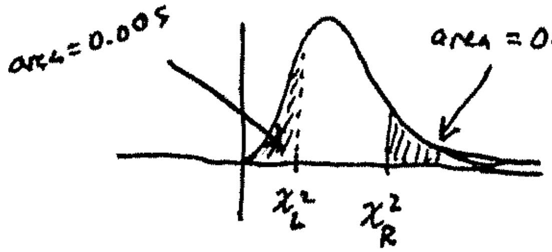
§6.4 #17

$$\begin{bmatrix} n = 14 \\ s = 3.90 \\ c = 0.99 \end{bmatrix}$$

$n = 14 \rightarrow$ d.f. $= 13$

$c = 0.99 \rightarrow \dfrac{1-c}{2} = \dfrac{1-0.99}{2} = 0.005$



$$\Rightarrow \begin{cases} \chi_R^2 = 29.819 \\ \chi_L^2 = 3.565 \end{cases}$$

Confidence interval:

variance:

$$\frac{(n-1)s^2}{\chi_R^2} < \sigma^2 < \frac{(n-1)s^2}{\chi_L^2}$$

$$\frac{13(3.90)^2}{(29.819)} < \sigma^2 < \frac{13(3.90)^2}{3.565}$$

$$\downarrow$$

$$6.631 < \sigma^2 < 55.464$$

std. dev:

$$\sqrt{\frac{(n-1)s^2}{\chi_R^2}} < \sigma < \sqrt{\frac{(n-1)s^2}{\chi_L^2}}$$

$$\downarrow$$

$$\sqrt{6.631} < \sigma < \sqrt{55.464}$$

$$\downarrow$$

$$2.575 < \sigma < 7.44$$

§7.2 #31

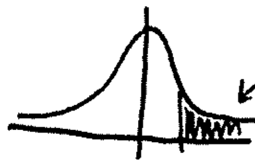
$$\begin{bmatrix} n = 50 \\ \bar{x} = 31 \\ \sigma = 2.5 \\ \alpha = 0.01 \end{bmatrix}$$

$H_0: \mu \le 30$

claim → $H_a: \mu > 30$

↓

right tail



z_0

area = 0.01

↓ (Table)

$z_0 = 2.33$

rejection region:

$$\boxed{z > 2.33}$$

test statistic:

$$\begin{bmatrix} z = \dfrac{\bar{x} - \mu}{\sigma_{\bar{x}}} \\ \sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}} \end{bmatrix}$$

$$\sigma_{\bar{x}} = \frac{2.5}{\sqrt{50}} = 0.3535$$

$$\boxed{z = \frac{31 - 30}{0.3535} = 2.82} > 2.33 \quad \text{(in RR)}$$

Therefore we reject Ho.

"There is sufficient evidence to support the claim."

§7.2 #34

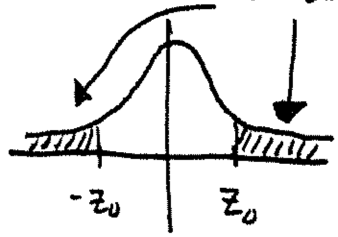
claim → $H_0: \mu = 48.8$

$H_a: \mu \neq 48.8$

two-tailed

$\alpha = 0.05$
$n = 120$
$\bar{x} = 49.5$
$\sigma = 3.6$

total area = 0.05



area of each: $\frac{\alpha}{2} = 0.025$

table → $-z_0 = -1.96$
$z_0 = 1.96$

rejection region

$z > 1.96$ or $z < -1.96$

test statistic:

$$\left[z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} \qquad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \right]$$

$$\sigma_{\bar{x}} = \frac{3.6}{\sqrt{120}} = 0.3286$$

$$\boxed{z = \frac{49.5 - 48.8}{0.3286} = 2.1302} > 1.96$$

↓

reject H_0

"There is sufficient evidence to reject the claim."