

## STAT 308 - Handout #21

### 12.1 CI for one popul'n proportion (p).

#### **Example**

In an article titled "Fluoridation Brushed off by Utah" it was reported that a small but vocal minority in Utah has been successful in keeping fluoride out of Utah water supplies in spite of evidence that fluoridation reduces tooth decay and the fact that a clear majority of Utah residents favour fluoridation.

To support this statement, a random sample of 120 residents was asked whether they were in favour of fluoridation or not.

- a. If 84 of the residents are in favour of fluoridation, use a 95% CI to estimate the true proportion  $p$  of all Utah residents in favour of fluoridation.
- Residents

In favour

Not in favour

$$\begin{array}{l} n \\ x \\ \alpha \\ z_{.05/2} \end{array} =$$

Point Estimate ( $\hat{p}$ ) ?                       $\hat{p} =$

Large Sample ?

$$\begin{array}{l} n\hat{p} \\ n\hat{q} \\ n \end{array} =$$

Then the 95% CI for  $p$  :

$$\begin{array}{l} \hat{p} \pm z_{.05/2} \sqrt{\frac{\hat{p}\hat{q}}{n}} \\ \\ \\ \end{array} =$$

or : ( , )

We are 95% confident that the true proportion of Utah residents in favour of fluoridation

- b. In looking at your answer in part (a), what is the margin of error in your estimation?

The proportion is estimated to be

- c. Is the interval in part (a) consistent with the statement that fluoridation is favoured by a clear majority of residents?

### Determining the Sample Size

- d. What is the sample size required to estimate the proportion of Utah residents, favouring fluoridation, with a 99% level of confidence and a margin of error less than or equal to .05 (5%)?

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

$$E =$$

$$p = ?$$

Sample size?

$$n = pq \left( \frac{z_{\alpha/2}}{E} \right)^2 =$$

The sample size required is

- e. What if we require more precision? Say  $d = .03$ .

$$n =$$

The sample size required

**Note:** The higher the precision the