

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output " mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output "].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\sav" mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\sav""].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.03

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\spv" mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\spv""].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.04

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
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Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\pdf" mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\pdf""].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.04

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["del /Q "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\sav*.sav" 2>nul"].
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.09

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['del /Q "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\spv*.spv" 2>nul'].
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.18

Host

Notes

Output Created		12-JUL-2026 14:31:55
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['del /Q "D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\pdf*.pdf" 2>nul'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.13

Stepwise Regression

Stepwise Regression
Import dataset.csv

Stepwise Regression

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Descriptives

Notes		
Output Created		12-JUL-2026 14:31:56
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\sav\stepwise_regression_analysis_data.sav
	Active Dataset	StepwiseRegressionData
	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 G1 G2 absences studytime failures age Medu Fedu traveltime famrel freetime goout /STATISTICS=MEAN STDDEV MIN MAX SKEWNESS KURTOSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.03

[StepwiseRegressionData] D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\sav\stepwise_regression_analysis_data.sav

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Descriptive Statistics

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness Statistic
Final grade outcome	649	.00	19.00	11.9060	3.23066	-.913
First-period grade candidate	649	.00	19.00	11.3991	2.74527	-.003
Second-period grade candidate	649	.00	19.00	11.5701	2.91364	-.360
School absences candidate	649	.00	32.00	3.6595	4.64076	2.021
Weekly study-time candidate	649	1.00	4.00	1.9307	.82951	.700
Past failures candidate	649	.00	3.00	.2219	.59324	3.093
Student age candidate	649	15.00	22.00	16.7442	1.21814	.417
Mother education candidate	649	.00	4.00	2.5146	1.13455	-.030
Father education candidate	649	.00	4.00	2.3066	1.09993	.215
Travel-time candidate	649	1.00	4.00	1.5686	.74866	1.248
Family relationship candidate	649	1.00	5.00	3.9307	.95572	-1.106
Free-time candidate	649	1.00	5.00	3.1803	1.05109	-.181
Going-out frequency candidate	649	1.00	5.00	3.1849	1.17577	-.009
Valid N (listwise)	649					

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Descriptive Statistics

	Skewness	Kurtosis	
	Std. Error	Statistic	Std. Error
Final grade outcome	.096	2.712	.192
First-period grade candidate	.096	.037	.192
Second-period grade candidate	.096	1.662	.192
School absences candidate	.096	5.781	.192
Weekly study-time candidate	.096	.038	.192
Past failures candidate	.096	9.824	.192
Student age candidate	.096	.072	.192
Mother education candidate	.096	-1.261	.192
Father education candidate	.096	-1.109	.192
Travel-time candidate	.096	1.109	.192
Family relationship candidate	.096	1.349	.192
Free-time candidate	.096	-.397	.192
Going-out frequency candidate	.096	-.865	.192
Valid N (listwise)			

Correlations

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Notes

Output Created		12-JUL-2026 14:31:57
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	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 for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES= G3 G1 G2 absences studytime failures age Medu Fedu traveltime famrel freetime goout /PRINT=TWOTAIL SIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.06

