

## Confidence Interval for Probability

The C.I. is the probability error of margin. It is

$$C.I. = \text{Prob.} + / - \text{Error of Margin}$$

$$= \hat{p} + / - E$$

*$\hat{p}$  for other texts*

$$\text{where } p' = \frac{x}{n} \quad \leftarrow \text{sample's probability}$$

$$E = Z_{\alpha/2} \sqrt{\frac{p'q'}{n}} \quad \leftarrow q' = 1 - p'$$

That is, the confidence interval for population proportion  $p$ :

$$p' - E < p < p' + E$$

where  $p' = \frac{x}{n}$ ,  $E = Z_{\alpha/2} \sqrt{\frac{p'q'}{n}}$

$$-2 < z < 2$$

$$\text{TI-84: } (\hat{p} - E, \hat{p} + E)$$

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$$\text{TI-84: Stat} \rightarrow \text{TESTS} \rightarrow A: 1\text{-PropZInt} \dots :$$

eg Earlier, we had that a Pew Research Center poll of 1007 randomly selected adults showed that 85% of respondents know what Twitter is. The sample results are  $n = 1007$ .

a. Find the 95% confidence interval estimate of the population proportion  $p$ .

b. Based on the results, can we safely conclude that more than 75% of adults know what Twitter is?

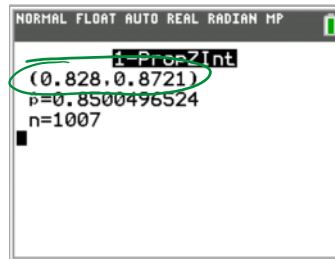
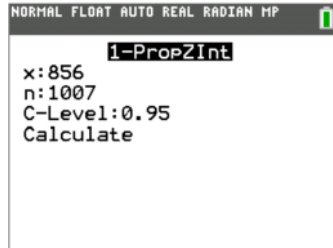
c. Assuming that you are a newspaper reporter, write a brief statement that accurately describes the results and includes all of the relevant information.

S:

a. Because  $p' = \frac{x}{n}$ ,  $x = np'$ ,

$$x = 1007 \cdot 85\%$$

round  $\left\{ \begin{array}{l} = 855.95 \\ \approx 856 \end{array} \right. \leftarrow \text{not okay for } x$



or:  $0.828 < p < 0.872$

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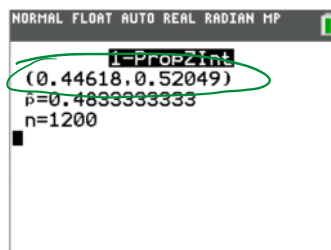
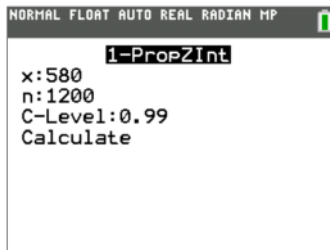
S: b. Because the C.I. is  $0.828 < p < 0.872$ . The interval is containing 75%. Then, yes.

is containing 15%. Then, yes.

C. For 95% of the time, there are 82.8% to 87.2% of people would know what Twitter is.

Eg. Suppose that a sample of 1200 registered voters in California, 580 of them said they plan to vote for Obama back in 2008. Construct the 99% confidence interval for the percentage of registered votes in California who plan to vote for Mr. Obama.

S:  
 $n = 1200$ ,  $x = 580$ , ask for 99% C.I..



$$44.6\% < p < 52.0\%$$