Chapter: 06

Q2.

(a) $\overline{X} = 19.9$

(b) std_unbiased = 3.51

stderr = 1.11

(c) $\text{stderr} = \frac{\text{std\_unbiased}}{\sqrt{N}}$

$$N = \left(\frac{\text{std\_unbiased}}{\text{stderr}}\right)^2$$

$$= \left(\frac{3.51}{0.1}\right)^2$$

$$= 1232$$

Q4.

$N = 40$, $\overline{X} = 340$, $\sigma = 75$

(a) $\alpha = 1 - 0.68$

$= 0.32$

$\frac{\alpha}{2} = 0.16$

$Z_{0.16} = \pm 1$

$$\left[340 - 1 \times \frac{75}{\sqrt{40}},\ 340 + 1 \times \frac{75}{\sqrt{40}}\right]$$

$[328.1, 351]$

(b) $\alpha = 1 - 0.99$

$\frac{\alpha}{2} = 0.005$

$Z_{0.005} = \pm 2.57$

$$\left[340 - 2.57 \times \frac{75}{\sqrt{40}},\ 340 + 2.57 \times \frac{75}{\sqrt{40}}\right]$$

$[309.5, 370.4]$

Q6.

$$F = \begin{cases} 1, & 0.51 \\ 0, & 0.48 \end{cases}$$

$$M = \begin{cases} 1, & 0.48 \\ 0, & 0.51 \end{cases}$$

(a) $\alpha = 1 - 0.99$

$\frac{\alpha}{2} = 0.005$

$Z_{0.005} = \pm 2.57$

std-unbiased $= 0.5$

$$\left[0.51 - 2.57 \times \frac{0.5}{\sqrt{2009}}, 0.51 + 2.57 \times \frac{0.5}{\sqrt{2009}}\right]$$

$[0.48, 0.53]$

(b) $\alpha = 1 - 0.99$

$\frac{\alpha}{2} = 0.005$

$Z_{0.005} = \pm 2.57$

std-unbiased $= 0.$

$$\left[0.49 - 2.57 \times \frac{0.5}{\sqrt{2009}}, 0.49 + 2.57 \times \frac{0.5}{\sqrt{2009}}\right]$$

$[0.46, 0.538]$

Chapter 07

Q1.

$\mu = 169 \qquad \sigma = 10$

$\bar{x} > 200$

$$z = \frac{200 - 169}{\frac{10}{\sqrt{50}}}$$

$= 21.9 \quad , Z_{21.9} = 0$

$P(X > 200) = 0$

Q2.

$\mu = 5 \quad , \sigma = 0.7$

(a) $N = 30 \quad , \bar{x} < 4$ (b) $N = 300$

$$z = \frac{4-5}{\frac{0.7}{\sqrt{30}}} \qquad z = \frac{4-5}{\frac{0.7}{\sqrt{300}}}$$

$$= -7.8 \qquad = -24.7$$

(c) As N increases, stderr decreases causing 4kg to be less likely.

Q3.

$H_0 : \mu = 25$

$H_A : \mu \neq 25$

$N = 10$

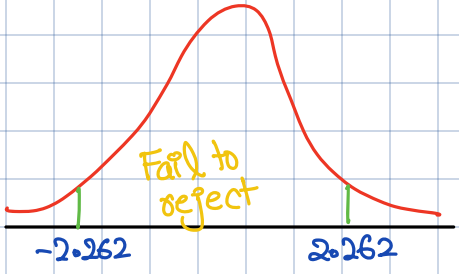
$\bar{x} = 19.9$

std_unbiased = 3.51

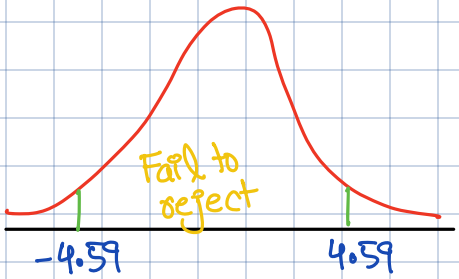
$$t = \frac{19.9 - 25}{\frac{3.51}{\sqrt{10}}}$$

$$= -4.59$$

Method -01:



Method 02:



↳ We reject H_0

$$p\text{-value} = \frac{0.001 + 0.0005}{2}$$

$$= 0.00075$$

p-value $< \alpha$

↳ We reject H_0

7.4

$\mu = 10$, $N = 100$, $\bar{x} = 7$, $\sigma = 1$

$$z = \frac{7 - 10}{\frac{1}{\sqrt{100}}}$$

$$= -30$$

$Z_{0.025} = \pm 1.96$

$\hookrightarrow$ We reject H_0

p-value $= 0$

p-value $< \alpha$

$\hookrightarrow$ We reject H_0