

STA-3163 Ch.5

5.10 page 287

①

(a)

Sec  
5.2

$\bar{Y} = \log(\text{count of larvae})$

$n = 40$

$$\bar{Y} = 9.02, S = 1.12$$

Find 90% Conf Int for  $\mu$  (or  $\bar{\mu}$ )

$$\bar{Y} \pm Z_{\alpha/2} \frac{S}{\sqrt{n}}$$

$$1 - \alpha = .90$$

$$\alpha = .10, \alpha/2 = .05$$

$$9.02 \pm 1.645 \frac{1.12}{\sqrt{40}}$$

$$Z_{\alpha/2} = Z_{.05} = \frac{1.645 + 1.65}{2} \\ = 1.645$$

\* We are using here

an estimate  $s$

in place of  $\sigma$  for large sample

$$A = 1 - .95 = .05$$

$$Z_{.05}$$

$$1.645$$

$$\Rightarrow 9.02 \pm 1.645 \frac{1.12}{\sqrt{40}} \Rightarrow 9.02 \pm 1.645 (.177)$$

$$\Rightarrow 9.02 \pm .291 \Rightarrow 8.729 \leq \mu \leq 9.311$$

$\Rightarrow$  We are 90% confident that mean  $\mu$  is between 8.729 and 9.311.

Sec  
5.3

estimate of  $\sigma = \hat{\sigma} = .7$

(Ref to Example 5.4 page 242)

a) 99% Conf Int for  $\mu$

Find  $n$  for width of interval  $W = 0.3$

$$E = W/2 = .3/2 = .15$$

$$n = \left( \frac{Z_{\alpha/2} \sigma}{E} \right)^2$$

(2)

$$1 - \alpha = .99 \rightarrow \alpha = .01 \rightarrow \alpha/2 = .005$$

$$Z_{\alpha/2} \approx Z_{.005} = 2.58 \text{ (see Ex 5-4, p. 242)}$$

use estimate

$$n = \left( \frac{2.58 * .7}{.15} \right)^2$$

$$\hat{\sigma} = .7$$

$$n = (12.04)^2 = 144.96 \rightarrow \text{choose } n = 145$$

(3)

STA-3163 - Sample info:  $n=50$ ,  $\bar{Y}=25.9$ ,  $s=5.6$

Sec 5.4 (1)  $H_0: \mu \geq 28$  (2)  $\alpha = .05$  (3) Test Statistic

$H_a: \mu < 28$  (one-sided)  
(lower side)

$$Z = \frac{\bar{Y} - \mu_0}{s/\sqrt{n}}$$

(4) RR:  $Z < Z_{\alpha}$  i.e.  $Z < -1.645$

$$(5) \text{ Calculate } Z = \frac{25.9 - 28}{5.6/\sqrt{50}} = \frac{-2.1}{5.6/7.071} = \frac{-2.1}{.792} = -2.65$$

(6)  $Z = -2.65$  which is  $< -1.645 \rightarrow$  Therefore reject  $H_0 \rightarrow$  There is sufficient evidence that  $\mu$  is less than 28.

Sample info:  $n=50$ ,  $\bar{Y}=36.5$ ,  $s=13.1$

Sec 5.6 (1)  $H_0: \mu \geq 40$  (2)  $\alpha = .05$  (3) Test Stat.  $Z = \frac{\bar{Y} - \mu_0}{s/\sqrt{n}}$

$H_a: \mu < 40$  (one-sided lower side)

(4) RR: P-value  $\leq \alpha$  i.e. P-Value  $\leq .05$

$$(5) \text{ Calculate } Z = \frac{36.5 - 40}{13.1/\sqrt{50}} = \frac{-3.5}{13.1/7.071} = \frac{-3.5}{1.853} = -1.89$$

$$\text{Calculate P-Value} = P[Z < Z_{\text{cal}}] = P[Z < -1.89]$$

$$\text{P-Value} = .0294$$

(6) Since P-value = .0294 is  $< .05$ , reject  $H_0 \Rightarrow$  There is sufficient evidence that  $\mu$  is  $< 40$ .

5.37 (1)  $H_0: \mu = 80$  (2)  $\alpha = .05$  (3) Test Stat.  $t = \frac{\bar{Y} - \mu_0}{s/\sqrt{n}}$ , df =  $n-1$   
P291  $H_a: \mu > 80$  (one-sided upper side)

Sec 5.7 (4) RR:  $t > t_{\alpha}$  i.e.  $t > t_{.05}(19) = 1.729$

$$(5) \text{ Calculate } t = \frac{82.05 - 80}{10.88/\sqrt{20}} = \frac{2.05}{10.88/4.472} = \frac{2.05}{2.433} = +8.43$$

(6) since  $t = +8.43$  not  $> 1.729$ , fail to reject  $H_0$   
 $\Rightarrow$  not sufficient evidence for  $\mu > 80$ .