A.P. Statistics

Casa Grande Union High School
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A high point of statistics is learning to interpret statistics in the news. When we studied confidence intervals, we dissected a presidential approval poll. When we studied statistical significance, we dissected studies that claim pizza consumption reduces cancer risk.

Victor's background includes economics, law and physics. This allows him to bring several applications into the classroom. Compound interest is arguably the most important application in the Algebra 5 curriculum. Below, Victor and the students maximize a profit function for a firm facing a downward sloping, linear demand curve.

One of the challenges that Victor embraces is trying to help students develop the ability to "think mathematically" and solve unfamiliar problems, such as those in the third section of the handout to the right. Victor is working on putting together projects for the end of the year. The focus will be on using the functions studied in the course to model phenomena in the real world.

Activity on the Logic of Significance Tests:

1. Several students draw a card from the first deck and record the result. After all cards have been drawn from the first deck, the students tally the results and determine if it is unlikely that half of the cards are red.
2. A second deck is shuffled and students draw a card. The students again record the number of red and black cards.
3. The students draw another card from the second deck and compare the results.

Critical Values

For a given confidence level \( C \), use the critical value \( z^* \) to determine how many standard deviations about the mean include \( C\% \) of the distribution.

Confidence Intervals for a Proportion of a Population

Recall: the Confidence Interval is always:

\[ \text{Estimate} \pm \text{Margin of Error} \]

The Margin of Error for \( p \) is:

\[ \pm z^* \times \text{SE} \]

The Confidence Interval is:

\[ p \pm z^* \times \text{SE} \]

The Critical Values for a 96% Confidence Level:

\[ z^* \approx 2.05 \]

Guided Practice

1. Suppose 25 students are surveyed and 15 of them are Republicans. Estimate the proportion of all students who are Republicans.

Estimate: \( \hat{p} = \frac{15}{25} = 0.6 \)

Margin of Error: \( \pm 1.96 \times \sqrt{\frac{0.6 \times 0.4}{25}} \approx 0.28 \)

Confidence Interval: \( 0.6 \pm 0.28 \) or \( 0.32 \) to \( 0.88 \)

2. A survey of 100 people found that 60 of them support the new policy. Estimate the proportion of all people who support the new policy.

Estimate: \( \hat{p} = \frac{60}{100} = 0.6 \)

Margin of Error: \( \pm 1.96 \times \sqrt{\frac{0.6 \times 0.4}{100}} \approx 0.13 \)

Confidence Interval: \( 0.6 \pm 0.13 \) or \( 0.47 \) to \( 0.73 \)

Conclusion:

The survey results suggest that a majority of students support the new policy, with an estimated proportion of 0.6, and a confidence interval of 0.47 to 0.73.