

Chapter 11 $\rightarrow$ Multinomial Experiments

$\rightarrow$ The Chi-Square (χ^2) Tests

$\rightarrow$ For categorical data

Section 11.1 $\rightarrow$ The Goodness of Fit Test.

Let's consider a binomial experiment & associated hypothesis test.

Claim: 17% of youth have asthma.

Sample data: $n = 400$ random youth
 $x = 88$ with asthma

Test the given claim at 1% significance.

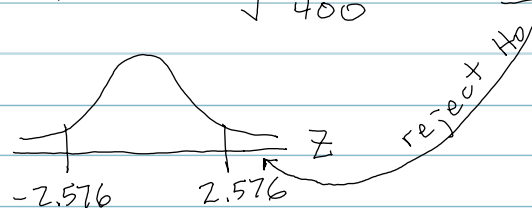
$$H_0: p = .17, H_1: p \neq .17$$

$$\text{Gather: } \hat{p} = \frac{x}{n} = \frac{88}{400} = 0.22, n = 400, \alpha = .01$$

$$\text{Requirements: } np = 400(.17) = 68 \geq 10, nq = 400(1-.17) = 332 \geq 10$$

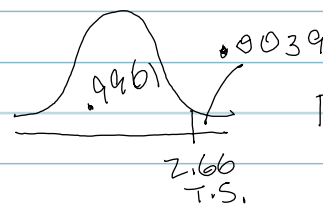
$$\text{Test Stat: } Z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = \frac{.22 - .17}{\sqrt{\frac{.17 \cdot .83}{400}}} = 2.66217$$

Z - Critical Value
 (Table A2)



P - value
 (Table A1)

Z	$\rightarrow .06$
$\downarrow$	$\downarrow$
2.6	$\rightarrow .9961$



$$p\text{-val} = 2(.0039) = 0.0078$$

$P\text{-value} < \alpha$ so reject H_0 & support H_1 .
 The data do not support the claim that 17% of youth have asthma.