

This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

Numeric Results for a Slope-Difference Test using GEE

Solve For: [Sample Size](#)
 Measurement Times: Equally spaced
 Correlation: Compound symmetry (all ρ 's equal)
 Missing Pattern: Constant (All missing proportions are equal)

Power	Total Sample Size N	Group 1 Allocation Percent R	Number of Measurement Times M	Difference in Slopes δ	Standard Deviation σ	Base Correlation ρ	First Row of Correlation Matrix	Missing Data Proportion	Measurement Times	Alpha
0,80051	467	50	2	0,5	2	0,3	$\rho_1(1)$	0	T(1)	0,15
0,80092	334	50	2	0,5	2	0,5	$\rho_2(1)$	0	T(1)	0,15
0,80029	200	50	2	0,5	2	0,7	$\rho_3(1)$	0	T(1)	0,15
0,80120	117	50	2	1,0	2	0,3	$\rho_1(1)$	0	T(1)	0,15
0,80283	84	50	2	1,0	2	0,5	$\rho_2(1)$	0	T(1)	0,15
0,80029	50	50	2	1,0	2	0,7	$\rho_3(1)$	0	T(1)	0,15
0,80922	30	50	2	2,0	2	0,3	$\rho_1(1)$	0	T(1)	0,15
0,80283	21	50	2	2,0	2	0,5	$\rho_2(1)$	0	T(1)	0,15
0,81269	13	50	2	2,0	2	0,7	$\rho_3(1)$	0	T(1)	0,15
0,80051	467	50	3	0,5	2	0,3	$\rho_1(2)$	0	T(2)	0,15
0,80092	334	50	3	0,5	2	0,5	$\rho_2(2)$	0	T(2)	0,15
0,80029	200	50	3	0,5	2	0,7	$\rho_3(2)$	0	T(2)	0,15
0,80120	117	50	3	1,0	2	0,3	$\rho_1(2)$	0	T(2)	0,15
0,80283	84	50	3	1,0	2	0,5	$\rho_2(2)$	0	T(2)	0,15
0,80029	50	50	3	1,0	2	0,7	$\rho_3(2)$	0	T(2)	0,15
0,80922	30	50	3	2,0	2	0,3	$\rho_1(2)$	0	T(2)	0,15
0,80283	21	50	3	2,0	2	0,5	$\rho_2(2)$	0	T(2)	0,15

This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

Numeric Results for a Slope-Difference Test using GEE (Continued)

Solve For: [Sample Size](#)
 Measurement Times: Equally spaced
 Correlation: Compound symmetry (all ρ 's equal)
 Missing Pattern: Constant (All missing proportions are equal)

Power	Total Sample Size N	Group 1 Allocation Percent R	Number of Measurement Times M	Difference in Slopes δ	Standard Deviation σ	Base Correlation ρ	First Row of Correlation Matrix	Missing Data Proportion	Measurement Times	Alpha
0,81269	13	50	3	2,0	2	0,7	$\rho3(2)$	0	T(2)	0,15
0,80029	420	50	4	0,5	2	0,3	$\rho1(3)$	0	T(3)	0,15
0,80029	300	50	4	0,5	2	0,5	$\rho2(3)$	0	T(3)	0,15
0,80029	180	50	4	0,5	2	0,7	$\rho3(3)$	0	T(3)	0,15
0,80029	105	50	4	1,0	2	0,3	$\rho1(3)$	0	T(3)	0,15
0,80029	75	50	4	1,0	2	0,5	$\rho2(3)$	0	T(3)	0,15
0,80029	45	50	4	1,0	2	0,7	$\rho3(3)$	0	T(3)	0,15
0,80922	27	50	4	2,0	2	0,3	$\rho1(3)$	0	T(3)	0,15
0,80450	19	50	4	2,0	2	0,5	$\rho2(3)$	0	T(3)	0,15
0,82056	12	50	4	2,0	2	0,7	$\rho3(3)$	0	T(3)	0,15

This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

Item	Values
$\rho_1(1)$	1; 0,3
$\rho_2(1)$	1; 0,5
$\rho_3(1)$	1; 0,7
$\rho_1(2)$	1; 0,3; 0,3
$\rho_2(2)$	1; 0,5; 0,5
$\rho_3(2)$	1; 0,7; 0,7
$\rho_1(3)$	1; 0,3; 0,3; 0,3
$\rho_2(3)$	1; 0,5; 0,5; 0,5
$\rho_3(3)$	1; 0,7; 0,7; 0,7
T(1)	0; 1
T(2)	0; 0,5; 1
T(3)	0; 0,33333; 0,66667; 1

