

AP Statistics

Chapter 9:

Testing a Claim: Significance Test

Day 2

HW: Lesson 2 Practice Worksheet

1. The level of dissolved oxygen (DO) in a stream or river is an important indicator of the water's ability to support aquatic life. A researcher measures the DO level at 15 randomly chosen locations along a stream. Here are the results in milligrams per liter (mg/l):

4.53	5.04	3.29	5.23	4.13	5.50	4.83	4.40
5.42	6.38	4.01	4.66	2.87	5.73	5.55	

A dissolved oxygen level below 5 mg/l puts aquatic life at risk. Can we conclude that aquatic life in this stream is at risk? Carry out a test at the $\alpha = 0.05$ significance level to help you answer this question. $\bar{x} = 4.771$ $s_x = .9396$ $n = 15$ $df = 14$ $t^* = -.943$

Hypotheses:

$H_0: \mu = 5$ (The dissolved oxygen level is 5 mg/l)

$H_a: \mu < 5$ (The dissolved oxygen level is below 5 mg/l)

p-value = .1809

Conditions:

- As stated, this is an SRS.
- $15 \leq \frac{1}{10} N \rightarrow 150$. We can assume there are at least 150 samples.
- When I plotted the data, there was no skewness or outliers.

Using my calculator, I performed a T-test. Since the p-value is .1809 and is greater than the significance level of $\alpha = .05$, we fail to reject the null hypothesis. There is not sufficient evidence to conclude the dissolved oxygen level is below 5 mg/l.

2. A college professor suspects that students at his school are getting less than 8 hours of sleep a night, on average. To test his belief, the professor asks a random sample of 28 students,

"How much sleep did you get last night?" Here are the data (in hours):

9	6	8	6	8	8	6	6.5	6	7	9	4	3	4	5
6	11	6	3	6	6	10	7	8	4.5	9	7	7		

Do these data provide convincing evidence in support of the professor's suspicion? Carry out a significance test at the $\alpha = 0.05$ level to help answer this question.

$\bar{x} = 6.643$ $s_x = 1.981$ $n = 28$ $df = 27$ $t^* = -3.625$ $p\text{-value} = .0006$

Hypotheses:

$H_0: \mu = 8$ (The average hours of sleep is 8 hours)

$H_a: \mu < 8$ (The average hours of sleep is less than 8 hours)

Conditions

- As stated, this is an SRS.
- $28 \leq \frac{1}{10} N \rightarrow 280$. We can assume that there are at least 280 students.
- When I plotted the data, there was no skewness or outliers.

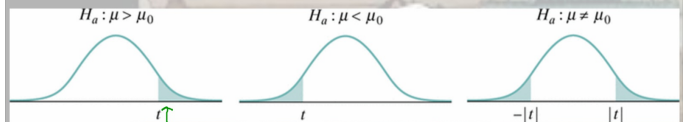
Using my calculator, I performed a T-test. Since the p-value is .0006 and is less than the significance level $\alpha = .05$, we reject the null hypothesis. There is sufficient evidence that the students get less than 8 hours of sleep.

One-Sided Tests vs Two-Sided Tests

$H_a: \mu > \mu_0$

$H_a: \mu < \mu_0$

$H_a: \mu \neq \mu_0$



$p = .04$ $p = .04$ $p = .08$

Yummy Pineapple

At the Hawaii Pineapple Company, managers are interested in the sizes of the pineapples grown in the company's fields. Last year, the mean weight of the pineapples harvested from one large field was 31 ounces. A new irrigation system was installed in this field after the growing season. Managers wonder whether this change will affect the mean weight of future pineapples grown in the field. To find out, they select and weigh a random sample of 50 pineapples from this year's crop. The Minitab output below summarizes the data.

Descriptive Statistics: Weight (oz)

Variable	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Weight (oz)	50	31.935	0.339	2.394	26.491	29.990	31.739	34.115	35.547

Do these data suggest that the mean weight of pineapples produced in the field has changed this year? Give appropriate statistical evidence to support your answer.

$H_0: \mu = 31$ (The average weight of a pineapple is 31 oz,
"is not")
 $H_a: \mu \neq 31$ (The " 31 oz.)