

Assignment 8. Hypothesis testing

Your name

March 30, 2024

Solve the following problems – each problem on a separate page – and submit to Gradescope for grading.

For each problem:

- formulate H_0 and H_1
- determine the type of the test (left-tailed, right-tailed, two-tailed)
- state which formula you are using
- state which method you will be using (p-value or rejection regions)
- state what conclusions you arrived at after your test

Clearly present every step of your computation.

How to write formulas in latex – examples:

Test statistic for a mean (normal distribution):

$$z_{DATA} = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

Test statistic for comparing two means:

$$z_{DATA} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

1 Volume of water bottles [5 points]

At a water bottling factory, a machine is supposed to put 2 liters of water into the bottles. After an overhaul, management thinks the machine is no longer putting the correct amount of water in. They sample 20 bottles and find an avg of 2.10 L of water with standard deviation of 0.33 L. Test the management's hypothesis at 0.01 level of significance.

2 Weight of males [5 points]

The government assumes the average weight of males in the US is 162.9 pounds or greater. A researcher thinks this is too high. He conducts a study of 39 males and gets an average weight of 160.1 pounds with standard deviation of 5.6 pounds. At 0.01 level of significance, test the new hypothesis.

3 Two cities: exercise [5 points]

It was always accepted that people from two nearby cities exercise the same amount. A researcher proposes a hypothesis that two cities don't exercise the same. City A surveys 36 people who answer that they exercise 2.9 hours per week on average with standard deviation of 1.1 hours. City B surveys 38 people who answer that they exercise 2.7 hours per week on average with standard deviation of 1.0 hour. Test the researcher's claim at 0.05 level of significance.