

Using The TI-83 for Hypothesis Testing for a Population Correlation Coefficient

You can use the TI-83 calculator to conduct hypothesis testing for a population correlation coefficient.

Hypothesis testing for a population correlation coefficient, ρ , can be one tailed or two tailed:

$\begin{cases} H_0 : \rho \geq 0 \\ H_a : \rho < 0 \end{cases}$ Left-tailed test	$\begin{cases} H_0 : \rho \leq 0 \\ H_a : \rho > 0 \end{cases}$ Right-tailed test	$\begin{cases} H_0 : \rho = 0 \\ H_a : \rho \neq 0 \end{cases}$ Two-tailed test
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Ho: no significant negative correlation	Ho: no significant positive correlation	Ho: no significant correlation
Ha: significant negative correlation	Ha: significant positive correlation	Ha: significant correlation

For this class, we will ONLY CONSIDER HYPOTHESIS TESTS FOR ρ THAT ARE TWO TAILED.

Example

Let's look at our latitude and temperature example from class. Enter the x-values (north latitude) in L_1 and y-values (April temperature) in L_2 . Hit STAT and arrow over to the TESTS menu. Arrow down and select E:LinRegTTest (linear regression t test). Select L_1 as the Xlist and L_2 as the Ylist. Leave Freq at 1 and select the type of test you are conducting (either two-tail, right tail, or left tail depending upon the alternate hypothesis H_a from above). For our example, we will use a two-tail test. Leave RegEQ blank and then highlight Calculate and hit the ENTER key.

<pre>EDIT CALC TESTS 0↑2-SampTInt... A:1-PropZInt... B:2-PropZInt... C:X²-Test... D:2-SampFTest... E:LinRegTTest... F:ANOVA(</pre>	<pre>LinRegTTest Xlist:L1 Ylist:L2 Freq:1 B & ρ: EQ <0 >0 RegEQ: Calculate</pre>
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The results of our hypothesis test are displayed. These are: the t test statistic ($t = -5.6971$), the p-value ($p = 4.5589E-4$ or 0.00045), the degrees of freedom ($d.f. = 8 = n-2$), the y-intercept ($a = 104.1780$) and slope ($b = -0.9830$) of the regression equation, the sample standard deviation ($s = 8.8659$), the correlation coefficient ($r = -.8957$) and the coefficient of determination ($r^2 = .8023$).

PLEASE NOTE: The regression equation on this screen ($y = a + bx$) is different than the one on the regression from the CALC menu ($y = ax + b$). The regression equation is the same, but the values of a and b are different on both screens.

<pre>LinRegTTest y=a+bx B≠0 and ρ≠0 t=-5.6971 p=4.5589E-4 df=8.0000 ↓a=104.1780</pre>	<pre>LinRegTTest y=a+bx B≠0 and ρ≠0 ↑b=-.9830 s=8.8659 r²=.8023 r=-.8957</pre>
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From the screen above, we would reject H_0 (large t test statistic and very small p-value) and conclude that there is a significant correlation between latitude and temperature.