

Key

Confidence Intervals and Margin of Error

1. A poll asks 956 licensed drivers whether they support a nationwide lowering of the drunk driving limit to 0.08% BAC (Blood Alcohol Content), and 72% said they did. State the margin of error and estimate a 95% and 99.7% confidence interval for the actual percentage among all licensed drivers.

margin of Error =  $.72 \pm 2 \sqrt{\frac{.72(1-.72)}{956}}$

margin of Error =  $.72 \pm 3 \sqrt{\frac{.72(1-.72)}{956}}$   
 $.72 \pm .0436$   
 $.72 \pm .4$

MARGIN of Error 4%

MARGIN of Error 3%

$.72 \pm .0290$   
 $.72 \pm .3$   
 69% - 75%

68% - 76%

2. A national poll asked 1581 adults whether or not they were satisfied with their jobs and 54% said they were. State the margin and estimate a 95% confidence interval for the actual percentage among all adults.

margin of Error =  $.54 \pm 2 \sqrt{\frac{.54(1-.54)}{1581}}$

$.54 \pm 0.025$   
 $.54 \pm 2.5%$

51.5% - 56.5%

54 ± 3  
 51 - 57

54 ± 2.5%

MARGIN of Error 3%

3. As part of a research project, a student wishes to survey students of the school to determine whether they prefer a male or female teacher. Presuming that about half of the students in the school prefer female teachers, estimate how many people the student must survey to have a margin of error of 4%.

margin of Error =  $2 \sqrt{\frac{p(1-p)}{n}}$   
 $.04 = 2 \sqrt{\frac{.5(1-.5)}{n}}$   
 $(.02)^2 = \left(\frac{\sqrt{.5(1-.5)}}{n}\right)^2$

$.0004 = \frac{.5(.5)}{n}$   
 $.0004n = .25$   
 $n = 625$

4. A survey estimated that 20% of all Americans aged 16 to 20 drove under the influence of drugs or alcohol. A similar survey is planned for New Zealand. They want a 95% confidence interval to have a margin of error of 4%. Find the necessary sample size if they expect to find results similar to those in the United States.

margin of Error =  $2 \sqrt{\frac{p(1-p)}{n}}$   
 $.04 = 2 \sqrt{\frac{.20(1-.20)}{n}}$   
 $(.02)^2 = \left(\frac{\sqrt{.20(.8)}}{n}\right)^2$

$.0004n = .16$   
 $n = 400$  people

$.0004 = \frac{.16}{n}$