KEY

MCTC C-Now Intro Stats **9.3 Hypothesis Tests for Population Proportions Classwork**

1. For a number of years, the proportion of entering students who survived the first year in engineering school was about 65% nationwide. Engineering schools then instituted various measures to improve the situation, including more diligent screening of admissions and more counseling help. After the change, in a random sample of 800 students who were beginning their first year at engineering school, 560 (or 70%) of the students survived the year. Is this evidence at the 5% significance level that the changes instituted by the schools were effective?

1) p = proportion of all first year engineering students who survive their first year after the new changes.
$H_0: p = .65$
$H_a: p > .65$ Right-tailed

2) $\hat{p} = .7$, $n = 800$

3) $z = \frac{.7 - .65}{\sqrt{\frac{.65(1-.65)}{800}}} = 2.96 \xrightarrow{\text{Table}} P\text{-value} = 1 - .9985 = .0015$

4) Because the P-value is significant, reject the null hypothesis. There is strong evidence to conclude that the changes were effective.

2. A 2012 survey asked a random sample of 439 U.S. teen girls aged 13-17 if they liked Justin Bieber. In this sample, 112 said "yes." The same survey was conducted in 2011 which resulted in 136 out of 439 saying that they liked the Biebs. Is this evidence that his popularity went down from 2011 to 2012?

1) p = proportion of all U.S. teen girls (13-17) who like Bieber in 2012.
$H_0: p = .31$
$H_a: p < .31$ Left-tailed

2) $\hat{p} = \frac{112}{439} = .26$, $n = 439$

3) $z = \frac{.26 - .31}{\sqrt{\frac{.31(1-.31)}{439}}} = -2.27 \xrightarrow{\text{Table}} P\text{-value} = .0116$

4) Because the P-value is significant, reject the null hypothesis. There is strong evidence to suggest that Bieber's popularity went down from 2011 to 2012.

3. According to the Centers for Disease Control and Prevention (CDC) Web site, 50% of high school students have never smoked a cigarette. Taeyeon wonders whether this national result holds true in his large, urban high school. For his AP Statistics class project, Taeyeon surveys an SRS of 150 students from his school. He gets responses from all 150 students, and 90 say that they have never smoked a cigarette. What should Taeyeon conclude? Give appropriate evidence to support your answer.

1) p = proportion of all students at Taeyeon's high school who have never smoked a cigarette.
$H_0: p = .5$
$H_a: p \neq .5$ Two-tailed

2) $\hat{p} = \frac{90}{150} = .6$, $n = 150$

3) $z = \frac{.6 - .5}{\sqrt{\frac{.5(1-.5)}{150}}} = 2.45 \xrightarrow{\text{Table}}$ P-value $= 2(1 - .9929) = .0142$

4) Because the P-value is significant, reject the null hypothesis. There is strong evidence to conclude that his high school is different than the national result.

4. A Gallup Poll found that 57.3% of the people in its random sample of 1033 U.S. adults said "Yes" when asked, "Would you like to lose weight?" Does this provide convincing evidence that the actual proportion of U.S. adults who would say they want to lose weight differs from 60%?

1) p = proportion of all U.S. adults who would say that they want to lose weight.
$H_0: p = .6$
$H_a: p \neq .6$ Two-tailed

2) $\hat{p} = .573$, $n = 1033$

3) $z = \frac{.573 - .6}{\sqrt{\frac{.6(1-.6)}{1033}}} = -1.77 \xrightarrow{\text{Table}}$ P-value $= 2(.0384) = .0768$

4) Because the P-value is not significant, we fail to reject H_0. There is not strong evidence to suggest that the proportion of U.S. adults who would say they want to lose weight differs from 60%.