WILLIAM D. LAW, JR. LEARNING COMMONS

CONFIDENCE INTERVAL FOR A PROPORTION

A confidence interval is an interval of plausible values for a population proportion. It is constructed so that we can state a chosen degree of confidence that the actual value of the parameter will be between the lower and upper endpoints of the interval.

STEP 1. Check for conditions of normality.

- a random sample
- n(Þ) > 1O and n(1-Þ) > 1O
- N > 1On

STEP 2. Enter data or summary statistics.

STAT > TESTS **A: 1-PropZInt**

Inpt: Data **Stats**

x: number of "successes" in the sample
n: sample size
C-Level: degree of confidence

Output screen

1-PropZInt
(lower endpoint **,** upper endpoint **)**
Þ= sample proportion
n= sample size

STEP 3. Interpret the confidence interval.

We are ____% confident that the *population* proportion is between ______ and ______.

To find margin of error with calculator output

Margin of Error = $\frac{\boldsymbol{upper\ endpoint - lower\ endpoint}}{\mathbf{2}}$

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CONFIDENCE INTERVAL MARGIN OF ERROR

STEP 1. Find the 90% z-critical value (z_c).

2nd VARS (DISTR) **3: invNorm**

area: 1.9O/2
µ: O
ð: 1

invNorm(1.9O/2,O,1) = **1.644853626**

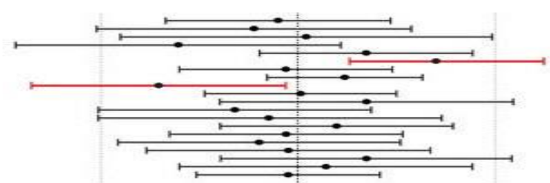
STEP 2. Use 1.645 for z_c and n and $\hat{p}$ to calculate the margin of error.

$$\hat{p} = \frac{x}{n} \quad \text{and} \quad M.E. = z_c * \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$confidence\ interval = \hat{p} \pm M.E.$$

Note: Increasing the level of confidence widens the interval giving a larger margin of error. Conversely, increasing the sample size decreases the margin of error, narrowing the interval.

Another look at the 90% Confidence Interval



The vertical line in the middle of the figure above denotes the unknown population proportion. The horizontal segments represent twenty 90% confidence intervals. The dot in the middle of each segment marks the sample proportion. Note that 18 of the 20 intervals (i.e., 90%) contain the true population proportion.