

Confidence Intervals and Hypothesis Tests: Two Samples

9.2 Z-Test to Compare Two Population Means: Independent Samples

1. A study in Turkey looked at the body image of 252 college students (148 males and 104 females). The students ranged in age from 19 to 27 years old. The students completed a body-image-satisfaction questionnaire where each item used a 5 point Likert-type scale. The mean for the males was 4.22 with a standard deviation of 0.48. The mean response for females was 4.04 with a standard deviation of 0.53. Use a 2% significance level to test the claim that males and females on average have the same body image satisfaction. What is the p-value for this test?
2. Programmers are the highest paid talent in the mainstream video game industry next to high-end businesspeople. Average salaries vary by region in the United States. A survey of 2010 data reveals that 47 randomly selected game programmers working in the eastern part of the United States earned an average of \$77,630 with a standard deviation of \$15,250. A randomly selected set of 35 game programmers in the west had average earnings of \$96,651 with a standard deviation of \$18,750. Use a 5% significance level to test the claim that programmers in the west earn more than programmers in the east.
3. The NFL is the most popular of all the sports leagues in the United States, but NFL players make, on average, the least amount of money per year. One major reason is that each NFL team has 53 total players. There are 32 NFL teams, for a total of 1,696 players. That's almost four times the number of players in pro football than in the NBA, over 1,000 more players than the NHL has, and well over twice as many players as MLB has. A random sample of 70 NFL athletes had an average salary \$1.9 million per year with a standard deviation of \$3.8 million. A sample of 68 NBA athletes had an average salary of \$5.15 million per year with a standard deviation of \$4.09 million per year. At the 1% significance level, test the claim that NFL players on average earn less than NBA players.

Answers:

1. The p-value for this test is 0.0058. The remaining parts of the hypothesis test follow:

Claim: $\mu_m = \mu_f$

H_0 : $\mu_m - \mu_f = 0$

H_a : $\mu_m - \mu_f \neq 0$

Test Stat: 2.76

Critical Value(s): ± 2.326

Initial Conclusion: Reject the null, support the alternative

Final Conclusion: The sample data warrants rejection of the claim...

2. It appears that game programmers out west earn more than their eastern counterparts.

Claim: $\mu_e < \mu_w$

H_0 : $\mu_e - \mu_w \geq 0$

H_a : $\mu_e - \mu_w < 0$

Test Stat: -4.91

Critical Value(s): -1.645

Initial Conclusion: Reject the null, support the alternative

Final Conclusion: The sample data supports the claim...

3. It appears NFL player earn a significant amount less than their NBA counterparts.

Claim: $\mu_{nfl} < \mu_{nba}$

H_0 : $\mu_{nfl} - \mu_{nba} \geq 0$

H_a : $\mu_{nfl} - \mu_{nba} < 0$

Test Stat: -4.83

Critical Value(s): -2.326

Initial Conclusion: Reject the null, support the alternative

Final Conclusion: The sample data supports the claim...