EXAMPLES Topic 16

16-12

O.U. = undergrad students between ages of 18 & 24

$n = 1413$

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

EQs

mean of sample $= \hat{p}$

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)

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

note: $z_{\alpha/2}$ same as z^*

α represents Complimentary Confidence

from 95% confidence

α is $1-.95 = .05$, 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

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 π 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)

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

So CI = (.76, .78)

c) the technical conditions are satisfied if

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

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

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

} both okay