

## INFERENCE TESTS

Complete the table for each problem:

1. A random sample of 49 medical doctors in LA showed that they worked an average of 53.1 hours/week with a standard deviation of 7.2 hours/week. If the California average is 60 hours/week, does this give evidence that the LA doctors work significantly less than the rest of California?

<b>Type of Test:</b> T-Test for means		
<b>Parameter(s):</b> $\mu$ = average number of hours that LA doctors work		
<b>H<sub>0</sub>:</b> $\mu = 60$ hrs	<b>H<sub>a</sub>:</b> $\mu < 60$ hrs	
<b>Test Statistic:</b> $t = -6.71$	<b>P-Value:</b> .0000001	<b>Reject/Fail to Reject:</b> Reject

2. White blood cell counts are normally distributed with mean 7500 and standard deviation of 500. If a patient has taken 50 laboratory blood tests that have a mean of 6899.75 and a standard deviation of 393.44, does this give evidence that his white blood cell count is significantly different than normal?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>	<b>H<sub>a</sub>:</b>	
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

3. USA Today reported that in 1992, 39% of all elementary school children claimed that when they grow up they want to do something to help other people. However, in 1995, 128 of a random sample of 317 of these same children claimed that when they grow up they want to do something to help other people. Does this information indicate that there has been an attitude change either way?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>	<b>H<sub>a</sub>:</b>	
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

4. The manager of a sporting goods store offered a bonus commission to his salespeople when they sold more goods. A new manager dropped the bonus system. For a random sample of six sales people, the weekly sales (in thousands of dollars) are shown in the following table with and without the bonus system

Salesperson	1	2	3	4	5	6
with bonus	2.9	3.0	5.8	4.4	5.3	5.6
w/o bonus	2.8	2.5	5.9	3.5	4.6	4.6

Does this imply that sales dropped when the bonus system was discontinued?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

5. In 1975, a random sample of 1484 adult U.S. citizens was surveyed, and 193 strongly agreed with the statement, "People should take care of themselves". Then, in 1991, a survey of 1013 adult U.S. citizens showed that only 61 strongly agreed with the statement. Does this indicate that the proportion of U.S. adults who strongly agree with the given statement has dropped?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

6. Five small cities in California gave information about the percentage of 16-19 year olds not in school and the death rate per 1000 residents. Given the information below, can the percentage of 16-19 year olds not in school be used to predict the death rate? Give statistical evidence of your belief.

City	1	2	3	4	5
% of 16-19 year olds	16.2	9.9	19.5	19.7	9.8
death rate/1000	7.7	8.8	7.0	8.1	8.4

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

7. Reading Nook Bookstore has 750 retail outlets across the country. The sales director wanted to see if Christmas music affects book sales in December. She randomly assigned some of the outlets to pipe in music and others not to. Then sales records for the month of December were kept. The results are shown in Table 11-11. Test the hypothesis that sales and Christmas music are independent.

	<10,000	10-20,000	>20,000
With music	5	18	7
Without music	10	7	3

<b>Type of Test:</b>			
<b>Parameter(s):</b>			
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>	
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>	

8. The following is based on information taken from Winter Wind Studies in Rocky Mountain National Park, by Glidden. At five weather stations on Trail Ridge Road in Rocky Mountain National Park, the peak wind gusts (mi/hr) in January and April are recorded below

Weather station	1	2	3	4	5
January	139	122	126	64	78
April	104	113	100	88	61

Does this information indicate that the peak wind gusts are higher in January than April?

<b>Type of Test:</b>			
<b>Parameter(s):</b>			
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>	
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>	

9. To compare 2 dog training programs, an obedience school trained 43 dogs using Program A and 41 dogs using Program B. For Program A, the average number of training hours required was 24.8 with a standard deviation of 3.1 hours. For Program B, the mean was 22.9 hours with a standard deviation of 3.3 hours. Is there a significant difference between the two programs?

<b>Type of Test:</b>			
<b>Parameter(s):</b>			
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>	
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>	

10. Five hundred adults participated in a comparison of the effectiveness of 3 arthritic pain relievers. Each participant used 1 of the 3 medications for 1 month and then was asked if the product was effective. The results were as follows:

Effective	Pain Reliever		
	A	B	C
Yes	115	78	140
No	60	72	35

Is there a difference in the effectiveness of these pain relievers?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

11. The manufacturer of a particular brand of microwave popcorn claims that only 2 percent of its kernels of corn fail to pop. A competitor, believing that the actual percentage is larger, tests 2,000 kernels and finds that 44 failed to pop. Do these results provide sufficient evidence to support the competitor's belief?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

12. Dannon is supposed to put 29.6 grams of fruit in their fruit-flavored yogurt. To see if enough fruit is being placed in cups of fruit-flavored yogurt, a quality inspector measured the amount in 27 containers. She found an average of 28.9 grams of fruit and standard deviation of 2.8 grams. Does this show that there is probably enough yogurt in the cups?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

13. A shoe manufacturer has developed a new running shoe that purportedly enables one to run faster. Eight adults participated in an experiment in which each ran a mile with regular track shoes and then ran a mile the next day with the new shoes. Their running times in seconds are below

runner	regular shoe	new shoe
1	321	318
2	307	299
3	397	401
4	269	260
5	285	285
6	364	363
7	295	289
8	302	296

Is there evidence that the new shoe works better?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>

14. A leading auto manufacturer claimed that a popular version of its minivan was available in the Midwest for an average price of \$16,000 with a standard deviation of \$800. A consumer group doubted that report and surveyed 50 recent purchasers of the minivan to dispute the manufacturer's claim. They came up with an average of \$16,277. Does this show that the manufacturer is making a false claim?

<b>Type of Test:</b>		
<b>Parameter(s):</b>		
<b>H<sub>0</sub>:</b>		<b>H<sub>a</sub>:</b>
<b>Test Statistic:</b>	<b>P-Value:</b>	<b>Reject/Fail to Reject:</b>