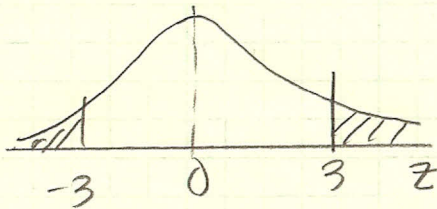


DATA2 - IN CLASS SAS

1) $n=9$ $H_0: \mu=20$
 $\sigma^2=25$ $H_1: \mu \neq 20$

REJECT IF $\bar{X} < 15$ or $\bar{X} > 25$

$$\Rightarrow \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} < \frac{15-20}{5/3} \quad \text{or} \quad \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} > \frac{25-20}{5/3}$$



$$Z < -3 \quad \text{or} \quad Z > 3$$

$$P(Z < -3 \text{ or } Z > 3) = 2P(Z > 3) = 2(0.0044) = 0.0088 - \text{TYPE I ERROR}$$

FOR TYPE 2, ACCEPT H_0 WHEN IT'S FALSE ($\mu=23$)

$$\Rightarrow 15 \leq \bar{X} \leq 25$$

$$\frac{15-23}{5/3} \leq \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \leq \frac{25-23}{5/3}$$

$$-4.8 \leq Z \leq 1.2$$

$$P(\text{TYPE 2}) = P(-4.8 \leq Z \leq 1.2) = 1 - (P(Z > 1.2) + P(Z > 4.8))$$

$$= 1 - 0.1151 - 0 = 0.8849$$

2) $H_0: \sigma^2 = 0.0025$

$H_a: \sigma^2 > 0.0025$

USE $\chi^2 = (n-1) \frac{s^2}{\sigma^2}$

$\alpha = 5\% \text{ LEVEL}$

$P(\text{TYPE I}) = P(\text{REJECT } H_0 | H_0 \text{ TRUE})$

$$= P(\chi^2 > \chi^2_{\alpha}) = P((n-1) \frac{s^2}{\sigma^2} > \chi^2_{\alpha})$$

$= \alpha$

FOR TYPE 2, NEED SPECIFIC AT $\sigma = \sigma_a$

$P(\text{TYPE 2}) = P(\text{ACCEPT } H_0 | H_0 \text{ FALSE})$

$$= P(\chi^2 \leq \chi^2_{\alpha}) = P((n-1) \frac{s^2}{\sigma_a^2} \leq \chi^2_{\alpha})$$

$= \beta$

3) $H_0: \mu=48$ USE 2-SIDED t-TEST RR: $\frac{\bar{X} - \mu}{s/\sqrt{n}} < -t_{0.05}$ or

$H_a: \mu \neq 48$ $\frac{\bar{X} - \mu}{s/\sqrt{n}} = \frac{47.1 - 48}{\sqrt{4.7/12}} = -1.438$

$\alpha = 0.1$

$\bar{X} = 47.1$

$s^2 = 4.7$

$n=12$

$t_{0.05(11)} = 1.796$

SINCE $t = -1.438 \notin \text{RR}$
 FAIL TO REJECT H_0 !

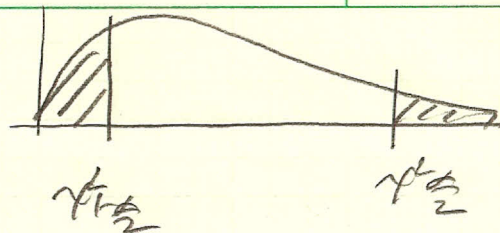
$\frac{\bar{X} - \mu}{s/\sqrt{n}} > t_{0.05}$

CI $\bar{X} \pm t_{0.05} \frac{s}{\sqrt{n}} = 2$

$(45.976, 48.22)$ $\mu=48 \in \text{CI}$
 ARE CONCLUSIVE

4) $n=51$ $H_0: \sigma = .25$
 $S^2 = .37$ $H_a: \sigma \neq .25$

$\alpha = .05$



$\chi^2_{.025} = 71.42$

$\chi^2 = \frac{(n-1)S^2}{\sigma^2} = \frac{(50)(.37)}{.25^2} = 109.52$

$\chi^2_{.975} = 32.36$

RR $\chi^2 > \chi^2_{.025}$ or $\chi^2 < \chi^2_{.975}$

SINCE $\chi^2 = 109.52 > \chi^2_{.025} = 71.42$
 REJECT H_0 !

2 SIDED CI FOR σ IS

$\left(\sqrt{\frac{(n-1)S^2}{\chi^2_{.025}}}, \sqrt{\frac{(n-1)S^2}{\chi^2_{.975}}} \right) = \left(\sqrt{\frac{50(.37)}{71.42}}, \sqrt{\frac{50(.37)}{32.36}} \right)$

$= (.3095, .4599)$

SINCE $\sigma = .25 \notin \text{CI}$, REJECT H_0 !

5) $H_0: \mu = 20$ ONE-SIDED, SO REJECT H_0 IF $t = \frac{\bar{X} - \mu_0}{S/\sqrt{n}} > t_\alpha$
 $H_a: \mu > 20$

a) $t_\alpha = t_{.05}(14) = 1.761$

$t = 3.2 > t_\alpha \Rightarrow \text{REJECT } H_0$

b) $t_\alpha = t_{.01}(8) = 2.896$

$t = 1.8 < t_\alpha \Rightarrow \text{FAIL TO REJECT } H_0$

c) FOR 23 DOF AND $t = 2.12$,

$2.069 < 2.12 < 2.5$

$t_{.025} < t < t_{.01}$

WE WOULD REJECT
 AT $\alpha = .025$ BUT
 FAIL TO REJECT AT
 $\alpha = .01$