1- PROPORTION Z-TEST

This test is used to compare a sample proportion ($\hat{p}$) to a population proportion (p) or to determine a confidence interval for a population proportion.

In 1995, 7,741 students identified themselves as binge drinkers (from an SRS of 140 colleges and 17, 592 students).

Does this constitute strong evidence that more than 40% of college students were binge drinkers in 1995?

P) IDENTIFY POPULATION PARAMETER:

p = proportion of US college students who were binge drinkers in 1995

H) STATE HYPOTHESES:

$H_0 : p = .40$ Ha : $p > .40$

A) VERIFY CONDITIONS REQUIRED FOR TEST:

a) SRS… says so in problem

b) N >10 (17,592) >175,920… probably

c) n p_0> 10 $n(1 - p_0) > 10$

(17,592)(.40) = 7036.8 > 10 (17,592)(.60) = 10,555.2 > 10

T) PERFORM TEST USING

a) TABLE C:

Calculate z test statistic and compare to critical z^* (or use normalcdf)

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = 10.84$$

The largest z^* in Table C is 3.291… since 10.84 > 3.291, p < .0005

DISTR ---> normalcdf (10.84, 100) = 1.14×10^{-27}
min, max

b) CALCULATOR:

STAT ⟶ TESTS ⟶ 1-Prop Z Test ⟶ p = 1.17×10^{-27} = 0

↓

X = # of successes

S) STATE CONCLUSION:

There is extremely strong evidence to reject H_0 (P-value almost 0) and conclude that more than 40% of college students in the US were binge drinkers in 1995.

CONFIDENCE INTERVAL (Use PAIS):

After checking for normal distribution [n $\hat{p}$ > 10 n(1 – $\hat{p}$) > 10], a 95% confidence interval for the proportion of college students who have engaged in binge drinking can be found using:

STAT ⟶ TEST ⟶ 1-Prop Z Int = (.433, .447)

We are 95% confident that between 43.3% and 44.7% of college students were binge drinkers in 1995.