

Tests of Hypothesis: One Sample

8.3 Large-Sample Test of Hypothesis about a Population Mean

1. An exercise researcher claims that 12 weeks of anabolic steroids can help elderly men increase their lean body mass by more than 2 kilograms. A study was done to assess the early effects of a potent anabolic androgen on muscle mass, strength, lower extremity power, and functional performance in older men. The drug used in the study was Oxandrolone. Thirty-two male participants between 66 and 78 years of age were given the drug for 12 weeks. The participants had an average total lean body mass increase of 2.7 kg with a standard deviation of 1.6 kg. Use the data and a 5% significance level to test the claim that the mean lean body mass increase will be larger than 2 kg.
2. Researchers wanted to study the sexual behavior of young adults. They surveyed 83 female teenagers between 14 and 16 years old. They were asked how many times in the past year they had engaged in sexual activity with someone they considered only a friend. This is commonly referred to as a “friends with benefits” arrangement. The responses were selected from a scale that ranged from 1 (not in the last 12 months) to 8 (almost every day or every day). It was hypothesized that the mean score for young adults would be less than 2.75 on the scale (In other words, between once or twice a year and once every couple of months). The sample set of responses for the 83 girls had a mean score of 2.41 and a standard deviation of 1.11. Use the results and a 1% significance level to test the researcher’s hypothesis.
3. I have claimed in the past that the average price of Statistics textbooks was equal to \$150.00. To test my claim, I randomly sampled 39 Statistics textbooks published over the last two years. The average price for those books was \$154.27, and the standard deviation was \$21.78. Use the data collected and a 2% significance level to test the claim that the average price of Statistics texts is equal to \$150.00.

Answers:

1. *Claim* : $\mu > 2$

$$H_0 : \mu \leq 2$$

$$H_a : \mu > 2$$

$$\text{TestStat} : Z = 2.47$$

$$\text{CriticalValue} : Z = 1.645$$

Reject the null, support the alternative

The sample data supports the claim that the mean LBM increase is greater than 2 kilograms.

2. *Claim* : $\mu < 2.75$

$$H_0 : \mu \geq 2.75$$

$$H_a : \mu < 2.75$$

$$\text{TestStat} : Z = -2.79$$

$$\text{CriticalValue} : Z = -2.326$$

Reject the null, support the alternative

The sample data supports the claim that the mean response on the sexual activity scale (for the question: how often have you engaged in “friends with benefits” sex over the past year?) is less than 2.75.

3. *Claim* : $\mu = 150.00$

$$H_0 : \mu = 150.00$$

$$H_a : \mu \neq 150.00$$

$$\text{TestStat} : Z = 1.22$$

$$\text{CriticalValues} : Z = -2.326 \text{ and } Z = +2.326$$

Do not reject the null, do not support the alternative

The sample data does not allow rejection of the claim that the mean price of Statistics textbooks is \$150.00.