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Final grade outcome	First-period grade candidate	Second-period grade candidate
Final grade outcome	Pearson Correlation	1	.826	.919
	Sig. (2-tailed)		.000	.000
	N	649	649	649
First-period grade candidate	Pearson Correlation	.826	1	.865
	Sig. (2-tailed)	.000		.000
	N	649	649	649
Second-period grade candidate	Pearson Correlation	.919	.865	1
	Sig. (2-tailed)	.000	.000	
	N	649	649	649
School absences candidate	Pearson Correlation	-.091	-.147	-.125
	Sig. (2-tailed)	.020	.000	.001
	N	649	649	649
Weekly study-time candidate	Pearson Correlation	.250	.261	.240
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Past failures candidate	Pearson Correlation	-.393	-.384	-.386
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Student age candidate	Pearson Correlation	-.107	-.174	-.107
	Sig. (2-tailed)	.007	.000	.006
	N	649	649	649
Mother education candidate	Pearson Correlation	.240	.260	.264
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Father education candidate	Pearson Correlation	.212	.218	.225
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Travel-time candidate	Pearson Correlation	-.127	-.154	-.154
	Sig. (2-tailed)	.001	.000	.000
	N	649	649	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		School absences candidate	Weekly study- time candidate	Past failures candidate
Final grade outcome	Pearson Correlation	-.091	.250	-.393
	Sig. (2-tailed)	.020	.000	.000
	N	649	649	649
First-period grade candidate	Pearson Correlation	-.147	.261	-.384
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Second-period grade candidate	Pearson Correlation	-.125	.240	-.386
	Sig. (2-tailed)	.001	.000	.000
	N	649	649	649
School absences candidate	Pearson Correlation	1	-.118	.123
	Sig. (2-tailed)		.003	.002
	N	649	649	649
Weekly study-time candidate	Pearson Correlation	-.118	1	-.147
	Sig. (2-tailed)	.003		.000
	N	649	649	649
Past failures candidate	Pearson Correlation	.123	-.147	1
	Sig. (2-tailed)	.002	.000	
	N	649	649	649
Student age candidate	Pearson Correlation	.150	-.008	.320
	Sig. (2-tailed)	.000	.831	.000
	N	649	649	649
Mother education candidate	Pearson Correlation	-.009	.097	-.172
	Sig. (2-tailed)	.827	.013	.000
	N	649	649	649
Father education candidate	Pearson Correlation	.030	.050	-.166
	Sig. (2-tailed)	.448	.200	.000
	N	649	649	649
Travel-time candidate	Pearson Correlation	-.008	-.063	.098
	Sig. (2-tailed)	.836	.108	.013
	N	649	649	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Student age candidate	Mother education candidate	Father education candidate
Final grade outcome	Pearson Correlation	-.107	.240	.212
	Sig. (2-tailed)	.007	.000	.000
	N	649	649	649
First-period grade candidate	Pearson Correlation	-.174	.260	.218
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Second-period grade candidate	Pearson Correlation	-.107	.264	.225
	Sig. (2-tailed)	.006	.000	.000
	N	649	649	649
School absences candidate	Pearson Correlation	.150	-.009	.030
	Sig. (2-tailed)	.000	.827	.448
	N	649	649	649
Weekly study-time candidate	Pearson Correlation	-.008	.097	.050
	Sig. (2-tailed)	.831	.013	.200
	N	649	649	649
Past failures candidate	Pearson Correlation	.320	-.172	-.166
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Student age candidate	Pearson Correlation	1	-.108	-.121
	Sig. (2-tailed)		.006	.002
	N	649	649	649
Mother education candidate	Pearson Correlation	-.108	1	.647
	Sig. (2-tailed)	.006		.000
	N	649	649	649
Father education candidate	Pearson Correlation	-.121	.647	1
	Sig. (2-tailed)	.002	.000	
	N	649	649	649
Travel-time candidate	Pearson Correlation	.034	-.265	-.208
	Sig. (2-tailed)	.380	.000	.000
	N	649	649	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Travel-time candidate	Family relationship candidate	Free-time candidate
Final grade outcome	Pearson Correlation	-.127	.063	-.123
	Sig. (2-tailed)	.001	.107	.002
	N	649	649	649
First-period grade candidate	Pearson Correlation	-.154	.049	-.094
	Sig. (2-tailed)	.000	.214	.016
	N	649	649	649
Second-period grade candidate	Pearson Correlation	-.154	.090	-.107
	Sig. (2-tailed)	.000	.022	.007
	N	649	649	649
School absences candidate	Pearson Correlation	-.008	-.090	-.019
	Sig. (2-tailed)	.836	.023	.634
	N	649	649	649
Weekly study-time candidate	Pearson Correlation	-.063	-.004	-.069
	Sig. (2-tailed)	.108	.916	.080
	N	649	649	649
Past failures candidate	Pearson Correlation	.098	-.063	.109
	Sig. (2-tailed)	.013	.111	.005
	N	649	649	649
Student age candidate	Pearson Correlation	.034	-.021	-.005
	Sig. (2-tailed)	.380	.601	.901
	N	649	649	649
Mother education candidate	Pearson Correlation	-.265	.024	-.020
	Sig. (2-tailed)	.000	.535	.617
	N	649	649	649
Father education candidate	Pearson Correlation	-.208	.020	.007
	Sig. (2-tailed)	.000	.606	.862
	N	649	649	649
Travel-time candidate	Pearson Correlation	1	-.010	.001
	Sig. (2-tailed)		.809	.981
	N	649	649	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Going-out frequency candidate
Final grade outcome	Pearson Correlation	-.088
	Sig. (2-tailed)	.026
	N	649
First-period grade candidate	Pearson Correlation	-.074
	Sig. (2-tailed)	.059
	N	649
Second-period grade candidate	Pearson Correlation	-.079
	Sig. (2-tailed)	.043
	N	649
School absences candidate	Pearson Correlation	.085
	Sig. (2-tailed)	.030
	N	649
Weekly study-time candidate	Pearson Correlation	-.075
	Sig. (2-tailed)	.055
	N	649
Past failures candidate	Pearson Correlation	.045
	Sig. (2-tailed)	.251
	N	649
Student age candidate	Pearson Correlation	.113
	Sig. (2-tailed)	.004
	N	649
Mother education candidate	Pearson Correlation	.010
	Sig. (2-tailed)	.808
	N	649
Father education candidate	Pearson Correlation	.028
	Sig. (2-tailed)	.481
	N	649
Travel-time candidate	Pearson Correlation	.057
	Sig. (2-tailed)	.144
	N	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Final grade outcome	First-period grade candidate	Second-period grade candidate
Family relationship candidate	Pearson Correlation	.063	.049	.090
	Sig. (2-tailed)	.107	.214	.022
	N	649	649	649
Free-time candidate	Pearson Correlation	-.123	-.094	-.107
	Sig. (2-tailed)	.002	.016	.007
	N	649	649	649
Going-out frequency candidate	Pearson Correlation	-.088	-.074	-.079
	Sig. (2-tailed)	.026	.059	.043
	N	649	649	649

