Inference for Proportions:
One Model - Three Activities

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Jennifer Bergamo *bergamoj@sunyocc.edu*
Kathleen Cantone *cantonek@sunyocc.edu*
Bridgette Jacob *jacobb@sunyocc.edu*

Onondaga Community College
Syracuse, NY

Grounded in Research

“Foster active learning in the classroom…Active learning allows students to discover, construct, and understand important statistical ideas and to model statistical thinking…Precede computer simulations with physical explorations”

GAISE College Report (2005)

“Provide students with the experience of physically drawing samples. Activities…give them a meaningful context to which they can relate to the computer simulations.”

Chance, delMas, & Garfield, (2004)

“… to improve students’ feel for the expected variability in a sampling situation, students need considerable hands-on experience in first predicting the results of samples, and then drawing actual samples, graphing the results, comparing their predictions to the actual data, and discussing observed variability in the distribution…”

Shaughnessy, Ciancetta, & Canada, (2004)

“Have students perform physical simulations to discover basic ideas of inference…We contend that simulation, not formal probability, provides the most effective introduction to sampling distributions and to concepts of inference.”

Rossman & Chance (1999)

The Sampling Distribution Model for a Proportion

Each group should take 48 samples of size n=32 from the container of beads (population).

Record the number of green beads in each sample: $\bar{x}_i$ =

Find the sample proportion for each sample: $\hat{p}_i = \frac{x}{n}$

Using the transparency provided, create a dot plot of the 48 sample proportions.

What is the shape of the distribution?

Where is it centered?

What can you determine about the spread of the distribution?

Sample	Number of Green Beads, x_i	Proportion of Green Beads, $\widehat{p_i} = \frac{x_i}{n}$
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

Sample	Number of Green Beads, x_i	Proportion of Green Beads, $\widehat{p_i} = \frac{x_i}{n}$
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		

Confidence Intervals for Proportions

Each member in your group should take a sample of n= 32 beads from the container of beads.

Record the number of green beads: X = ______

Find the sample proportion: $\hat{p} = \frac{x}{n}$

Calculate the margin of error for a 95% confidence interval:

$$E = z^{*}\sqrt{\frac{\hat{p}\hat{q}}{n}} =$$

Find the 95% confidence interval for p, the true proportion of green beads in the container:

$$\hat{p} - E < p < \hat{p} + E$$

We are 95% confident that the true proportion of green beads in the container falls between _____ and _____.

Draw your confidence interval on the transparency provided.

Compare your interval with the others listed.

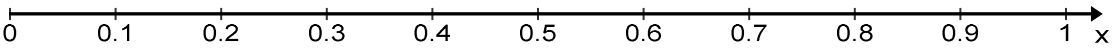
The true proportion of green beads, p, in the jar is _______.

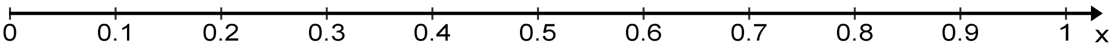
Does your confidence interval capture the true proportion of green beads in the container? _______

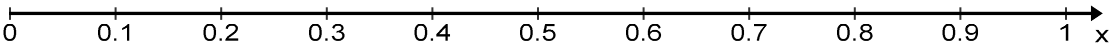
Do all of the confidence intervals listed on the transparency capture the true proportion of green beads in the container?
_____

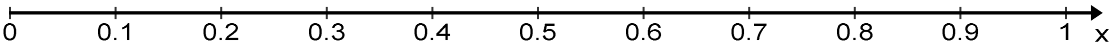
Find the proportion of confidence intervals listed on the transparency that contain p: ______ = ________%

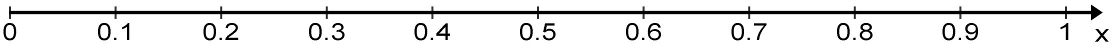
Confidence Intervals for Proportion of Green Beads

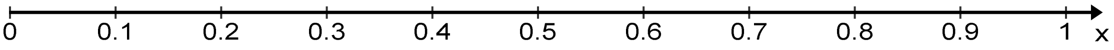


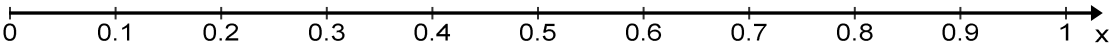


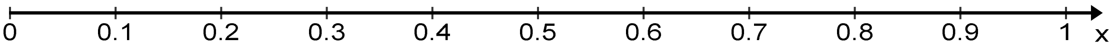


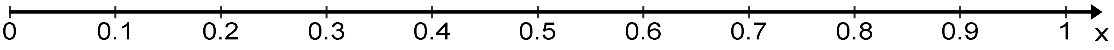


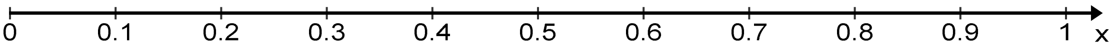












Using sampling to Test a Claim about a Population Proportion

Each group should take one sample of size n=32 from the jar of beads (population).

A student believes that the true proportion of green beads in the population is 0.14. Use your sample to test the hypothesis that the proportion of green beads in the population differs from 0.14.

Hypotheses: H_0:

H_a:

Test Statistic: $z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1-p_0)}{n}}}$ =

P-value:

Conclusion: Is your result statistically significant at the 5% level?