

TI-84+ Lab 9 for Statistics 301

Topics: confidence intervals of μ (σ known and unknown), confidence interval of proportion p , t -distribution probability and percentiles, chi-square probability and percentiles

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

“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

Confidence Interval For Mean μ , σ Known. In a random sample of 32 totally blind people taken from a normally distributed population, the average touch-sensitivity was found to be $\bar{x} = 0.013$ with a standard deviation of $\sigma = 0.003$.

The 95% CI (“z-interval”) for the mean touch-sensitivity, μ , is given by:

- STAT TESTS 7
- STATS ∇ 0.003 ∇ 0.013 ∇ 32 ∇ 0.95 ∇ ENTER

The pair of numbers (0.01196, 0.01404), which are the upper and lower limits of the 95% CI, is returned.

For a 92% CI, where $\sigma = 0.004$, type

- STAT TESTS 7
- ∇ 0.004 ∇ ∇ ∇ 0.92 ∇ ENTER

and the CI (0.01176, 0.01424) is returned.

Confidence Intervals For Mean μ , σ Unknown. 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 \dots 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.

Confidence Intervals For Proportion p . It is found that 54 of 180 randomly selected credit card purchase slips were made with the Visa credit card. Determine the 99% CI for proportion p .

The 99% CI (“1-PropZInt-interval”) for the proportion, p , is given by:

- STAT TESTS ALPHA A
- 54 ENTER 180 ENTER 0.99 ENTER ENTER

The pair of numbers (0.21202, 0.38798), which are the upper and lower limits of the 99% CI, is returned.

Probability For t -distribution.

- Determine probability t -distribution with 18 degrees of freedom is less than 2.31.

– 2nd DISTR tcdf((–) EE 99, 2.31, 18)

The value 0.983... will appear.

Percentile For t Distribution

- PRGM INVT ENTER, then ENTER a second time!
- df=18
- $P(T \leq t) = 0.95$

A percentile of 1.734 is returned.

Graphing The t -distribution. To graph the t -distribution with 4 degrees of freedom and shade between -1 and 1.5, type

- WINDOW -3 3 1 -0.1 0.4 0.1
- Y = 2nd DISTR 4:tpdf(X , 4) GRAPH
- 2nd DISTR DRAW 2:Shadet(-1 , 1.5 , 4) ENTER

Probability For Chi-Square Distribution. To determine the probability the chi-square distribution is between 1.23 and 2.31 at 18 degrees of freedom, type

- 2nd DISTR χ^2 cdf(1.23 , 2.31 , 18) ENTER

A probability of 0.000003565 is returned.

Percentile For Chi-Square Distribution. To run the INVCHI2 program to determine the 95th percentile of the Chi-Square distribution at 5 degrees of freedom:

- PRGM INVCHI2 ENTER and ENTER (a second time!)
- df=5
- $P(\chi \leq \chi^2)=0.95$

A percentile of 11.07 is returned.

Graphing The Chi-Square Distribution. To graph the chi-square distribution with 4 degrees of freedom and shade between 0 and 3.9, type

- WINDOW 0 15 1 -0.1 0.3 0.1
- Y = 2nd DISTR 6: χ^2 pdf(X , 4) GRAPH
- 2nd DISTR DRAW 3:Shade χ^2 (0 , 3.9 , 4) ENTER