Power	The probability of rejecting a false null hypothesis when the alternative hypothesis is true.
N	The total number of subjects in the study.
R	The treatment group allocation proportion. It is the proportion of subjects that are in the treatment group (group 1).
M	The number of time points at which each subject is measured.
δ	The difference in slopes at which the power is calculated. It is equal to the difference in means at the final measurement.
σ	The standard deviation of a response.
ρ	The base correlation between two responses on the same subject. It may be transformed based on the correlation pattern.
First Row of Correlation Matrix	Presents the top row of the correlation matrix.
Missing Data Proportion	Gives the proportion of missing data used for all time values.
Measurement Times	Gives the name of the set containing the measurement time proportions. These measurement times represent the proportion of the total study time that has elapsed just before the measurement.
Alpha	The probability of rejecting a true null hypothesis.

This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

Summary Statements

A two-group repeated measures design (with a continuous response and with 2 measurements for each subject) will be used to test whether there is a group difference in slopes. The comparison will be made using a two-sided Wald Z-test using GEE methods, with a Type I error rate (α) of 0,15. The (repeated) measurements of each subject will be made at the following 2 times, expressed as proportions of the total study time: 0; 1. Missing values are assumed to occur completely at random (MCAR). The missing value proportions will be combined to form the pairwise observant probabilities using a monotonic pairwise missing pattern. The anticipated proportions missing at each measurement time are 0; 0. The first row of the autocorrelation matrix of the responses within a subject is assumed to be 1; 0,3, with subsequent rows following the same pattern (Compound symmetry (all ρ 's equal)). The residual (zero-mean) standard deviation for both groups is assumed to be 2. To detect a slope difference (difference in means at the final measurement) of 0,5 with 80% power, the total number of needed subjects is 467 (with 50% of the subjects in the treatment group (Group 1)). The sample size was computed using PASS 2026, version 26.0.3.

References

Ahn, C., Heo, M., and Zhang, S. 2015. Sample Size Calculations for Clustered and Longitudinal Outcomes in Clinical Research. CRC Press. New York.
Jung, S.H. and Ahn, C. 2003. Sample size estimation for GEE method for comparing slopes in repeated measures data. Statistics in Medicine, Volume 22, pages 1305-1315.

Citation

PASS 2026 Power Analysis and Sample Size Software (2026). NCSS, LLC. Kaysville, Utah, USA, ncss.com/software/pass.

This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

There are 28 days remaining in your free trial (Expires on 02/05/2026).

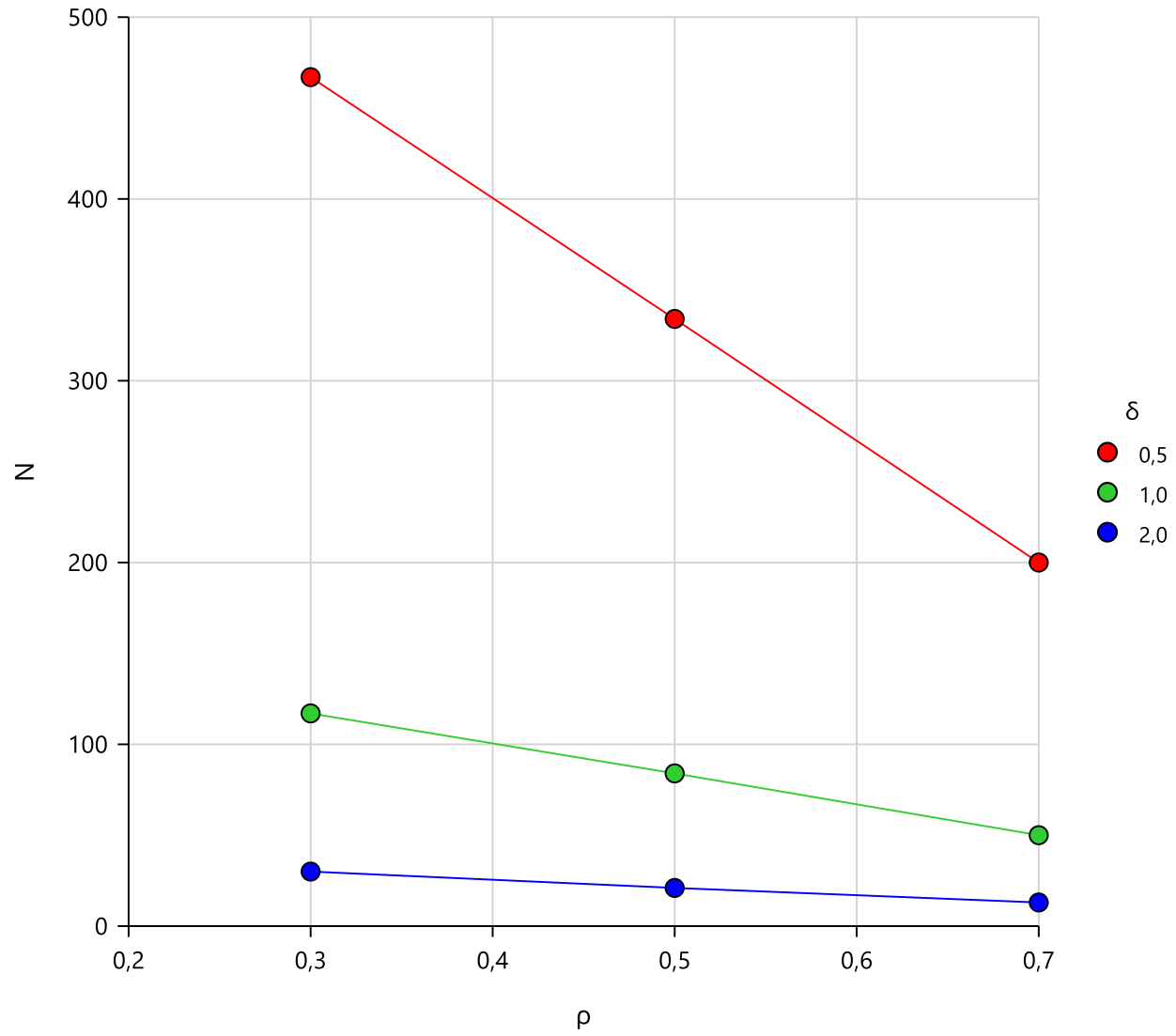
NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