Correlations

		School absences candidate	Weekly study- time candidate	Past failures candidate
Family relationship candidate	Pearson Correlation	-.090	-.004	-.063
	Sig. (2-tailed)	.023	.916	.111
	N	649	649	649
Free-time candidate	Pearson Correlation	-.019	-.069	.109
	Sig. (2-tailed)	.634	.080	.005
	N	649	649	649
Going-out frequency candidate	Pearson Correlation	.085	-.075	.045
	Sig. (2-tailed)	.030	.055	.251
	N	649	649	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Student age candidate	Mother education candidate	Father education candidate
Family relationship candidate	Pearson Correlation	-.021	.024	.020
	Sig. (2-tailed)	.601	.535	.606
	N	649	649	649
Free-time candidate	Pearson Correlation	-.005	-.020	.007
	Sig. (2-tailed)	.901	.617	.862
	N	649	649	649
Going-out frequency candidate	Pearson Correlation	.113	.010	.028
	Sig. (2-tailed)	.004	.808	.481
	N	649	649	649

Correlations

		Travel-time candidate	Family relationship candidate	Free-time candidate
Family relationship candidate	Pearson Correlation	-.010	1	.129
	Sig. (2-tailed)	.809		.001
	N	649	649	649
Free-time candidate	Pearson Correlation	.001	.129	1
	Sig. (2-tailed)	.981	.001	
	N	649	649	649
Going-out frequency candidate	Pearson Correlation	.057	.090	.346
	Sig. (2-tailed)	.144	.022	.000
	N	649	649	649

Stepwise Regression
Descriptive statistics and candidate-predictor correlations

Correlations

		Going-out frequency candidate
Family relationship candidate	Pearson Correlation	.090
	Sig. (2-tailed)	.022
	N	649
Free-time candidate	Pearson Correlation	.346
	Sig. (2-tailed)	.000
	N	649
Going-out frequency candidate	Pearson Correlation	1
	Sig. (2-tailed)	
	N	649

Stepwise Regression

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Regression

Notes

Output Created		12-JUL-2026 14:31:57
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	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 cases with no missing values for any variable used.

