

Host

Notes

Output Created		22-JUN-2026 23:18:12
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['cmd /c if not exist "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output" mkdir "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output"'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.09

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Output Created		22-JUN-2026 23:18:12
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=[cmd /c if not exist "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav" mkdir "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav"].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.08

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Notes

Output Created		22-JUN-2026 23:18:12
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=[cmd /c if not exist "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\spv" mkdir "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\spv"].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.05

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Output Created		22-JUN-2026 23:18:12
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['cmd /c if not exist "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\pdf" mkdir "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\pdf"'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

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Output Created		22-JUN-2026 23:18:13
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=[cmd /c if not exist "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\txt" mkdir "D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\txt"...
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

Host

Notes

Output Created		22-JUN-2026 23:18:13
Comments		
Input	Data	D:\DATA ANALYSIS\EANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['cmd /c echo SPSS Factorial ANOVA script started > "D:\DATA ANALYSIS\EANOVA Family\Factorial ANOVA\SPSS_Output\txt\SPSS_SCRIPT_STARTED.txt"'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

Factorial ANOVA: G3 by Studytime and Sex

Dataset Name

Notes

Output Created		22-JUN-2026 23:18:13
Comments		
Input	Data	D:\DATA ANALYSIS\EANOVA Family\Factorial ANOVA\dataset.csv
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		DATASET NAME FactorialANOVAData WINDOW=FRONT.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Warnings

The active dataset will replace the existing dataset named FactorialANOVAData.

```
sex into sex_num (Student sex)
Old Value   New Value   Value Label
F           1           F
M           2           M
```

File Information

Factorial ANOVA: G3 by Studytime and Sex

Notes

Output Created		22-JUN-2026 23:18:14
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav\factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		DISPLAY DICTIONARY.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.00

Variable Information

Variable	Position	Label	Measurement Level	Role	Column Width	Alignment
school	1	<none>	Nominal	Input	10	Left
sex	2	Student sex	Nominal	Input	10	Left
age	3	<none>	Scale	Input	8	Right
address	4	<none>	Nominal	Input	10	Left
famsize	5	<none>	Nominal	Input	10	Left
Pstatus	6	<none>	Nominal	Input	10	Left
Medu	7	<none>	Nominal	Input	8	Right
Fedu	8	<none>	Nominal	Input	8	Right
Mjob	9	<none>	Nominal	Input	20	Left
Fjob	10	<none>	Nominal	Input	20	Left
reason	11	<none>	Nominal	Input	20	Left
guardian	12	<none>	Nominal	Input	20	Left
traveltime	13	<none>	Nominal	Input	8	Right
studytime	14	Weekly study time group	Nominal	Input	8	Right

Factorial ANOVA: G3 by Studytime and Sex

Variable Information

Variable	Print Format	Write Format
school	A10	A10
sex	A10	A10
age	F8.2	F8.2
address	A10	A10
famsize	A10	A10
Pstatus	A10	A10
Medu	F8.2	F8.2
Fedu	F8.2	F8.2
Mjob	A20	A20
Fjob	A20	A20
reason	A20	A20
guardian	A20	A20
traveltime	F8.2	F8.2
studytime	F8.2	F8.2

Factorial ANOVA: G3 by Studytime and Sex

Variable Information

Variable	Position	Label	Measurement Level	Role	Column Width	Alignment
failures	15	<none>	Nominal	Input	8	Right
schoolsup	16	<none>	Nominal	Input	10	Left
famsup	17	<none>	Nominal	Input	10	Left
paid	18	<none>	Nominal	Input	10	Left
activities	19	<none>	Nominal	Input	10	Left
nursery	20	<none>	Nominal	Input	10	Left
higher	21	<none>	Nominal	Input	10	Left
internet	22	<none>	Nominal	Input	10	Left
romantic	23	<none>	Nominal	Input	10	Left
famrel	24	<none>	Nominal	Input	8	Right
freetime	25	<none>	Nominal	Input	8	Right
goout	26	<none>	Nominal	Input	8	Right
Dalc	27	<none>	Nominal	Input	8	Right
Walc	28	<none>	Nominal	Input	8	Right
health	29	<none>	Nominal	Input	8	Right
absences	30	<none>	Scale	Input	8	Right
G1	31	<none>	Nominal	Input	8	Right
G2	32	<none>	Nominal	Input	8	Right
G3	33	Final grade score	Nominal	Input	8	Right
sex_num	34	Student sex numeric factor generated from sex	Nominal	Input	9	Right

Factorial ANOVA: G3 by Studytime and Sex

Variable Information

Variable	Print Format	Write Format
failures	F8.2	F8.2
schoolsup	A10	A10
famsup	A10	A10
paid	A10	A10
activities	A10	A10
nursery	A10	A10
higher	A10	A10
internet	A10	A10
romantic	A10	A10
famrel	F8.2	F8.2
freetime	F8.2	F8.2
goout	F8.2	F8.2
Dalc	F8.2	F8.2
Walc	F8.2	F8.2
health	F8.2	F8.2
absences	F8.2	F8.2
G1	F8.2	F8.2
G2	F8.2	F8.2
G3	F8.2	F8.2
sex_num	F1	F1