Plots

N vs ρ by δ

Power=0,8 $\alpha=0,15$ R=50 M=2 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

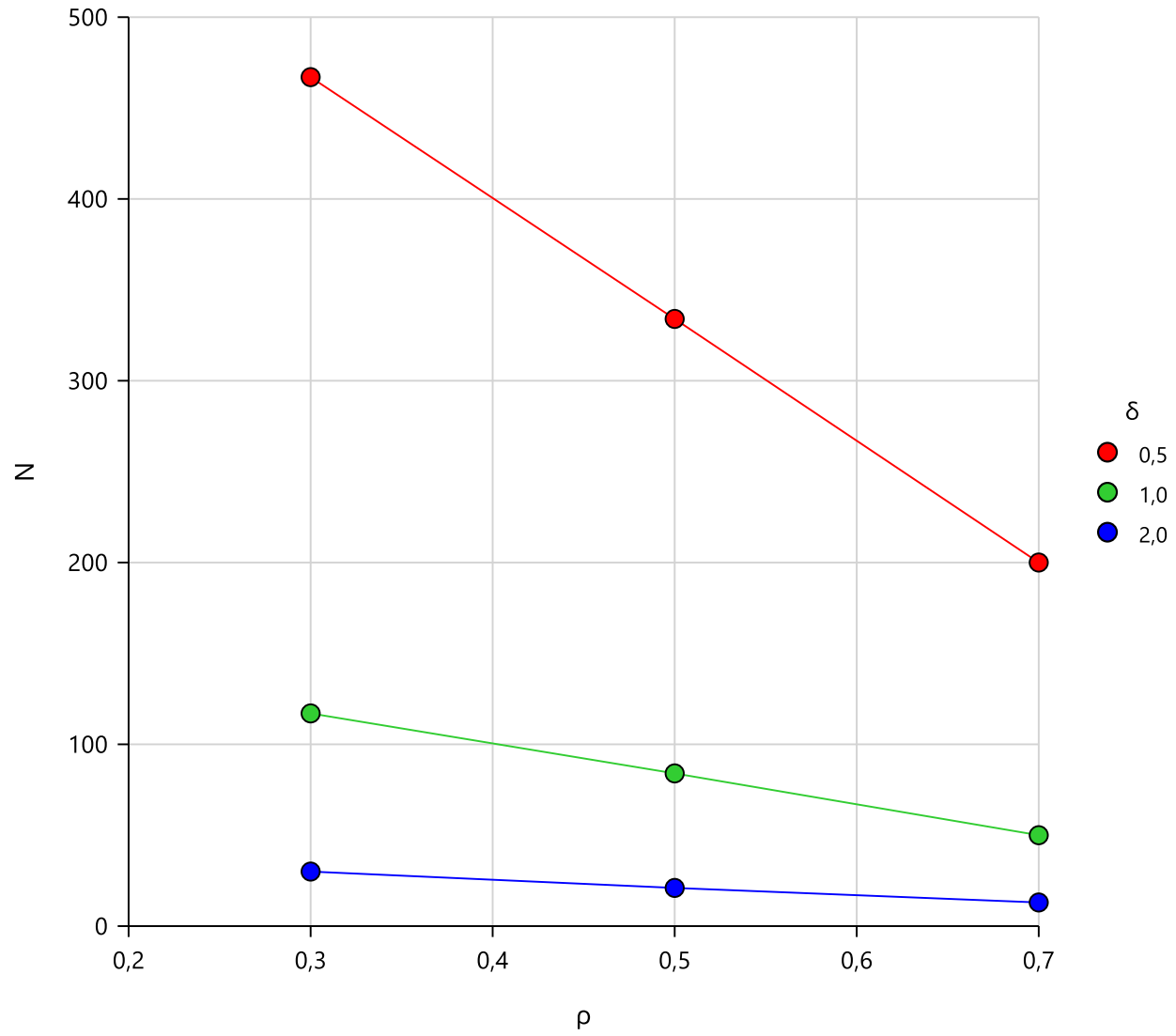
There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