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Notes

Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA CHANGE CI(95) COLLIN TOL ZPP /CRITERIA=PIN(.05) POUT(.10) TOLERANCE(.0001) /NOORIGIN /DEPENDENT G3 /METHOD=STEPWISE G1 G2 absences studytime failures age Medu Fedu travelttime famrel freetime goout /SAVE PRED(step_pred) RESID(step_resid) ZPRED(step_zpred) ZRESID(step_zresid) COOK(step_cook)...
Resources	Processor Time	00:00:00.11
	Elapsed Time	00:00:00.30
	Memory Required	13872 bytes
	Additional Memory Required for Residual Plots	0 bytes
Variables Created or Modified	step_pred	Unstandardized Predicted Value
	step_resid	Unstandardized Residual
	step_zpred	Standardized Predicted Value
	step_zresid	Standardized Residual
	step_cook	Cook's Distance
	step_lev	Centered Leverage Value

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Second-period grade candidate	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	First-period grade candidate	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Past failures candidate	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	School absences candidate	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Final grade outcome

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Model Summary^e

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.919 ^a	.844	.843	1.27810	.844	3493.282	1
2	.921 ^b	.848	.847	1.26248	.004	17.105	1
3	.921 ^c	.849	.848	1.25821	.001	5.387	1
4	.922 ^d	.850	.849	1.25513	.001	4.174	1

Model Summary^e

Model	Change Statistics	
	df2	Sig. F Change
1	647	.000
2	646	.000
3	645	.021
4	644	.041

- a. Predictors: (Constant), Second-period grade candidate
- b. Predictors: (Constant), Second-period grade candidate, First-period grade candidate
- c. Predictors: (Constant), Second-period grade candidate, First-period grade candidate, Past failures candidate
- d. Predictors: (Constant), Second-period grade candidate, First-period grade candidate, Past failures candidate, School absences candidate
- e.

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5706.374	1	5706.374	3493.282	.000 ^b
	Residual	1056.893	647	1.634		
	Total	6763.267	648			
2	Regression	5733.637	2	2866.819	1798.671	.000 ^c
	Residual	1029.629	646	1.594		
	Total	6763.267	648			
3	Regression	5742.165	3	1914.055	1209.052	.000 ^d
	Residual	1021.102	645	1.583		
	Total	6763.267	648			
4	Regression	5748.740	4	1437.185	912.295	.000 ^e
	Residual	1014.526	644	1.575		
	Total	6763.267	648			

a. Dependent Variable: Final grade outcome

b. Predictors: (Constant), Second-period grade candidate

c. Predictors: (Constant), Second-period grade candidate, First-period grade candidate

d. Predictors: (Constant), Second-period grade candidate, First-period grade candidate, Past failures candidate

e. Predictors: (Constant), Second-period grade candidate, First-period grade candidate, Past failures candidate, School absences candidate

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.122	.206		.593	.553
	Second-period grade candidate	1.018	.017	.919	59.104	.000
2	(Constant)	-.171	.215		-.796	.426
	Second-period grade candidate	.897	.034	.809	26.448	.000
	First-period grade candidate	.149	.036	.127	4.136	.000
3	(Constant)	.085	.241		.353	.724
	Second-period grade candidate	.888	.034	.801	26.093	.000
	First-period grade candidate	.140	.036	.119	3.872	.000
	Past failures candidate	-.211	.091	-.039	-2.321	.021
4	(Constant)	-.041	.248		-.164	.870
	Second-period grade candidate	.887	.034	.800	26.127	.000
	First-period grade candidate	.145	.036	.123	4.016	.000
	Past failures candidate	-.225	.091	-.041	-2.471	.014
	School absences candidate	.022	.011	.032	2.043	.041

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Coefficients^a

Model		95.0% Confidence Interval for B		Correlations		
		Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	-.282	.526			
	Second-period grade candidate	.985	1.052	.919	.919	.919
2	(Constant)	-.594	.251			
	Second-period grade candidate	.831	.964	.919	.721	.406
	First-period grade candidate	.078	.220	.826	.161	.063
3	(Constant)	-.388	.559			
	Second-period grade candidate	.821	.955	.919	.717	.399
	First-period grade candidate	.069	.211	.826	.151	.059
	Past failures candidate	-.389	-.032	-.393	-.091	-.036
4	(Constant)	-.528	.447			
	Second-period grade candidate	.820	.954	.919	.717	.399
	First-period grade candidate	.074	.216	.826	.156	.061
	Past failures candidate	-.403	-.046	-.393	-.097	-.038
	School absences candidate	.001	.043	-.091	.080	.031

