

8.3 TESTING A CLAIM ABOUT A PROPORTION

Much of media presentations are about proportions, percentages or probabilities

Assumptions:

1. Sample observations are a simple random sample.
1. Conditions for a binomial experiment are satisfied.
2. $np \geq 5$ and $nq \geq 5$, so that the binomial distribution of sample proportions can be approximated by a normal distribution with $\mu = np$ and $\sigma = \sqrt{npq}$.

Notation:

n = number of trials

$\hat{p} = \frac{x}{n}$ (sample proportion)

p = population proportion (used in the null hypothesis)

$q = 1 - p$

TEST STATISTIC:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$$

SIGNIFICANCE LEVEL: if α is not given, use .05.

Three Methods: Traditional, p -Value, Confidence Intervals (already done)

I. TRADITIONAL METHOD:

Step 1: Identify **claim**, H_0 , H_1 .

Note: H_0 must contain equality

Step 2: Identify the **Critical Values (C.V.)** and the **Critical Region**.

Step 3: Identify and Compute the **Test Statistic**.

Test Statistic for p : $z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$

where p is the proportion of the claim.

Step 4: Reject or Fail to Reject the Null Hypothesis

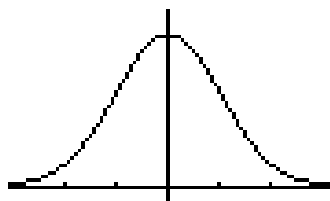
Step 5: State the Appropriate Conclusion (Flow Chart pg. 403)

Example: The Chapter Problem, pg. 391

Claim: $\alpha =$

H_0 : C.V. =

H_1 : T.S. =



Conclusion:

II. p-VALUE METHOD:

Step 1: Identify **claim**, H_0 , H_1 .

Step 2: Identify and Compute the **Test Statistic**.

$$\text{Test Statistic for } p: z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$$

where p is the proportion of the claim.

Step 3: Calculate the **p-value** associated with the test statistic.

The p -value is the probability of getting a value of the sample test statistic that is *at least as extreme* as the one found from the sample data, assuming H_0 is true.

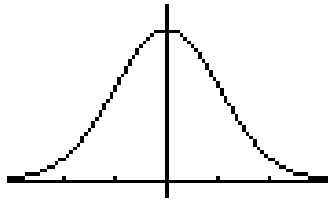
Step 4: Reject or Fail to Reject H_0 .

Reject H_0 if $p < \alpha$

Fail to Reject H_0 if $p > \alpha$

Step 5: State the Appropriate Conclusion (Flow Chart pg. 403)

*** Find the p-value associated with the test statistic of the Chapter Problem.



III. USING THE TI-83 FOR HIPOTHESIS TESTING

STAT>>TESTS 5:1PropZTest (p_o is p , the proportion of the claim)

Once again, do the Chapter Problem, this time using the calculator.

MORE PRACTICE:

Note: The problems might give x , n or % or proportion or probability.

***#6, pg. 420

$n =$

C.V.

Claim:

$x =$

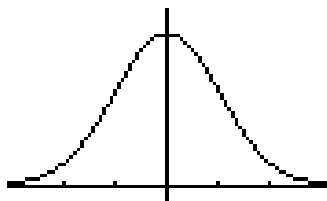
$H_0:$

$p =$

T.S.

$H_1:$

$\hat{p} =$



p-value:

Conclusion:

***#10, pg. 421

$n =$

C.V.

Claim:

$\bar{x} =$

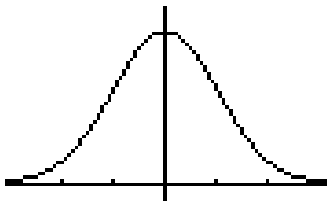
$H_0:$

$p =$

T.S.

$H_1:$

$\hat{p} =$



p-value:

Conclusion:

***#12, pg. 421

$n =$

C.V.

Claim:

$\bar{x} =$

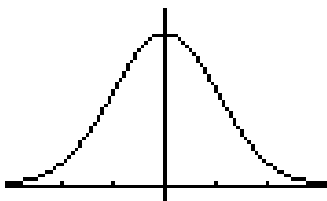
$H_0:$

$p =$

T.S.

$H_1:$

$\hat{p} =$



p-value:

Conclusion: