

# EXAMPLES Topic 16

16-12

O.U. = <sup>under-</sup>grad students between ages of 18 & 24

$$n = 1413$$

$$\hat{p} = .76 \text{ or } 76\%$$

EQs

$$\text{mean of sample} = \hat{p}$$

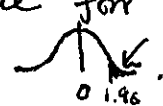
$$\text{S.D. of sample} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

a) margin of error is the half width of a Confidence Interval.  
(def. pg. 336)

$$\hat{p} + z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

from 95% confidence

note:  $z_{\alpha/2}$  same as  $z^*$   
 $\alpha$  represents <sup>1 minus</sup> confidence

$\alpha$  is ~~1~~  $1 - .95 = .05$ , so for the value of  $z_{\alpha/2}$  we look up the z-value for  $.05/2 = .025$  prob at the right side of the curve . That has a z-value of 1.96

$$\text{so } \hat{p} = .76$$

$$z_{\alpha/2} = 1.96$$

$$n = 1413$$

$$\hat{p} + z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = .76 + 1.96 \sqrt{\frac{(.76)(1-.76)}{1413}}$$

$$= .76 + 1.96 \sqrt{.000129}$$

$$= .76 + .02 = .78$$

b) The confidence interval for the parameter  $\pi$  is

$$\left( \hat{p} - z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right)$$

The right side was calculated in a)

$$\hat{p} - z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \hat{p} - .02 = .76 - .02 = .74$$

$$\text{so CI} = (.74, .78)$$

c) the technical conditions are satisfied if

$$n\hat{p} \geq 10 \quad \text{and} \quad n(1-\hat{p}) \geq 10$$

$$n\hat{p} = 1413 \times .76 > 10$$

$$n(1-\hat{p}) = 1413(.24) > 10$$

} both okay