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Second-period grade candidate	1.000	1.000
2	(Constant)		
	Second-period grade candidate	.252	3.971
	First-period grade candidate	.252	3.971
3	(Constant)		
	Second-period grade candidate	.248	4.025
	First-period grade candidate	.249	4.019
	Past failures candidate	.841	1.189
4	(Constant)		
	Second-period grade candidate	.248	4.026
	First-period grade candidate	.248	4.039
	Past failures candidate	.836	1.195
	School absences candidate	.973	1.028

a. Dependent Variable: Final grade outcome

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Excluded Variables^a

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Tolerance
1	First-period grade candidate	.127 ^b	4.136	.000	.161	.252
	School absences candidate	.024 ^b	1.506	.132	.059	.984
	Weekly study-time candidate	.031 ^b	1.918	.055	.075	.942
	Past failures candidate	-.046 ^b	-2.730	.006	-.107	.851
	Student age candidate	-.008 ^b	-.525	.600	-.021	.989
	Mother education candidate	-.003 ^b	-.159	.874	-.006	.930
	Father education candidate	.005 ^b	.330	.742	.013	.949
	Travel-time candidate	.015 ^b	.959	.338	.038	.976
	Family relationship candidate	-.019 ^b	-1.223	.222	-.048	.992
	Free-time candidate	-.025 ^b	-1.601	.110	-.063	.989
	Going-out frequency candidate	-.015 ^b	-.945	.345	-.037	.994
2	School absences candidate	.029 ^c	1.859	.064	.073	.978
	Weekly study-time candidate	.024 ^c	1.500	.134	.059	.931
	Past failures candidate	-.039 ^c	-2.321	.021	-.091	.841
	Student age candidate	.002 ^c	.147	.883	.006	.962
	Mother education candidate	-.007 ^c	-.436	.663	-.017	.926
	Father education candidate	.002 ^c	.142	.887	.006	.947
	Travel-time candidate	.018 ^c	1.144	.253	.045	.974
	Family relationship candidate	-.015 ^c	-1.002	.317	-.039	.989
	Free-time candidate	-.025 ^c	-1.603	.109	-.063	.989
	Going-out frequency candidate	-.014 ^c	-.913	.362	-.036	.994

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Excluded Variables^a

Model		Collinearity Statistics	
		VIF	Minimum Tolerance
1	First-period grade candidate	3.971	.252
	School absences candidate	1.016	.984
	Weekly study-time candidate	1.061	.942
	Past failures candidate	1.175	.851
	Student age candidate	1.012	.989
	Mother education candidate	1.075	.930
	Father education candidate	1.053	.949
	Travel-time candidate	1.024	.976
	Family relationship candidate	1.008	.992
	Free-time candidate	1.012	.989
	Going-out frequency candidate	1.006	.994
2	School absences candidate	1.022	.250
	Weekly study-time candidate	1.074	.249
	Past failures candidate	1.189	.248
	Student age candidate	1.039	.245
	Mother education candidate	1.080	.250
	Father education candidate	1.056	.250
	Travel-time candidate	1.026	.251
	Family relationship candidate	1.011	.250
	Free-time candidate	1.012	.251
	Going-out frequency candidate	1.006	.252

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Excluded Variables^a

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Tolerance
3	School absences candidate	.032 ^d	2.043	.041	.080	.973
	Weekly study-time candidate	.022 ^d	1.390	.165	.055	.929
	Student age candidate	.014 ^d	.862	.389	.034	.880
	Mother education candidate	-.010 ^d	-.607	.544	-.024	.921
	Father education candidate	-.001 ^d	-.052	.959	-.002	.941
	Travel-time candidate	.019 ^d	1.236	.217	.049	.973
	Family relationship candidate	-.017 ^d	-1.093	.275	-.043	.987
	Free-time candidate	-.022 ^d	-1.440	.150	-.057	.983
	Going-out frequency candidate	-.014 ^d	-.882	.378	-.035	.993
4	Weekly study-time candidate	.025 ^e	1.564	.118	.062	.923
	Student age candidate	.010 ^e	.640	.522	.025	.869
	Mother education candidate	-.011 ^e	-.683	.495	-.027	.920
	Father education candidate	-.003 ^e	-.196	.845	-.008	.936
	Travel-time candidate	.020 ^e	1.310	.191	.052	.972
	Family relationship candidate	-.014 ^e	-.931	.352	-.037	.981
	Free-time candidate	-.021 ^e	-1.365	.173	-.054	.982
	Going-out frequency candidate	-.016 ^e	-1.040	.299	-.041	.988

