



Bookmarks

- ▶ Important Pre-Course Survey
- ▶ Contact Us
- ▶ How To Navigate the Course
- ▶ Discussion Board
- ▶ Office Hours
- ▶ Week 0: Introduction to Data (Optional Review)
- ▶ Week 1: Sampling
- ▼ **Week 2: Hypothesis Testing (One Group Means)**

**Readings**

Reading Check due  
May 03, 2016 at 17:00  
UTC

**Lecture Videos**

Comprehension Check  
due May 03, 2016 at  
17:00 UTC

**R Tutorial Videos****Pre-Lab**

Pre-Lab due May 03,  
2016 at 17:00 UTC

**Lab**

Week 2: Hypothesis Testing (One Group Means) > Lecture Videos > Alpha Levels, Critical Values, and P-Values



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## Alpha Levels, Critical Values, and P-Values...Oh, My



SPEAKER: MICHAEL J.  
MAHOMETA, Ph.D.

Critical values, p-values,  
alpha level, hypothesis  
tests -

that's a lot of  
vocabulary.

But lucky for us, it's  
vocabulary that's all  
related.

We have a Null and an

▶ 0:00 / 8:04

▶ 1.0x



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## Comprehension Check

1. A medical researcher compares a new treatment for poison ivy against a traditional ointment. He finds that the new treatment significantly reduces itching, with a p-value of 0.047.

Lab due May 03, 2016  
at 17:00 UTC

**Problem Set**

Problem Set due May  
03, 2016 at 17:00 UTC

(1/1 point)

What does the p-value mean in this context?

- ☒ It is the likelihood of observing this reduction in itching if there really is no difference between the two treatments ✓
- ☐ It is the chance that the new treatment is effective.
- ☐ It is our level of confidence in the difference between the two treatments.
- ☐ It is the proportion of new treatments that were found to be more effective than traditional ointments.

2. Aviation experts fear that pilots are being asked to fly longer than is recommended by national guidelines. Current FAA regulations for domestic flights generally limit pilots to eight hours of flight time during a 24-hour period. FAA administrators conduct an analysis using a large sample of flight records for domestic flights in the past year.

(1/1 point)

2a. What are the null and alternative hypotheses for this test?

- ☒  $H_0 : \mu \leq 8 \text{ hours}$ , and  $H_a : \mu > 8 \text{ hours}$  ✓
- ☐  $H_0 : \mu \leq 8 \text{ hours}$ , and  $H_a : \mu < 8 \text{ hours}$
- ☐  $H_0 : \mu = 8 \text{ hours}$ , and  $H_a : \mu \neq 8 \text{ hours}$

- ☐  $H_0 : \mu \neq 8 \text{ hours}$ , and  $H_a : \mu = 8 \text{ hours}$

(1/1 point)

2b. If the FAA administrators want to be 95% confident in the result of their hypothesis test, what value of  $\alpha$  should they set?

- ☐  $\alpha = 0.001$

- ☐  $\alpha = 0.10$

- ☐  $\alpha = 0.025$

- ☒  $\alpha = 0.05$  ✓

(1/1 point)

2c. Identify the critical z-value(s) for this problem.

- ☐  $z = 2.31$

- ☐  $z = -1.96$

- ☒  $z = 1.64$  ✓

- ☐  $z = \pm 1.96$

(1/1 point)

2d. The average flight time for the pilots is found to be 8.12 hours. The standard deviation reported by the FAA is 0.72 hours, and there were 81 pilots in the sample. What is the z-statistic for this hypothesis test?

☐  $z = 0.15$

☐  $z = 1.10$

☒  $z = 1.50$  ✓

☐  $z = -0.15$

(1/1 point)

2e. Is the z-statistic in the critical region?

☐ Yes

☒ No ✓

☐ Cannot be determined

(1/1 point)

2f. What should be the conclusion of this test?

☐ Reject the null hypothesis.

☒ Fail to reject the null hypothesis. ✓

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