

**Honors Statistics: 8-3 and 8-4
Independent and Dependent Samples**

A researcher for the EPA wants to determine if the air quality in the United States has changed over the past 2 years. You select a random sample of 10 metropolitan areas and find the number of days each year that the areas failed to meet acceptable air quality standards.

Year 1	18	125	9	22	138	29	1	19	17	31
Year 2	24	152	13	21	152	23	6	31	34	20

1. Are these sample independent or dependent? Explain
2. Construct a 90% confidence interval.
3. Based on the confidence interval, is there a significant difference in the air quality from year 1 and year 2? Explain.

The time (in minutes) it took white mice and brown mice to run a simple maze are given below.

White mice	18	24	20	13	15	12
Brown mice	25	16	19	14	16	10

4. Are these samples independent or dependent? Explain.
5. Construct a 98% confidence interval.
6. Based on the confidence interval, is there a significant difference between the time it takes the white mice and the brown mice to finish the maze? Explain.

Students in a statistics class were asked to report the number of hours they slept on weeknights and on weekends.

Student	A	B	C	D	E	F	G	H
Weeknights	8	5.5	7.5	8	7	6	6	8
Weekends	4	7	10.5	12	11	9	6	9

7. Are these samples independent or dependent? Explain.
8. At a significance level of 0.01, test the claim that there is a difference in the mean number of hours slept. Use the p-value method

A random sample of enrollments from medical schools that specialize in medical research and from those that are known for primary care is listed.

Medical Research	474	577	605	663	783	467	670	414	813	443	565	696	692
Primary Care	783	605	427	728	546	474	371	107	442	587	293	277	

9. Are these samples independent or dependent? Explain.
10. Test the claim that the enrollment is higher for medical schools who specialize in medical research. Use the traditional method.

Answers

1. Dependent
2. (-13.2, -0.2)
3. Yes
4. Independent
5. (-7.4, 8.02)
6. No
7. Dependent
8. Pvalue = .141; not a significant difference
9. Independent
10. $t(cv) = 1.796$; $t = 2.03$; yes there is a significant difference