400) = P\left(z < \frac{63{,}400 - \mu_{\bar{x}}}{\sigma_{\bar{x}}}\right)$$

$$= P(z < -1.099)$$

$$\overset{\text{TABLE}}{=} 0.1379$$

Section 6.1

#23) $c = 0.99$, $\bar{x} = 10.5$, $\sigma = 2.14$, $n = 45$

$\downarrow$

$z_c \overset{\text{TABLE}}{=} 2.575$, $E = \frac{z_c \sigma}{\sqrt{n}} = \frac{(2.575)(2.14)}{\sqrt{45}} = 0.821$

Confidence interval: $\bar{x} - E = 9.679$
$\bar{x} + E = 11.321$

$\Rightarrow$ 99% confidence interval is $9.679 < \mu < 11.321$

#26) We are told the confidence interval is $(21.61, 30.15)$. Thus

$$\begin{cases} \bar{x} - E = 21.61 & (i) \\ \bar{x} + E = 30.15 & (ii) \end{cases}$$

Solve (i) for $\bar{x}$ to get

$$(\star) \quad \boxed{\bar{x} = E + 21.61}$$

Plug this into (ii) to get

$$(E + 21.61) + E = 30.15$$

combine like terms and subtract 21.61

$$2E = 8.54$$

div by 2

$$\boxed{E = \frac{8.54}{2} = 4.27}$$

plug this back into $(\star)$

$$\bar{x} = 4.27 + 21.61 = 25.88$$

#29) Using $n = \left(\frac{z_c \sigma}{E}\right)^2$ with $c = 0.90$, $\sigma = 6.8$, $E = 1$,

TABLE

$z_c = 1.645$

we calculate

$$n = \left(\frac{(1.645)(6.8)}{1}\right)^2 = 125.12 \xrightarrow{\text{round up}} 126$$

#37 **Given:** $n = 50$, $\bar{x} = 2650$, $\sigma = 425$, $c = 0.95$ $\xrightarrow{\text{TABLE}}$ $z_c = 1.96$

First compute

$$E = \frac{z_c \sigma}{\sqrt{n}} = \frac{(1.96)(425)}{\sqrt{50}} = 117.80$$

Confidence interval

$$\bar{x} - E = 2650 - 117.80 = 2532.2$$

$$\bar{x} + E = 2650 + 117.80 = 2767.8$$

So confidence interval for μ with 95% confidence is

$$2532.2 < \mu < 2767.8$$