Statistical Reasoning key
Hypothesis Tests

Name: Date: Class:

Hypothesis Testing of Proportions Practice

1. Jessica, who is running for student body president, claims that 80% of the student body favors her in the upcoming election. Her opponent, Diego, believes the proportion is actually lower and surveys a SRS of 90 students he feels are likely to vote. Diego finds that only 76% of the 90 students surveyed say they will vote for Jessica. Is this evidence, at a 5% significance level, that Jessica's claim is incorrect? $n = 90$ $X = .76(90)$ $68.4 \rightarrow 68$ $\alpha = .05$

- **State:** H_0: $p = 80\%$.
  H_a: $p < 80\%$.

- **Plan:** **Test type:** Left Tail P-test
- **Do:** **P-value:** 0.15
- **Conclude:** **Reject the null / Fail to Reject the null**

With a p value of 0.15 at the 5 % significance level we ***(don't have/ have)*** sufficient evidence to reject the null hypothesis and ***(can/cannot)*** conclude that the proportion in favor of Jessica is less than 80%.
(insert alternative hypothesis in context here)

2. Nationally, the proportion of red cars on the road is 0.12. A statistically-minded fan of the Philadelphia Phillies (whose team color is red) wonders if Phillies fans are more likely to drive red cars. One day during a home game, he takes an SRS of 210 cars parked at Citizens Bank Park (the Phillies home field) while a game is being played, and counts 35 red cars. (There are 21,000 parking spaces.) Is this convincing evidence that Phillies fans prefer red cars more than the general population? Support your conclusion with a test of significance of 5%.

$n = 210$ $X = 35$ $\alpha = .05$

- **State:** H_0: $p = .12$
  H_a: $p > .12$

- **Plan:** **Test type:** Right Tail P Test
- **Do:** **P-value:** 0.019
- **Conclude:** **Reject the null / Fail to Reject the null**

With a p value of .019 at the 5 % significance level we ***(don't have/ have)*** sufficient evidence to reject the null hypothesis and ***(can/cannot)*** conclude that the proportion of red cars is greater than .12.
(insert alternative hypothesis in context here)

3. Do political "attack ads" work? A congressional candidate who currently has the support of only 44% of the voters runs a television spot that aggressively attacks the character of his opponent. To determine whether the advertisement changes his support level, his pollsters survey an SRS of 450 voters and find that 186 support the candidate. Suppose his pollsters conducted a statistical test at a 5% significance level to determine if the sample accurately represented the national polls. Use the proportions to determine whether this test would reject or fail to reject the null hypothesis. $n=450$ $X=186$ $\alpha=.05$

- **State:** H_0: $p = .44$
  H_a: $p \neq .44$
- **Plan:** **Test type:** Two Tail P test
- **Do:** **P-value:** 0.25
- **Conclude:** **Reject the null / Fail to Reject the null**

With a p value of .25 at the 5 % significance level we ***(don't have/ have)*** sufficient evidence to reject the null hypothesis and ***(can/cannot)*** conclude that the proportion of voters is different from 44%.
(insert alternative hypothesis in context here)

4. Although arsenic is known to be a poison, it also has some beneficial medicinal uses. In one study of the use of arsenic to treat a rare type of blood cell cancer denoted by APL (for acute promyelitic leukemia), APL patients were given an arsenic compound as part of their treatment.

It is known that 15% of APL patients are in remission after the conventional treatment. Suppose that a study included 40 randomly selected patients (the actual number in the study was much smaller). Of the 40 patients receiving arsenic, 42% were in remission and showed no signs of leukemia in a subsequent examination (*The Washington Post*, Nov. 5, 1998). Is there sufficient evidence to conclude that the proportion in remission for the arsenic treatment is greater than 0.15, the remission proportion for the conventional treatment? Test the relevant hypotheses using a 0.01 significance level. $n=40$ $X=.42(40)$ $\alpha=0.01$
$16.8 \rightarrow 17$

- **State:** H_0: $p = .15$
  H_a: $p > 0.15$
- **Plan:** **Test type:** Right Tail P test
- **Do:** **P-value:** 0
- **Conclude:** **Reject the null / Fail to Reject the null**

With a p value of 0 at the .01 % significance level we ***(don't have/ have)*** sufficient evidence to reject the null hypothesis and ***(can/cannot)*** conclude that the proportion of patients in remission is greater than 15%.
(insert alternative hypothesis in context here)