N vs ρ by δ

Power=0,8 $\alpha=0,15$ R=50 M=3 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

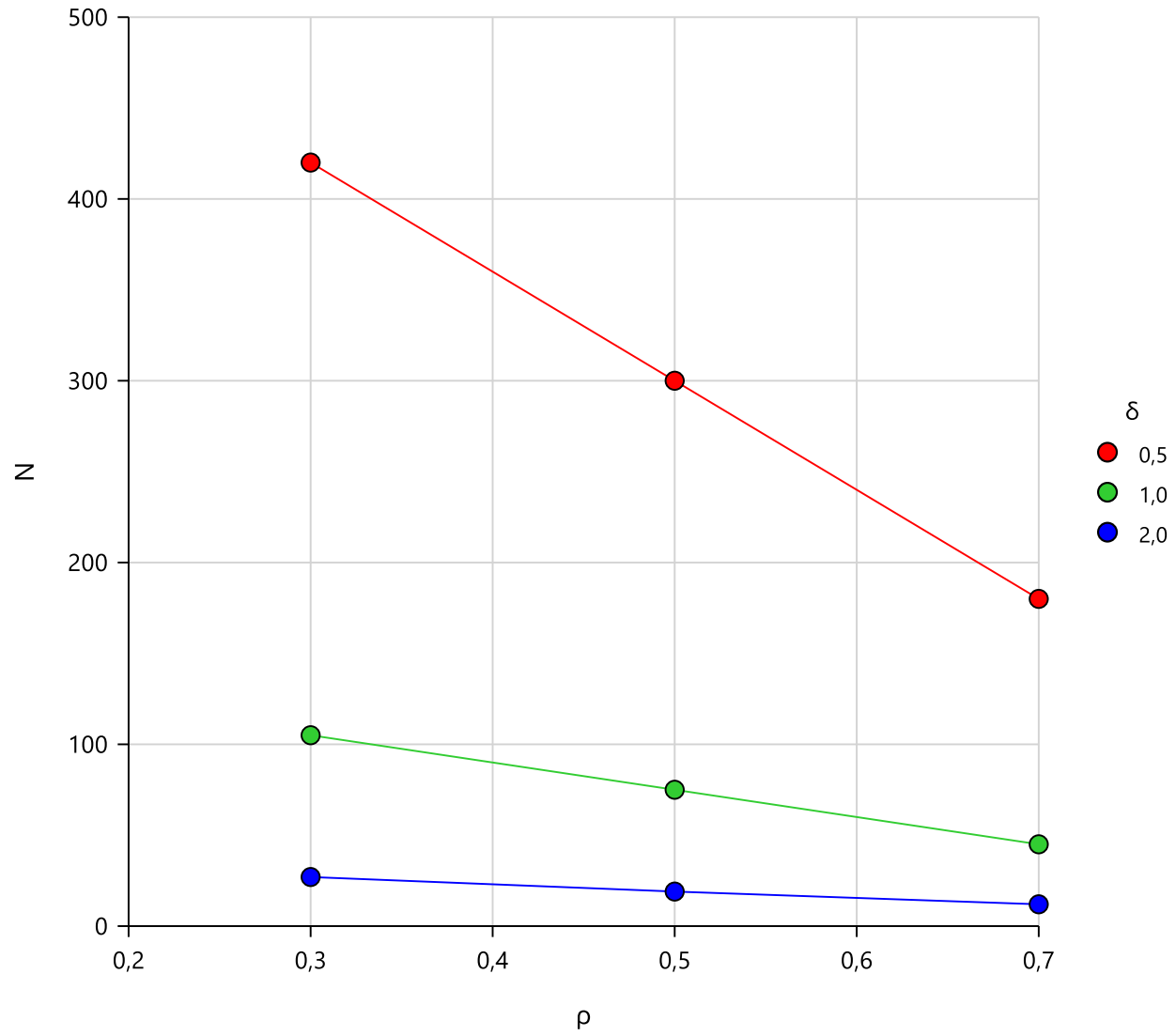
There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

