11.4 Section Exercises

Test Statistics for Hypothesis Tests for Two Population Proportions

Calculate the test statistic for a hypothesis test for two population proportions using the given information. Assume that the presumed difference between the population proportions is 0.

1. $x_1 = 15, \quad n_1 = 28, \quad x_2 = 21, \quad n_2 = 33,$

2. $x_1 = 139, \quad n_1 = 180, \quad x_2 = 178, \quad n_2 = 208,$

3. $x_1 = 18, \quad n_1 = 67, \quad x_2 = 20, \quad n_2 = 59,$

4. $x_1 = 62, \quad n_1 = 101, \quad x_2 = 71, \quad n_2 = 130,$

Hypothesis Tests for Two Population Proportions

Perform each hypothesis test using the method of your choice or the one assigned by your instructor. For each exercise, complete the following steps.

a. State the null and alternative hypotheses.
b. Determine which distribution to use for the test statistic, and state the level of significance.
c. Calculate the test statistic.
d. Draw a conclusion by comparing the *p*-value to the level of significance and interpret the decision.

5. A newspaper story claims that more houses are purchased by singles now than singles 5 years ago. To test this claim, two studies were conducted on the buying habits of singles over the past 5 years. In the first study, 500 house purchases in the current year were randomly selected and 100 of those were made by singles. In the second study, again 500 house purchases were randomly selected from 5 years ago and 72 of those were made by single people. Test the newspaper's claim using a 0.01 level of significance. Is there sufficient evidence to support the newspaper's claim?

6. Researchers claim that the birth rate in Bonn, Germany is higher than the national average. A random sample of 1200 Bonn residents produced 12 births, whereas a random sample of 1000 people from all over Germany had 8 births during the same year. Test the researchers' claim using a 0.05 level of significance.

7. University officials hope that changes they have made have improved the retention rate. Last year, a sample of 1926 freshmen showed that 1400 returned as sophomores. This year, 1508 of 2011 freshmen sampled returned as sophomores. Determine if there is sufficient evidence at the 0.05 level to say that the retention rate has improved.

8. Adrian hopes that his new training methods have improved his batting average. Before starting his new regimen, he was batting .220 in a random sample of 50 at-bats. For a random sample of 24 at-bats since changing his training techniques, his batting average is .375. Determine if there is sufficient evidence to say that his batting average has improved at the 0.10 level of significance.

9. There is an old wives' tale that women who eat chocolate during pregnancy are more likely to have happy babies. A pregnancy magazine wants to test this claim, and it gathers 100 randomly selected pregnant women for its study. Half of the women sampled agree to eat chocolate at least once a day, while the other half agree to forego chocolate for the duration of their pregnancies. A year later, the ladies complete a survey regarding the overall happiness of their babies. The results are given in the following table. At the 0.01 level of significance, test the claim of the old wives' tale.

Numbers of Babies

	Happy Babies	Unhappy Babies
With Chocolate	24	26
Without Chocolate	22	28

10. A new government program claims to lower high school dropout rates. In one school district, from a sample of 3400 students, the previous dropout rate was 4.5%. Two years after the start of the new program, the dropout rate has been lowered to 3.8% out of 1450 students sampled. Is there enough evidence to say that the government program is effective at lowering the high school dropout rate? Test the government's claim at the 0.10 level of significance.

11. To test the fairness of law enforcement in its area, a local citizens' group wants to know whether women and men are unequally likely to get speeding tickets. Two hundred randomly selected adults were phoned and asked whether or not they had been cited for speeding in the last year. Using the results in the following table and a 0.05 level of significance, test the claim of the citizens' group.

Speeding Tickets

	Ticketed	Not Ticketed
Men	11	75
Women	12	102

12. A study was performed to determine the percentage of people who wear life vests while out on the water. A researcher believed that the percentage was different for those who rode jet skis compared to those who were in boats. Out of 200 randomly selected people who rode a jet ski, 91% wore life vests. Out of 250 randomly selected boaters, 83.2% wore life vests. Using a 0.10 level of significance, test the claim that the proportion of people who wear life vests while riding a jet ski is not the same as the proportion of people who wear life vests while riding in a boat.