

1. A study done by researchers at Alfred University concluded that 80% of all student athletes in this country have been subjected to some form of hazing. The study is based on responses from 1,400 athletes. What are the margin of error and 95% confidence interval for the study?

$$.8 \pm E \quad E = 2 \sqrt{\frac{(.8)(1-.8)}{1400}} = .0214 \quad .8 \pm .0214 \quad (.7786 < p < .8214)$$

2. A study by Stanford University researchers for the Office of National Drug Control Policy and the Department of Health and Human Services concluded that 98% of the top rental films involve drugs, drinking, or smoking. Assume that this study is based on the top 400 rental films. Use the results of this sample to estimate the proportion of all films that involve drugs, drinking, or smoking, and then construct the 95% confidence interval.

$$.98 \pm E \quad E = 2 \sqrt{\frac{(.98)(1-.98)}{400}} = .014 \quad .98 \pm .014 \quad (.966 < p < .994)$$

3. The Wechsler IQ test is designed so that the mean is 100 and the standard deviation is 15 for the population of normal adults. Find the sample size necessary to estimate the mean IQ score of Minnesota residents. We want to be 95% confident that our sample mean is within 3 IQ points of the true mean. Assume that $\sigma = 15$ for Minnesota as well.

$$n = \left(\frac{2.15}{3} \right)^2 = 100$$

4. Assume that you want to estimate the proportion of students at Washburn who can correctly identify the Vice President of the United States. How many students must you randomly select in order to be 95% confident that your sample proportion is within 0.1 of the population proportion?

$$n = \frac{1}{(0.1)^2} = 100$$

5. Data from the National Center for Education Statistics on 4,400 college graduates show that the mean time required to graduate with a bachelor's degree is 5.15 years with a standard deviation of 1.68 years. Use a single value to estimate the mean time required to graduate for all college graduates, and then construct the 95% confidence interval.

$$5.15 \pm E \quad E = \left(\frac{2 \cdot 1.68}{\sqrt{4400}} \right) = .0507 \quad 5.15 \pm .0507$$

$$5.0993 < \mu < 5.2007$$

6. You select a random sample of 31 families in your neighborhood and find the following family sizes (number of people in the family):

2	3	6	5	4	2	3	3	1	2	3
2	3	4	5	3	1	3	3	4	7	3
2	3	2	2	3	4	1	5	2		

- a) What is the mean family size for the sample?

$$\bar{x} = 3.0968$$

- b) What is the standard deviation for the sample?

$$s = 1.4226$$

- c) What is the best estimate for the mean family size for the population of all American families?

The sample mean 3.0968 is the best estimate

- d) What is the 95% confidence interval for the estimate?

$$3.0968 \pm \frac{2(1.4226)}{\sqrt{31}}$$

$$2.5858 < \mu < 3.6078$$

- e) Comment of the reliability of the estimate. In other words, were there any issues with the way in which the sample was taken?

This was only a random sample taken in my neighborhood. We should take a random sample of all American families.

7. A Pew Research Center poll included 1708 randomly selected adults who were asked whether "global warming is a problem that requires immediate government action." Results showed that 939 of those surveyed indicated that immediate government action is required. A news reporter wants to determine whether these survey results constitute strong evidence that the majority (more than 50%) of people believe that immediate government action is required.

- a) What is the best estimate of the proportion of adults who believe that immediate government action is required?

$$\hat{p} = \frac{939}{1708} = .5498$$

- b) Construct a 95% confidence interval estimate of the proportion of adults believing that immediate government action is required.

$$.5498 \pm 2 \sqrt{\frac{(.5498)(1-.5498)}{1708}}$$

$$.5257 < p < .5739$$

- c) Is there strong evidence supporting the claim that the majority is in favor of immediate government action? Why or why not?

Yes because we are 95% confident that the proportion of all adults who favor immediate gov't. action is between 52.57% and 57.39%, which is greater than 50%.