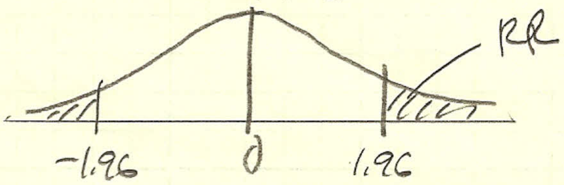
1) $H_0: \mu = 12.4 \quad \sigma = 2.6 \quad n = 20 \quad \bar{X} = 11.3 \quad \alpha = .05$

ⓐ $H_a: \mu \neq 12.4$

TWO-SIDED TEST

$$Z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} = \frac{11.3 - 12.4}{2.6/\sqrt{20}} = -1.892$$

$$Z_{\frac{\alpha}{2}} = Z_{.025} = 1.96$$

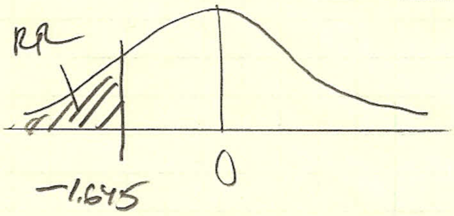


SINCE $-Z_{.025} \leq -1.892 \leq Z_{.025}$, $\boxed{\text{FAIL TO REJECT } H_0}$

ⓑ $H_a: \mu < 12.4$

ONE-SIDED TEST

$$-Z_\alpha = -Z_{.05} = -1.645$$



SINCE $-1.892 \leq -Z_{.05}$, $\boxed{\text{REJECT } H_0}$

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2) $H_0: \mu_A = \mu_B$ (NO DIFF) USE t-STAT

$H_a: \mu_A < \mu_B$ (LOWER TAIL)
$$T = \frac{(\bar{X}_A - \bar{X}_B) - (\mu_1 - \mu_2)}{S_p\sqrt{\frac{1}{n_A} + \frac{1}{n_B}}}$$

$t_{.05,23} = 1.714$

THIS YIELDS LOWER CI

$$\left(-\infty, (\bar{X}_1 - \bar{X}_2) + t_\alpha S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}\right)$$

$DOF = 11 + 14 - 2 = 23$

$$= (64 - 69) + 1.714(7.9208)(.4029)$$

$$S_p = \sqrt{\frac{(10)(52) + (13)(71)}{23}} = 7.9208$$

$$= -5 + 5.4689 = .46987$$

$\boxed{\text{SO, 95\% ONE SIDED CI IS } (-\infty, .46987)}$ $\boxed{\text{SINCE CI CONTAINS 0, NO EVIDENCE OF A DIFFERENCE}}$

IF ONE DID A TWO-SIDED

$$-5 \pm (2.069)(7.9208)(.4029) = \begin{cases} 1.6027 \\ -11.6027 \end{cases}$$

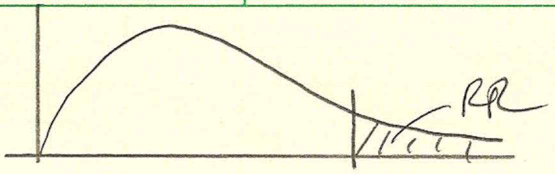
STILL CONTAINS 0 ⇒ SAME CONCLUSION.

3) $\sigma^2 = 100$ $\quad H_0: \sigma^2 = 100$

$n = 20$ $\quad H_a: \sigma^2 > 100$

$S^2 = 158.63$

$\alpha = .01$



$$\chi^2 = \frac{(19)(158.63)}{100} = 30.1397 \qquad \chi^2_{.01,19} = 36.19$$

$\boxed{\text{SINCE } 30.1397 < \chi^2_{.01}, \text{ FAIL TO REJECT } H_0. \text{ NO DIFF. BETW. STANDARD TEST AND NEW TEST}}$

CAN'T DO 2-SIDED TEST. $\chi^2_{.005}$ NOT IN BOOK

OUR $\chi^2 = 30.1397 = \chi^2_{.05,19}$

$\Rightarrow \boxed{p = .05}$

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4) a) $H_0: \mu_M = \mu_W$

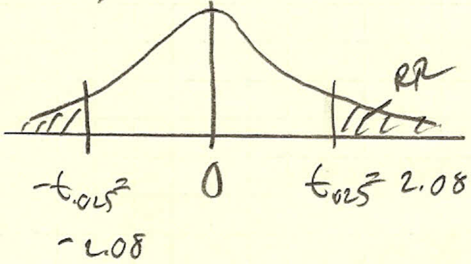
$H_a: \mu_M \neq \mu_W$

$\alpha = .05$

$t_{.025,4} = 2.08$

$$T = \frac{(\bar{X}_M - \bar{X}_W) - (\mu_M - \mu_W)}{S_p\sqrt{\frac{1}{n_M} + \frac{1}{n_W}}} \qquad S_p = \sqrt{\frac{(12)(9.1) + (9)(26.4)}{21}} = 4.0637$$

$$= \frac{(16.2) - (14.9)}{4.0637(.4206)} = .76059$$



SINCE $-t_{.025} \leq .76059 \leq t_{.025}$

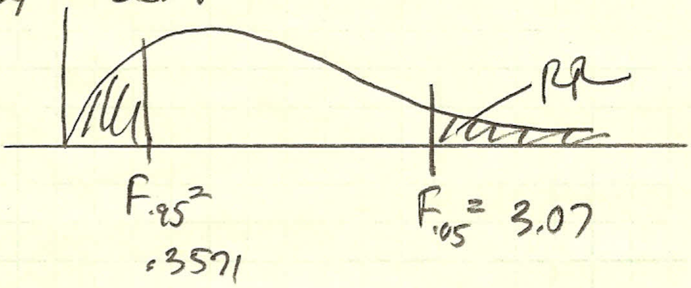
$\boxed{\text{FAIL TO REJECT } H_0. \text{ NO DIFF BETW. MEANS}}$

b) $H_0: \sigma_M^2 = \sigma_W^2$

$H_a: \sigma_M^2 \neq \sigma_W^2$

$\alpha = .1$

$$F = \frac{S_X^2}{S_Y^2} = \frac{9.1}{26.4} = .3446$$



$F_{.05,\,12,\,9} = 3.07$

$$F_{.95,\,12,\,9} = \frac{1}{F_{.05,\,9,\,12}} = \frac{1}{2.8} = .3571$$

$\boxed{\text{SINCE } .3446 < F_{.95}, \text{ REJECT } H_0. \text{ VARIABILITY IN MEN LOWER THAN VAR. IN WOMEN!}}$