N vs ρ by δ

Power=0,8 $\alpha=0,15$ R=50 M=4 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

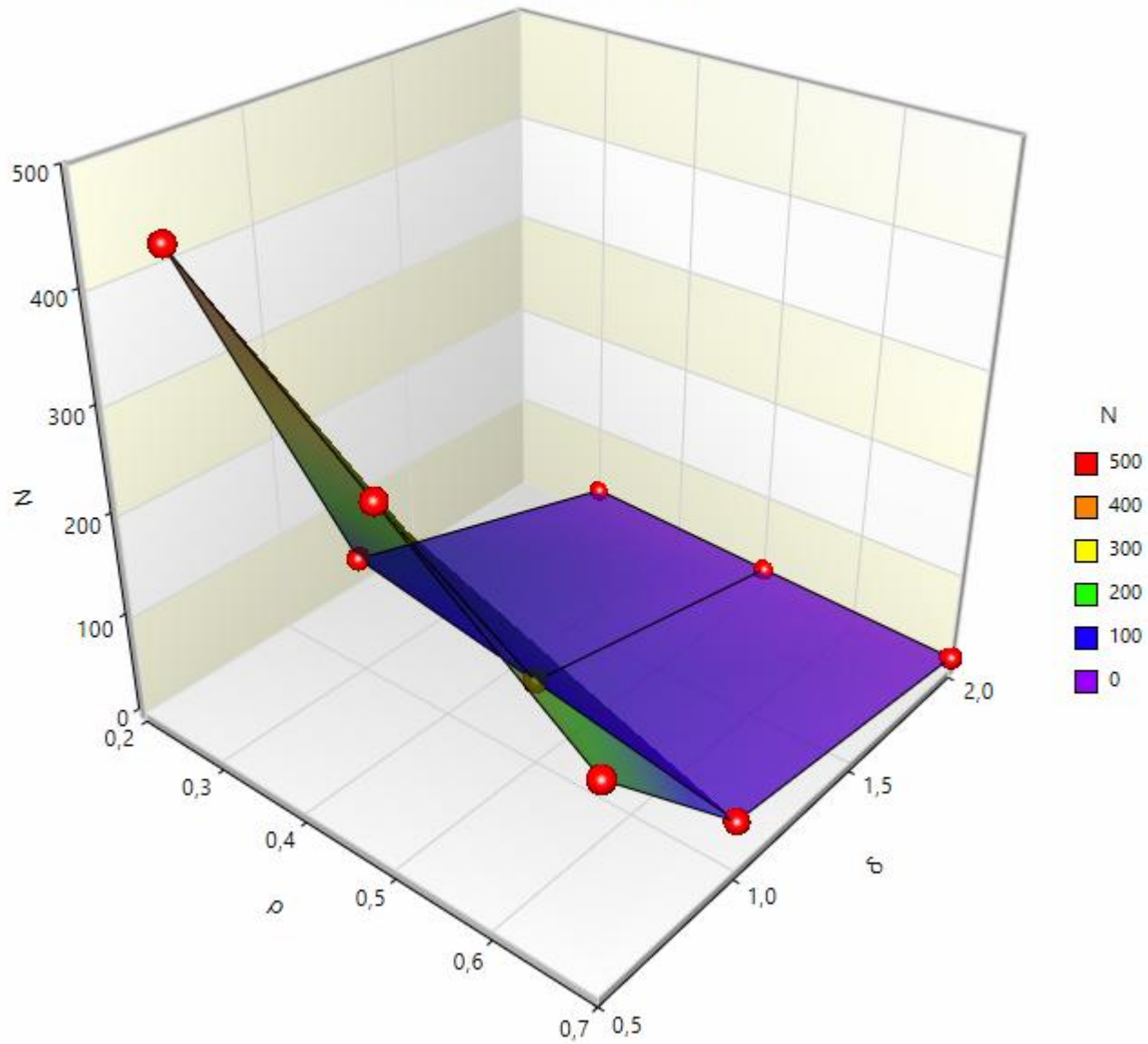
There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