Variables in the working file

Factorial ANOVA: G3 by Studytime and Sex

Variable Values

Value	Label	
studytime	1.00	Studytime 1
	2.00	Studytime 2
	3.00	Studytime 3
	4.00	Studytime 4
sex_num	1	F
	2	M

Descriptives

Notes

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	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=G3 /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Factorial ANOVA: G3 by Studytime and Sex

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
G3	649	.00	19.00	11.9060	3.23066
Valid N (listwise)	649				

Frequencies

Notes

Output Created	22-JUN-2026 23:18:14	
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav \factorial_anova_spss_rea dy_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax	FREQUENCIES VARIABLES=studytime sex_num /ORDER=ANALYSIS.	
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Statistics

		studytime	sex_num
N	Valid	649	649
	Missing	0	0

Frequency Table

Factorial ANOVA: G3 by Studytime and Sex

studytime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	212	32.7	32.7	32.7
	2.00	305	47.0	47.0	79.7
	3.00	97	14.9	14.9	94.6
	4.00	35	5.4	5.4	100.0
	Total	649	100.0	100.0	

sex_num

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	383	59.0	59.0	59.0
	2	266	41.0	41.0	100.0
	Total	649	100.0	100.0	

Means

Notes

Output Created	22-JUN-2026 23:18:14	
Comments		
Input	Data	D:\DATA ANALYSIS\E ANOVA Family\Factorial ANOVA\SPSS_Output\sav \factorial_anova_spss_ready_data.sav
	Active Dataset	FactorialANOVAData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649

Factorial ANOVA: G3 by Studytime and Sex

Notes

Missing Value Handling	Definition of Missing	For each dependent variable in a table, user-defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		MEANS TABLES=G3 BY studytime BY sex_num /CELLS=COUNT MEAN STDDEV MEDIAN MIN MAX.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
G3 * studytime * sex_num	649	100.0%	0	0.0%	649	100.0%

Factorial ANOVA: G3 by Studytime and Sex

Report

G3

studytime	sex_num	N	Mean	Std. Deviation	Median	Minimum	Maximum
1.00	1	89	11.1910	2.96907	11.0000	.00	17.00
	2	123	10.5935	3.37745	11.0000	.00	18.00
	Total	212	10.8443	3.21862	11.0000	.00	18.00
2.00	1	198	12.1970	3.22374	12.0000	.00	18.00
	2	107	11.8972	3.28500	11.0000	.00	19.00
	Total	305	12.0918	3.24313	12.0000	.00	19.00
3.00	1	75	13.1200	2.60955	13.0000	8.00	18.00
	2	22	13.5909	2.10801	14.0000	9.00	17.00
	Total	97	13.2268	2.50210	13.0000	8.00	18.00
4.00	1	21	14.1905	2.87435	14.0000	10.00	19.00
	2	14	11.3571	2.49945	11.0000	6.00	17.00
	Total	35	13.0571	3.03841	13.0000	6.00	19.00
Total	1	383	12.2533	3.12415	12.0000	.00	19.00
	2	266	11.4060	3.32069	11.0000	.00	19.00
	Total	649	11.9060	3.23066	12.0000	.00	19.00

Univariate Analysis of Variance

Factorial ANOVA: G3 by Studytime and Sex

Notes

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Comments		
Input	Data	D:\DATA ANALYSIS\IE ANOVA Family\Factorial ANOVA\SPSS_Output\sav \factorial_anova_spss_rea dy_data.sav
	Active Dataset	FactorialANOVADData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax	<pre> UNIANOVA G3 BY studytime sex_num /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY PARAMETER /PLOT=PROFILE (studytime*sex_num) /EMMEANS=TABLES (studytime) /EMMEANS=TABLES (sex_num) /EMMEANS=TABLES (studytime*sex_num) /CRITERIA=ALPHA(.05) /DESIGN=studytime sex_num studytime*sex_num. </pre>	
Resources	Processor Time	00:00:01.06
	Elapsed Time	00:00:00.36

Factorial ANOVA: G3 by Studytime and Sex

Between-Subjects Factors

		Value Label	N
studytime	1.00	Studytime 1	212
	2.00	Studytime 2	305
	3.00	Studytime 3	97
	4.00	Studytime 4	35
sex_num	1	F	383
	2	M	266

Descriptive Statistics

Dependent Variable: G3

studytime	sex_num	Mean	Std. Deviation	N
1.00	1	11.1910	2.96907	89
	2	10.5935	3.37745	123
	Total	10.8443	3.21862	212
2.00	1	12.1970	3.22374	198
	2	11.8972	3.28500	107
	Total	12.0918	3.24313	305
3.00	1	13.1200	2.60955	75
	2	13.5909	2.10801	22
	Total	13.2268	2.50210	97
4.00	1	14.1905	2.87435	21
	2	11.3571	2.49945	14
	Total	13.0571	3.03841	35
Total	1	12.2533	3.12415	383
	2	11.4060	3.32069	266
	Total	11.9060	3.23066	649

