

## One sample and Two Independent Samples t-test Exercise Answers

1. Is there any evidence that leadership style (as measured by the amount of controlling behavior) differs between principals in urban and rural areas in Georgia? Data are provided in Table 1 below.

Table 1: Results of t-tests and Descriptive Statistics Leadership Style by School Location

Outcome	Location						95% CI for Mean Difference	t	df
	Urban			Rural					
	M	SD	n	M	SD	n			
Leadership Style	78.56	16.70	9	69.10	19.31	10	-8.12, 27.03	1.14	17

\*  $p < .05$ .

Results from this small sample show there are not statistically significant mean differences, at the .05 level, in leadership style between urban and rural principals. Principals from both urban and rural school districts appear to display similar levels of controlling behavior.

2. Using just the urban data in Table 1, address the following research question.

Research Question: Do urban principals in Georgia show levels of controlling behavior that differ from urban principals nationwide? Prior research in this areas shows that nationally urban principals average about a 73 on this measure of controlling behavior.

Table 2

*Results of One-sample t-test and Descriptive Statistics for Leadership Style*

	M	SD	n	Comparison Value	95% CI for Mean Difference	t	df
Leadership Style	78.56	16.70	9	73.00	-7.28, 18.39	0.99	8

\*  $p < .05$ .

Leadership style of urban principals in Georgia does not appear to differ, statistically at the .05 level of significance, from the national average level of controlling behavior displayed by principals. Georgia urban principals appear to show similar levels of controlling behavior as that found nationwide.

3. Laser toner cartridges for the Hewlett-Packard LaserJet 1200 series, which cost \$75 each, are estimated to last approximately 2000 pages per cartridge assuming 5% coverage per page. To test this advertising claim, 15 toner cartridges were purchased and installed in 15 HP LaserJet 1200 printers throughout a school district. Secretaries were asked to record the number of pages printed with each cartridge and stop recording once visible lines of non-print became apparent. Below are the number of pages recorded. Is there any evidence that the advertisers' claim of 2000 pages is supported?

Number of pages recorded: 1985, 1675, 1548, 1756, 1865, 1235, 1498, 1195, 1611, 1754, 2056, 1454, 1332, 1444, and 1669

Table 3

*Results of One-sample t-test and Descriptive Statistics for LaserJet 1200 Pages Printer*

	M	SD	n	Comparison Value	95% CI for Mean Difference	t	df
Pages Printed	1605.13	255.28	15	2,000	-536.24, -253.49	-5.99*	14

\* p < .05.

The number of pages printed per HP laser cartridge was statistically different from the claim of 2000 pages at the .05 level of significance. Results show that the sample HP laser cartridges produced fewer printed pages than the claim of 2000.

4. Do children diagnosed with depression demonstrate differing levels of intelligence from students not diagnosed with depression? Data are provided below in Table 2.

Table 4: Results of t-tests and Descriptive Statistics IQ Scores by Depression Status

Outcome	Group						95% CI for Mean Difference	t	df
	Depressed			Non-depressed					
	M	SD	n	M	SD	n			
IQ Scores	103.70	13.77	10	106.40	13.45	10	-15.49, 10.09	-0.44	18

\* p < .05.

There is not a statistically significant mean difference in IQ scores between depressed and non-depressed participants at the .05 level. Results show mean IQ scores that were similar for both groups.

5. Children in 3<sup>rd</sup> grade are asked to participate in an experimental study to learn whether use of interactive storyboards result in increased academic reading interest. The experimental group participates for 10 weeks while control group does not have access to interact storyboards. At the end of 10 weeks a measure of academic reading interest is administered to both groups are scores are recorded below. Is there any evidence academic reading interest differs between these two groups at the end of 10 weeks? Academic reading interest scale ranges from 1 = low to 25 = high. Perform this test with Type 1 error rated controlled at the 5% level.

Storyboards			No Storyboards		
25	23	18	4	12	
16	19	19	17	21	
17	24	21	7	14	
21	18	20	20	25	

Table 5

*Results of t-test and Descriptive Statistics for Academic Reading Interest by Storyboard Exposure*

	Storyboard Exposure						95% CI for Mean Difference	t	df
	Yes			No					
	M	SD	n	M	SD	n			
Aca. Reading Interest	20.08	2.81	12	15.00	7.17	8	-0.99, 11.17	1.91	8.45

Note: Welch-Satterthwaite approximation employed due to unequal group variances.

\*  $p < .05$ .

Results of t-test show there is no statistically significant difference in academic reading interest between those 3<sup>rd</sup> grade students exposed to storyboards and those not exposed. This finding suggests mean scores for academic reading interest are similar whether 3<sup>rd</sup> grade students are exposed or unexposed to storyboards.

6. Is there a difference in age of spectators at football games based upon which section of stadium is sampled? Spectators beneath the luxury boxes had a mean age of 34.9 (sd = 19.3, n = 33) while those near the band had a mean age of 24.7 (sd = 9.1, n = 16). Control Type 1 rate at 5%.

Table 6

*Results of t-test and Descriptive Statistics for Spectator Age by Stadium Location*

	Stadium Location						95% CI for Mean Difference	t	df
	Near Luxury Boxes			Near Band					
	M	SD	n	M	SD	n			
Age	34.9	19.3	33	24.7	9.1	16	-2.03, -18.37	-2.51*	46.99

Note: Welch-Satterthwaite approximation employed due to unequal group variances.

\*  $p < .05$ .

There is a statistically significance difference in age depending upon which section of a football stadium is considered. Those sampled near the luxury boxes tended to be older than those sampled near the band.