N vs ρ and δ

Power=0,8 $\alpha=0,15$ R=50 M=2 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

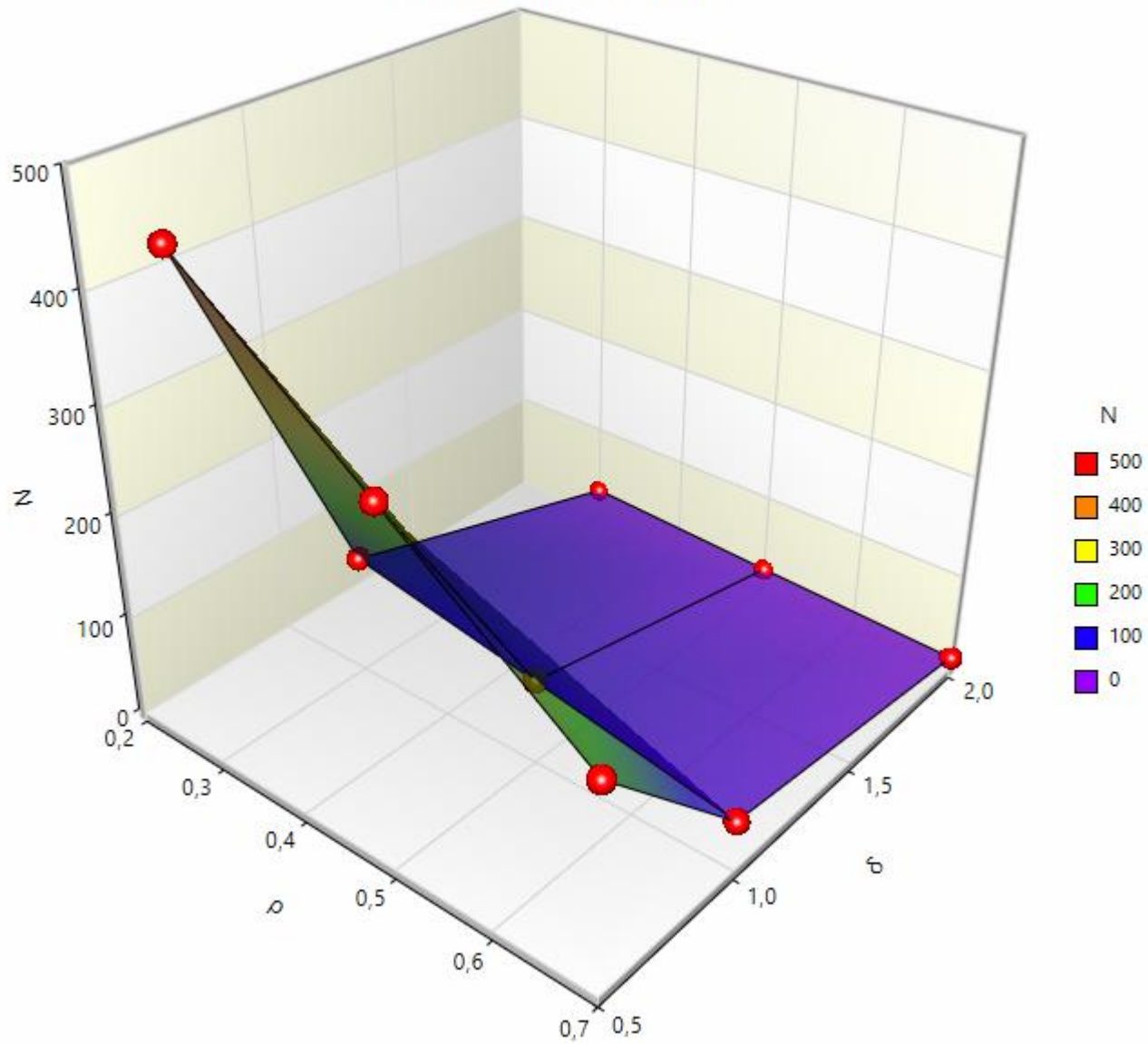
There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

N vs ρ and δ

Power=0,8 $\alpha=0,15$ R=50 M=3 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