Factorial ANOVA: G3 by Studytime and Sex

Levene's Test of Equality of Error Variances^{a,b}

		Levene Statistic	df1	df2	Sig.
G3	Based on Mean	.719	7	641	.656
	Based on Median	.733	7	641	.644
	Based on Median and with adjusted df	.733	7	593.511	.644
	Based on trimmed mean	.720	7	641	.656

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: G3

b. Design: Intercept + studytime + sex_num + studytime * sex_num

Tests of Between-Subjects Effects

Dependent Variable: G3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	560.961 ^a	7	80.137	8.282	.000
Intercept	45515.165	1	45515.165	4703.932	.000
studytime	382.980	3	127.660	13.193	.000
sex_num	50.217	1	50.217	5.190	.023
studytime * sex_num	64.815	3	21.605	2.233	.083
Error	6202.306	641	9.676		
Total	98761.000	649			
Corrected Total	6763.267	648			

Factorial ANOVA: G3 by Studytime and Sex

Tests of Between-Subjects Effects

Dependent Variable: G3

Source	Partial Eta Squared
Corrected Model	.083
Intercept	.880
studytime	.058
sex_num	.008
studytime * sex_num	.010
Error	
Total	
Corrected Total	

a. R Squared = .083 (Adjusted R Squared = .073)

Parameter Estimates

Dependent Variable: G3

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	11.357	.831	13.661	.000	9.725	12.990
[studytime=1.00]	-.764	.877	-.870	.384	-2.487	.959
[studytime=2.00]	.540	.884	.611	.541	-1.196	2.276
[studytime=3.00]	2.234	1.063	2.100	.036	.145	4.322
[studytime=4.00]	0 ^a	.	.	.	.	.
[sex_num=1]	2.833	1.073	2.640	.008	.726	4.941
[sex_num=2]	0 ^a	.	.	.	.	.
[studytime=1.00] * [sex_num=1]	-2.236	1.157	-1.932	.054	-4.508	.037
[studytime=1.00] * [sex_num=2]	0 ^a	.	.	.	.	.
[studytime=2.00] * [sex_num=1]	-2.534	1.136	-2.230	.026	-4.765	-.302
[studytime=2.00] * [sex_num=2]	0 ^a	.	.	.	.	.
[studytime=3.00] * [sex_num=1]	-3.304	1.312	-2.519	.012	-5.880	-.728

Factorial ANOVA: G3 by Studytime and Sex

Parameter Estimates

Dependent Variable: G3

Parameter	Partial Eta Squared
Intercept	.225
[studytime=1.00]	.001
[studytime=2.00]	.001
[studytime=3.00]	.007
[studytime=4.00]	.
[sex_num=1]	.011
[sex_num=2]	.
[studytime=1.00] * [sex_num=1]	.006
[studytime=1.00] * [sex_num=2]	.
[studytime=2.00] * [sex_num=1]	.008
[studytime=2.00] * [sex_num=2]	.
[studytime=3.00] * [sex_num=1]	.010

Parameter Estimates

Dependent Variable: G3

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
[studytime=3.00] * [sex_num=2]	0 ^a	.	.	.	.	.
[studytime=4.00] * [sex_num=1]	0 ^a	.	.	.	.	.
[studytime=4.00] * [sex_num=2]	0 ^a	.	.	.	.	.

Factorial ANOVA: G3 by Studytime and Sex

Parameter Estimates

Dependent Variable: G3

Parameter	Partial Eta Squared
[studytime=3.00] * [sex_num=2]	.
[studytime=4.00] * [sex_num=1]	.
[studytime=4.00] * [sex_num=2]	.

a. This parameter is set to zero because it is redundant.

Estimated Marginal Means

1. Weekly study time group

Dependent Variable: G3

Weekly study time group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1.00	10.892	.216	10.467	11.317
2.00	12.047	.187	11.681	12.414
3.00	13.355	.377	12.615	14.096
4.00	12.774	.537	11.720	13.828

2. Student sex numeric factor generated from sex

Dependent Variable: G3

Student sex numeric factor generated from sex	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	12.675	.216	12.250	13.099
2	11.860	.285	11.300	12.419

Factorial ANOVA: G3 by Studytime and Sex

3. Weekly study time group * Student sex numeric factor generated from sex

Dependent Variable: G3

Weekly study time group	Student sex numeric factor generated from sex	Mean	Std. Error	95% ...
				Lower Bound
1.00	1	11.191	.330	10.544
	2	10.593	.280	10.043
2.00	1	12.197	.221	11.763
	2	11.897	.301	11.307
3.00	1	13.120	.359	12.415
	2	13.591	.663	12.289
4.00	1	14.190	.679	12.858
	2	11.357	.831	9.725

3. Weekly study time group * Student sex numeric factor generated from sex

Dependent Variable: G3

Weekly study time group	Student sex numeric factor generated from sex	95% Confidence .
		Upper Bound
1.00	1	11.838
	2	11.144
2.00	1	12.631
	2	12.488
3.00	1	13.825
	2	14.893
4.00	1	15.523
	2	12.990

Profile Plots

Factorial ANOVA: G3 by Studytime and Sex

