

SOLUTION: STATISTICAL INFERENCE (P)

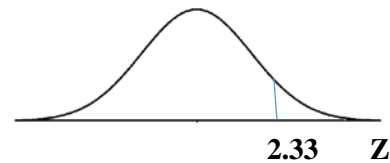
ONE-SAMPLE Z TEST FOR PROPORTION (P)

PROBLEM 1:

A researcher claims that at most 10% of smokers will develop lung cancer. A sample of 600 smokers is drawn and 88 developed lung cancer.

- (a) Test at  $\alpha = .01$
- (b) Construct a 99% 2-tail Confidence Interval. No claim has been made.

- (a)  $H_0 : P \leq .10$
- $H_1 : P > .10$



$$P_s = 88/600 = .147$$

$$Z = \frac{.147 - .10}{\sqrt{\frac{(.10)(.90)}{600}}} = \frac{.047}{.012} = 3.92$$

Therefore, reject  $H_0$   $P < .01$ .

$$(b) \quad .147 \pm 2.58 \left( \sqrt{\frac{(.147)(.853)}{600}} \right)$$

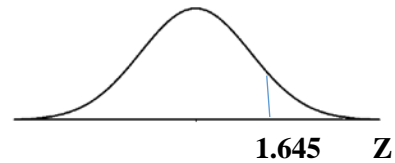
$$.110 \longleftrightarrow .184$$

**PROBLEM 2:**

A college claims that no more than 15% of their students are receiving financial aid. An auditor takes a sample of 200 students and finds that 42 are receiving aid.

- (a) Test at  $\alpha=.05$   
 (b) Construct a 95% Confidence Interval. No claim has been made.

(a)  $H_0 : P \leq .15$   
 $H_1 : P > .15$



$$P_s = \frac{42}{200} = .21$$

$$Z = \frac{.21 - .15}{\sqrt{\frac{(.15)(.85)}{200}}} = \frac{.06}{.025} = 2.4$$

Therefore, reject  $H_0$   $P < .05$ .

(b)

$$.21 \pm 1.96 \left( \sqrt{\frac{(.21)(.79)}{200}} \right)$$

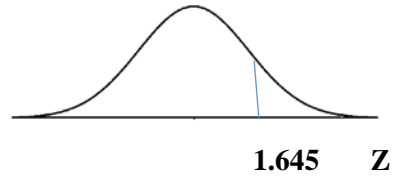
$$.15 \longleftrightarrow .27$$

**PROBLEM 3:**

A defense company working for the government claims that at most 5% of its missiles are defective. A sample of 200 missiles is taken and 18 are defective.

- (a) Test the company's claim at  $\alpha = .05$
- (b) Construct a 95% 2-sided Confidence Interval. (No claim has been made.)

- (a)  $H_0 : P \leq .05$
- $H_1 : P > .05$



$$P_s = 18/200 = .09$$

$$Z = \frac{.09 - .05}{\sqrt{\frac{(.05)(.95)}{200}}} = \frac{.04}{.0154} = 2.60$$

Therefore, reject  $H_0$   $P < .05$ .

$$(b) \quad .09 \pm 1.96 \left( \sqrt{\frac{(.09)(.91)}{200}} \right)$$

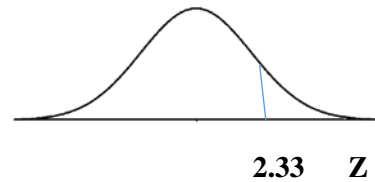
.05 ← → .13

**PROBLEM 4:**

A college claims that at most 2% of its students have plagiarized a term paper. A sample of 150 student papers is taken and 12 show signs of plagiarism.

- (a) Test the college's claim at  $\alpha = .01$
- (b) Construct a 90% 2-sided Confidence Interval.

- (a)  $H_0 : P \leq .02$   
 $H_1 : P > .02$



$$P_s = 12/150 = .08$$

$$Z = \frac{.08 - .02}{\sqrt{\frac{(.02)(.98)}{150}}} = \frac{.06}{.0114} = 5.262$$

Therefore, reject  $H_0$   $P < .01$ .

- (b)  $.08 \pm 1.645 \left( \sqrt{\frac{(.08)(.92)}{150}} \right)$   
 $.044 \longleftrightarrow .116$