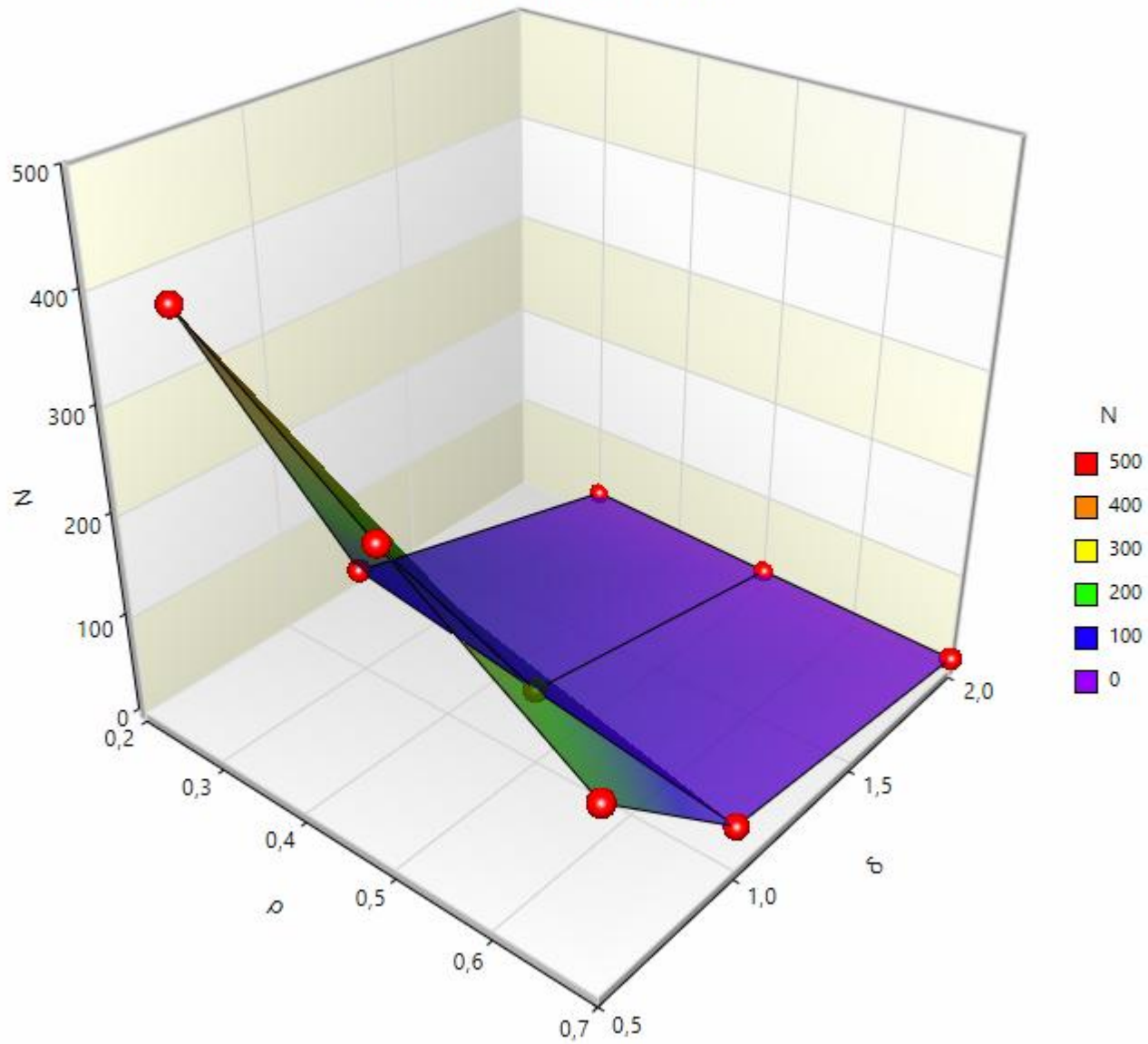
There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

N vs ρ and δ

Power=0,8 $\alpha=0,15$ R=50 M=4 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

