

For the following scenarios, determine the claim, H_0 , and H_1 and then give the name of the appropriate test to use to find the test statistic and/or p-value.

1. Test the claim that a team is more likely to win if they play at their home field.

$H_0: p = 0.5$
 $H_A: p > 0.5$

1 proportion z test

or

$H_0: p_1 = p_2$
 $H_A: p_1 > p_2$

2 proportion z test

2. Test the claim that older people are more likely to snore on a regular basis than young people.

$H_0: p_1 = p_2$
 $H_A: p_1 > p_2$

2 proportion z test

3. Test the claim that, in general, cars exceed a posted speed limit of 30 mph on a particular road.

$H_0: \mu = 30$
 $H_A: \mu > 30$

1 sample T test

4. Test the claim that people pay more for a used car when purchasing it from a friend than when purchasing from a stranger.

$H_0: \mu_1 = \mu_2$
 $H_A: \mu_1 > \mu_2$

2 sample T test

Complete the following hypothesis tests using the method stated.

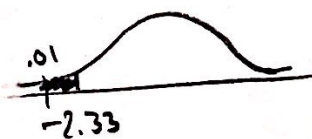
5. The Hawk-Eye electronic system is used in tennis for displaying an instant replay that shows whether a ball is in bounds or out of bounds so players can challenge calls made by referees. In the most recent U.S. Open, singles players made 611 challenges and 172 of them were successful with the call overturned. Use a 0.01 significance level to test the claim that fewer than $\frac{1}{3}$ of the challenges are successful? What do the results suggest about the ability of players to see calls better than referees? (P-value method – try to do it by hand without a calculator test → i.e. Find the test statistic using the formula and the p-value using a table.)

$H_0: p = \frac{1}{3}$
 $H_A: p < \frac{1}{3}$

$$Z = \frac{\frac{172}{611} - \frac{1}{3}}{\sqrt{\frac{(\frac{1}{3})(\frac{2}{3})}{611}}} = -2.72$$

Reject H_0

$Z_{\alpha} = -2.33$



There is sufficient evidence to support the claim that fewer than $\frac{1}{3}$ of calls are overturned.

6. Since the Hawk-Eye instant replay system was introduced, men challenged 1412 referee calls with 421 being overturned and women challenged 759 referee calls with 220 being overturned. Use a 0.05 significance level to test the claim that men and women have equal success in challenging calls. (P-value method)

$$p_1 = \frac{421}{1412} \quad H_0: p_1 = p_2$$

$$p_2 = \frac{220}{759} \quad H_A: p_1 \neq p_2$$

$$z_{\alpha/2} = \pm 1.96$$



$$\bar{p} = \frac{421 + 220}{1412 + 759} = \frac{640}{2171}$$

$$\bar{q} = \frac{1531}{2171}$$

$$z = \frac{\frac{421}{1412} - \frac{220}{759}}{\sqrt{\frac{(\frac{640}{2171})(\frac{1531}{2171})}{1412} + \frac{(\frac{640}{2171})(\frac{1531}{2171})}{759}}}$$

$z = 0.405$ Fail to Reject H_0
 There is not sufficient evidence to reject the claim that men and women have equal success challenge calls.

7. Listed below are the number of years it took for a random sample of college students to earn bachelor's degrees (based on data from the National Center for Education Statistics). Use a 0.01 significance level to test the claim that for all college students, the mean time required to earn a bachelor's degree is greater than 4.0 years. Is there anything about the data that would suggest that the conclusion might not be valid? (Do the hypothesis test anyway but state what the issue is with the data.) (Critical value method.)

4	4	4	4	4	4	4.5	4.5	4.5	4.5	4.5	4.5	6	6
8	9	9	13	13	15								

$$H_0: \mu = 4.0$$

$$H_A: \mu > 4.0$$

$$t = 3.189$$

$$t_{\alpha} = 2.539$$

Reject H_0

There is sufficient evidence to support the claim that the mean time to earn a Bachelor's degree is more than 4 years.



8. The issue of whether stress affects the recall ability of police eyewitnesses was studied in an experiment that tested eyewitness memory a week after a nonstressful interrogation of a cooperative suspect and a stressful interrogation of an uncooperative and belligerent suspect. The numbers of details recalled a week after the incident were recorded, and the summary statistics are given below. Use a 0.01 significance level to test the claim in the article that "stress decreases the amount recalled."

Nonstress: $n = 40, \bar{x} = 53.3, s = 11.6$

Stress: $n = 40, \bar{x} = 45.3, s = 13.2$

$$H_0: \mu_1 = \mu_2$$

$$H_A: \mu_1 > \mu_2$$

$$t = 2.879$$

$$t_{\alpha} = 2.426$$

$$df = 39$$

Reject H_0

there is sufficient evidence to suggest that stress decreases the amount recalled

