

Chapter 8

Lecture 29

Clicker Questions:

Confidence Interval,
Hypothesis testing about population mean
Type I and Type II Errors

1. Suppose we wish to test

$$H_0: \mu \leq 47 \text{ versus } H_a: \mu > 47.$$

What will result if we conclude that the mean is greater than 47 when its true value is really 52?

- A. We have made a correct decision
- B. We have made a Type I error.
- C. We have made a Type II error.
- D. None of the above are correct.

2. The reading comprehension test scores for fourth graders are believed to follow the normal distribution. Fifteen randomly selected fourth graders took the test, and their scores gave a mean of 73 and an SD of 8. The English teacher wants to construct a confidence interval for the population mean test score based on the sample of 15 fourth graders. What model should she use to find the critical value?

- A. The standard normal model.
- B. The t-model with 14 degrees of freedom.
- C. The t-model with 15 degrees of freedom.
- D. None of the above is appropriate as the sample size 15 is not large enough.

3. The label on particular brand of jam jars lists a content weight of 269 grams. A sample of 100 jars was selected from the main factory and weighed. The content weights had average 264 grams. We will test that the jam jar label of this brand correctly identifies content weight.

What is the parameter of interest?

- A. 269 grams
- B. 264 grams
- C. The mean weight of all jam jars of this particular brand from the main factory
- D. Whether or not jam jars of this particular brand are underweight

4. The label on particular brand of jam jars lists a content weight of 269 grams. A sample of 100 jars was selected from the main factory and weighed. The content weights had average 264 grams. We will test that the jam jar label of this brand correctly identifies content weight.

What is the null hypothesis?

- A. The mean weight of sampled jam jars is 264 grams.
- B. The mean weight of sampled jam jars is 269 grams.
- C. The mean weight of jam jars produced in the main factory is 264 grams.
- D. The mean weight of jam jars produced in the main factory is 269 grams.

5. The label on particular brand of jam jars lists a content weight of 269 grams. A sample of 100 jars was selected from the main factory and weighed. The content weights had average 264 grams. We will test that the jam jar label of this brand correctly identifies content weight.

What is the alternative hypothesis?

- A. The mean weight of sampled jam jars is 264 grams.
- B. The mean weight of sampled jam jars is not equal to 269 grams.
- C. The mean weight of jam jars produced in the main factory is 264 grams.
- D. The mean weight of jam jars produced in the main factory is not equal to 269 grams.

6. The label on particular brand of jam jars lists a content weight of 269 grams. A sample of 100 jars was selected from the main factory and weighed. The content weights had average 264 grams. We will test that the jam jar label of this brand correctly identifies content weight. **We know that the variability in weights of jam jars is $\sigma = 10$ grams. What is the test statistic for testing**

H_0 : the mean weight of jam jars of this particular brand is 269 grams?

- A. -10
- B. -5
- C. -0.5
- D. 0.5
- E. 5

7. The label on particular brand of jam jars lists a content weight of 269 grams. A sample of 100 jars was selected from the main factory and weighed. The content weights had average 264 grams. We will test that the jam jar label of this brand correctly identifies content weight. We know that the variability in weights of jam jars is $\sigma = 10$ grams. **The test statistic for testing $H_0: \mu = 269$ is found to be -5.**

The p-value has a value

- A. close to 0.
- B. close to 1.
- C. equal to the significance level of the test.

8. The label on particular brand of jam jars lists a content weight of 269 grams. A sample of 100 jars was selected from the main factory and weighed. The content weights had average 264 grams. We will test that the jam jar label of this brand correctly identifies content weight. We know that the variability in weights of jam jars is $\sigma = 10$ grams.

The test statistic for testing $H_0: \mu = 269$ is found to be -5.

The p-value is close to 0.

The conclusion is

- A. reject the null hypothesis at the 5% significance level.
- B. do not reject the null hypothesis at the 5% significance level.
- C. have proved that the null is false.
- D. have proved that the null is true.
- E. both (A) and (C).

9. A 99% confidence interval for the mean IQ of a population is (100, 105). Based on the same dataset, would we reject the null hypothesis: the mean IQ of the population is 106 at level 0.01 (in a 2-sided test)?

A. Yes.

B. No.

C. There is insufficient information to tell.

10. A 99% confidence interval for the mean IQ of a population is (100, 105). Based on the same dataset, would we reject the null hypothesis: the mean IQ of the population is 106 at 5% significance level (in a 2-sided test)?

A. Yes.

B. No.

C. There is insufficient information to tell.

11. A simple random sample of letters are weighed in a local postal office. The sample SD of the weights of these letters is 7 grams, and the standard error of the mean weight is 1 gram. How many letters are there in the random sample?

- A. 1
- B. 7
- C. 21
- D. 49
- E. None of the above

Answers:

1. A
2. B
3. C
4. D
5. D
6. B
7. A
8. A
9. A
10. A
11. D