

TI-83 Lab 6 for Statistics 503

Topics: CI of μ (small sample), test of μ (small sample), CI of $\mu_1 - \mu_2$ (small sample), tests of $\mu_1 - \mu_2$ (small, independent), μ_d (dependent or paired),

Dataset(s): none

“nitrates.dat”, a dataset of the effect of using nitrates as meat preservatives:

7251 6871 9632 6866 9094 5849 8957 7978 7468 7064 7494 7883 8178 7523 8724

Dataset(s): “activation.dat”, a dataset of the times (in seconds) for a series of fire-prevention sprinkler systems:

27 41 22 27 23 35 30 33 24 27 28 22 24

Confidence Intervals For Mean μ , Small Sample. In a study to determine the effects of nitrates as meat preservatives, 15 data values, given in “nitrate.dat” above, are observed. Assuming the underlying distribution is normal, determine both a 90% and 95% CI for the mean effect of nitrates, μ .

In this case, the data values must first be stored in one of the STAT lists, say list L_1 :

- STAT ENTER 7251 ENTER \cdots 8724 ENTER

Then, a 90% CI (“t-interval”) is given by:

- STAT TESTS 8
- DATA ENTER ∇ 2nd L_1 ∇ 1 ∇ 0.90 ∇ ENTER

After some effort, the pair of numbers, (7332.9, 8244.7), which are the upper and lower limits of the 90% CI, is returned.

Then, a 95% CI (“t-interval”) is given by:

- STAT TESTS 8
- DATA ENTER ∇ 2nd L_1 ∇ 1 ∇ 0.90 ∇ ENTER

The pair of numbers, (7233.7, 8343.9), which are the upper and lower limits of the 95% CI, is returned.

Test For Mean μ , Small Sample. In a study of the times of first sprinkler activation (in seconds) for a series of tests of fire-prevention sprinkler systems, 13 data

values, given in “activation.dat” above, are observed. The system has been designed so that the true average activation time is supposed to be at most 25 seconds. Assume the underlying distribution is normal.

In this case, the data values must first be stored in one of the STAT lists, say list L_1 :

- STAT ENTER 27 ENTER \cdots 24 ENTER

Then, the p-value for this “t-test” is given by:

- STAT TESTS 2
- DATA ∇ 25 ∇ L_1 ∇ $> \mu_o$ ENTER ∇ CALCULATE ENTER

The p-value 0.0426 is returned.

Confidence Interval For Difference in Means $\mu_1 - \mu_2$, Independent Samples. Hematocrit level³ is a measure of the concentration of red cells in blood. The hematocrit levels for a random sample of nine 17-year-old males and six 17-year-old females is given by:

males	3.06	2.78	2.87	3.52	3.81	3.60	3.30	2.77	3.62
females	1.31	1.17	1.72	1.20	1.55	1.53			

In this case, the data values must first be stored in two of the STAT lists, say list L_1 and L_2 .

A *pooled* 95% confidence interval of the difference in means, $\mu_1 - \mu_2$, is given by, is given by:

- STAT TESTS 0:2-SampTInt...
- DATA ENTER Data ∇ 2nd L_1 ∇ 2nd L_2 ∇ 1 ∇ 1 ∇ 0.95 ∇ Yes ∇ ENTER

After some effort, the pair of numbers, (1.4562, 2.2351), which are the upper and lower limits of the pooled 95% CI, is returned.

An *unpooled* 95% confidence interval of the difference in means, $\mu_1 - \mu_2$, is given as before, only, this time, answer “no” to the question, “Pooled?”. In this case, the pair of numbers, (1.4976, 2.1935), which are the upper and lower limits of the *unpooled* 95% CI, is returned.

Test For Difference in Means $\mu_1 - \mu_2$, Independent Samples. Hematocrit level⁴ is a measure of the concentration of red cells in blood. The hematocrit levels for a random sample of nine 17-year-old males and six 17-year-old females is given by:

³Samuels, related to Example 7.1, p 190 and Example 7.3, p 193, 1989.

⁴Samuels, related to Example 7.1, p 190 and Example 7.3, p 193, 1989.

males	3.06	2.78	2.87	3.52	3.81	3.60	3.30	2.77	3.62
females	1.31	1.17	1.72	1.20	1.55	1.53			

In this case, the data values must first be stored in two of the STAT lists, say list L_1 and L_2 .

A *pooled* two-sided test $\mu_1 - \mu_2 \neq 0$ is given by, is given by:

- STAT TESTS 4:2-SampleTTest
- DATA ENTER Data ∇ 2nd L_1 ∇ 2nd L_2 ∇ 1 ∇ 1 ∇ $\mu_1 \neq \mu_2$ ∇ Yes ∇ ENTER

The p-value 0.000000042 is returned.

Test For Difference in Means $\mu_d = \mu_1 - \mu_2$, Dependent Samples. First get the calculator to determine the differences in the paired data and then perform either a “t-test”, or, if $n > 30$, a “z-test”.