## C.I. On Population Proportion

to a "class of interest."

ex: # of green m; ms out of n total m; ms

a point estimator for population proportion?

P = 10

We would like a confidence interval on the unknown population parameter P, population Proportion

whether an observation belongs or doesn't belong to a class of interest: binomially distributed either an mim is green, or iont!

$$P: \begin{cases} 1-\alpha \times 100\% & C.I. \text{ on } P \text{ is} \\ P-Z_{\alpha/2} & P \text{ is} \\ N \end{cases}$$
where  $\hat{P} = \frac{x}{n}$ 

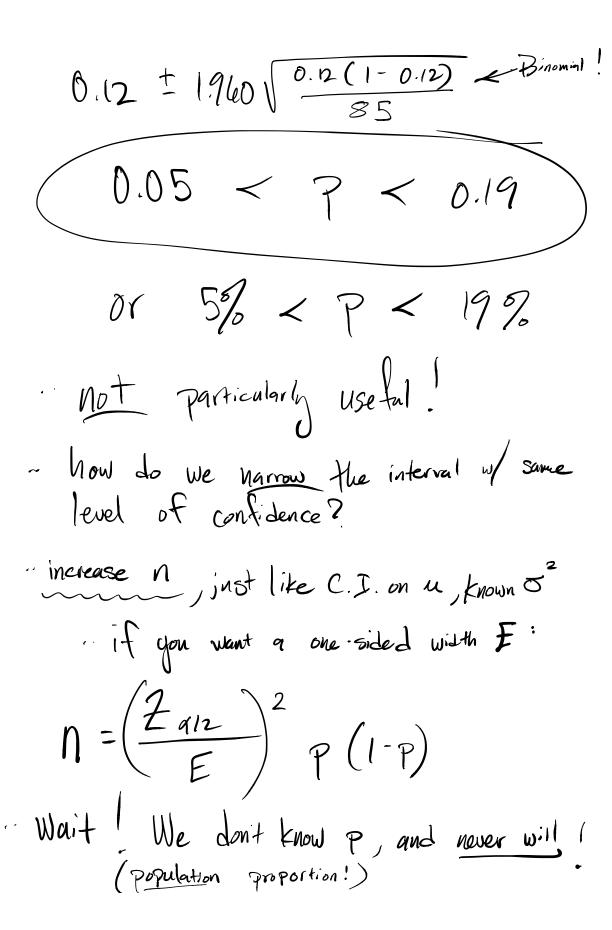
we just found that x = 10 have Surface finish rougher than allowed

write 95% confidence interval on the population proportion of bad bearings

Sample pap. proportion:
$$A = \frac{x}{N} = \frac{16}{85} = 0.12$$

$$\int \text{or } 12\%$$

. need Zaiz;



Somebody Smart Noticed a local Minimum

$$P(1-p) = 0.25$$
- no matter what p is,  $p(1-p)$  can't

exceed 0.25

or we may use
$$h = \left(\frac{2\pi n}{E}\right)^2 \cdot 0.25$$

... and it will work 1

don't forget to round up to next integer Value of N

" What if we need a width of ±2%? . then E = 0.02

$$n = \left(\frac{2a_{12}}{E}\right)^2 \cdot 0.25 \left(\frac{1.760}{0.02}\right)^2 \cdot 0.25$$

- that's a lot of cranks last bearings!

one-sided conf. bounds: use appropriate
upger or lower bound of C.J.,
and substitute Za for Za12.

Prediction Interval

this is an interval on the next value of X.

reminds you that it's the next value; hence, prediction

Widens interval

companed to a C.I.

on u due to

Uncertainty in prediction!

ex: tensile adhesion test problem; n-22, x=13.71,5=3.55

95% (.I. on u:

12.14 < U < 15.28

now write a 95% prediction interval on the tensile strength of the 23rd sample

 $t_{112, n-1} = t_{.025, 21} = 2.080$ 

 $\chi_{23}$ :  $|3,7| \pm 2.080 \cdot 3.55 \sqrt{1 + \frac{1}{22}}$ 

6-16 < ×23 < 21.26

much wider than C.I. on Me due to high sample std. dev. of 3 = 3.55