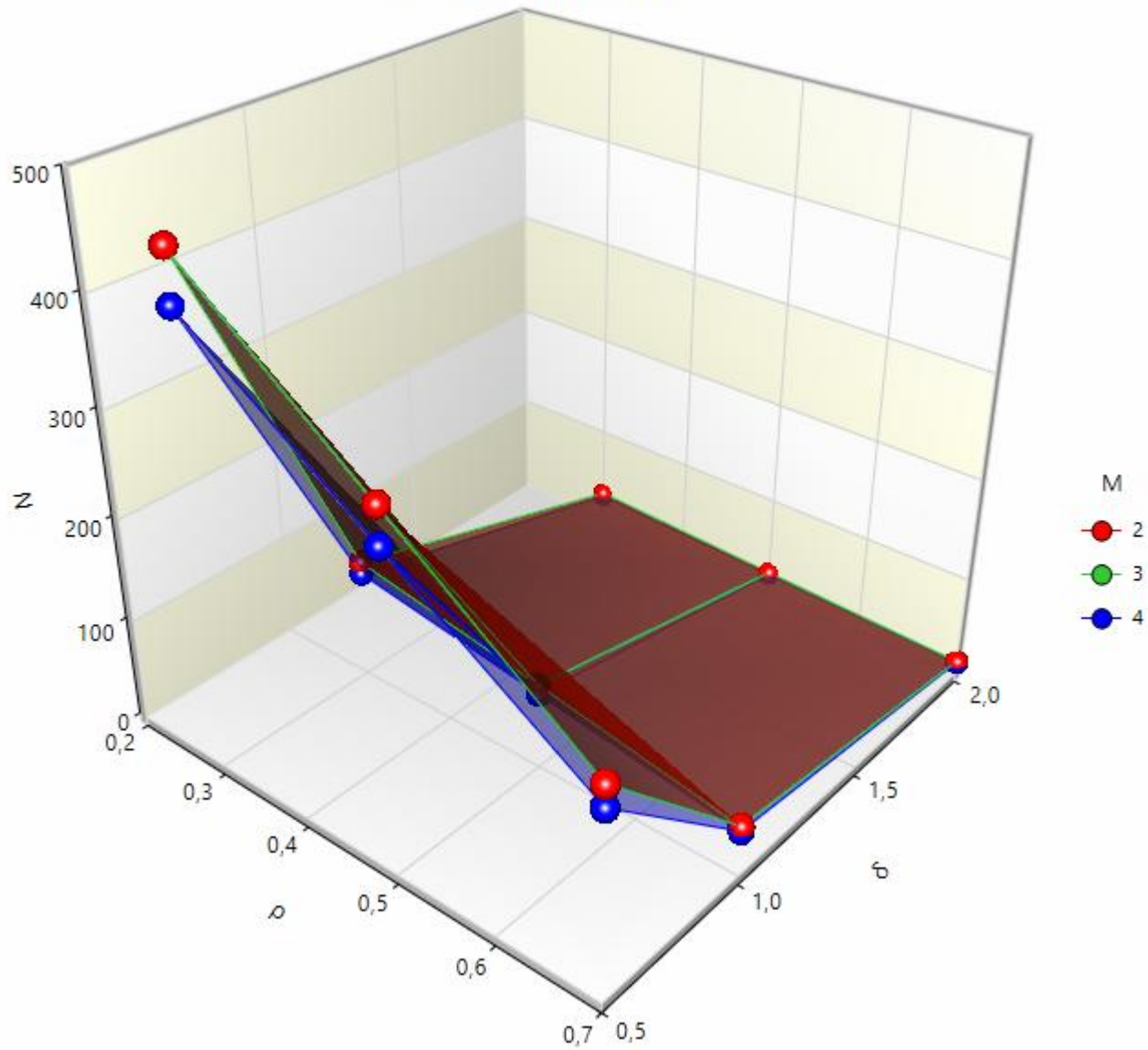
There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

N vs ρ and δ by M

Power=0,8 $\alpha=0,15$ R=50 $\sigma=2$ Miss=0



This report is for evaluation purposes only. Visit www.ncss.com/pass for more information about purchasing a license.

There are 28 days remaining in your free trial (Expires on 02/05/2026).

NOTICE: In this restricted free trial report, alpha is always equal to 0,15.

GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome)

Procedure Input Settings

C:\Users\Utilizador\Documents\PASS 2026\Procedure Settings\Autosave\GEE Tests for the Slope of Two Groups in a Repeated Measures Design (Continuous Outcome) - Autosaved 2026_4_5-9_38_5.t443

Design Tab

Solve For:	Sample Size
Alternative Hypothesis:	Two-Sided
Power:	0,8
Alpha:	0,15
R (Group 1 Allocation %):	50
Measurement Time Input Type:	Equally Spaced Measurement Times
M (Number of Measurement Times):	2 3 4
δ (Difference in Slopes, i.e., Means):	0,5 1 2
σ (Standard Deviation):	2
Pattern of ρ 's Across Time:	Compound Symmetry (All ρ 's Equal)
ρ (Base Correlation):	0,3 0,5 0,7
Missing Input Type:	Constant
Constant Missing Proportion:	0
