Correlation Coefficient Significance and Confidence Interval

Significance of a Pearson correlation coefficient from n pairs: t statistic, two-sided p-value and a Fisher-z confidence interval for the true correlation.

Method: t test for r and Fisher's z transformation

Input parameters

Unit system: SI

Parameter	Value	Unit
Sample correlation coefficient	0.62000	
Number of pairs	20.000	
Confidence level	95.000	%

Calculated results

Parameter	Value	Unit
t statistic	3.3526	
Two-sided p-value	0.003545	
Lower confidence limit	0.24458	
Upper confidence limit	0.83377	
Share of variance explained	38.440	%

Notes for this case

• Under no correlation, t = r√((n − 2)/(1 − r²)) follows Student's t with n − 2 degrees of freedom; the two-sided p-value is computed from the regularised incomplete beta function. Fisher's z = atanh r is nearly normal with standard error 1/√(n − 3), giving the confidence interval tanh(z ± z_c·se). Correlation does not imply causation, and a few outliers can dominate r; plot the data.

Formula and method

$$t = r\sqrt{\frac{n-2}{1-r^2}}, \quad z = \tanh^{-1} r, \quad \rho = \tanh\left(z \pm \frac{z_c}{\sqrt{n-3}}\right)$$

Variables

r	Sample correlation coefficient	-
n	Number of pairs	-
$1-\alpha$	Confidence level	-
t	t statistic	-
p	Two-sided p-value	-
ρ_{lo}	Lower confidence limit	-
ρ_{hi}	Upper confidence limit	-
r^2	Share of variance explained	-

Method and standards

Correlation test.

Assumptions and limits

- Bivariate normal data; independent pairs.

References

t test for r and Fisher's z transformation

Report details

Report reference	FCC-N55W-3Q7Z (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Correlation Coefficient Significance and Confidence Interval
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/correlation-significance-test

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.