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Excluded Variables^a

Model		Collinearity Statistics	
		VIF	Minimum Tolerance
3	School absences candidate	1.028	.248
	Weekly study-time candidate	1.077	.246
	Student age candidate	1.136	.244
	Mother education candidate	1.085	.247
	Father education candidate	1.063	.247
	Travel-time candidate	1.028	.248
	Family relationship candidate	1.013	.246
	Free-time candidate	1.017	.248
	Going-out frequency candidate	1.007	.248
4	Weekly study-time candidate	1.084	.245
	Student age candidate	1.150	.243
	Mother education candidate	1.087	.247
	Father education candidate	1.068	.247
	Travel-time candidate	1.029	.247
	Family relationship candidate	1.020	.246
	Free-time candidate	1.019	.248
	Going-out frequency candidate	1.012	.248

a. Dependent Variable: Final grade outcome

b. Predictors in the Model: (Constant), Second-period grade candidate

c. Predictors in the Model: (Constant), Second-period grade candidate, First-period grade candidate

d. Predictors in the Model: (Constant), Second-period grade candidate, First-period grade candidate, Past failures candidate

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

e. Predictors in the Model: (Constant), Second-period grade candidate, First-period grade candidate, Past

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	(Constant)	Variance Proportions	
					Second-period grade candidate	First-period grade candidate
1	1	1.970	1.000	.02	.02	
	2	.030	8.072	.98	.98	
2	1	2.956	1.000	.01	.00	.00
	2	.036	9.048	.98	.08	.05
	3	.008	19.607	.01	.92	.95
3	1	3.075	1.000	.00	.00	.00
	2	.889	1.860	.00	.00	.00
	3	.029	10.329	.98	.10	.06
	4	.008	19.998	.01	.90	.94
4	1	3.525	1.000	.00	.00	.00
	2	.898	1.981	.00	.00	.00
	3	.541	2.553	.00	.00	.00
	4	.028	11.295	.98	.10	.06
	5	.008	21.441	.01	.90	.94

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions	
		Past failures candidate	School absences candidate
1	1		
	2		
2	1		
	2		
	3		
3	1	.01	
	2	.78	
	3	.21	
	4	.00	
4	1	.01	.03
	2	.72	.01
	3	.09	.91
	4	.18	.04
	5	.00	.00

a. Dependent Variable: Final grade outcome

Stepwise Regression
Native SPSS stepwise variable selection predicting G3

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.3145	19.4231	11.9060	2.97851	649
Std. Predicted Value	-3.892	2.524	.000	1.000	649
Standard Error of Predicted Value	.053	.401	.100	.046	649
Adjusted Predicted Value	.3247	19.4287	11.9067	2.97746	649
Residual	-9.08849	5.72033	.00000	1.25125	649
Std. Residual	-7.241	4.558	.000	.997	649
Stud. Residual	-7.318	4.566	.000	1.002	649
Deleted Residual	-9.28278	5.74155	-.00072	1.26427	649
Stud. Deleted Residual	-7.637	4.638	-.003	1.019	649
Mahal. Distance	.178	65.124	3.994	6.221	649
Cook's Distance	.000	.229	.002	.012	649
Centered Leverage Value	.000	.100	.006	.010	649

a. Dependent Variable: Final grade outcome

Stepwise Regression

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Descriptives

Notes

Output Created		12-JUL-2026 14:31:58
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	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= step_pred step_resid step_zpred step_zresid step_cook step_lev /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.08

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Unstandardized Predicted Value	649	.31454	19.42311	11.9060092	2.97850845
Unstandardized Residual	649	-9.08849	5.72033	.0000000	1.25125024
Standardized Predicted Value	649	-3.89170	2.52378	.0000000	1.00000000
Standardized Residual	649	-7.24108	4.55756	.0000000	.99690880
Cook's Distance	649	.00000	.22897	.0020942	.01199249
Centered Leverage Value	649	.00028	.10050	.0061633	.00960006
Valid N (listwise)	649				

Explore

Notes

Output Created		12-JUL-2026 14:31:58
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	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 for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Notes

Syntax		EXAMINE VARIABLES=step_resid step_zresid /PLOT BOXPLOT HISTOGRAM NPLOT /STATISTICS DESCRIPTIVES EXTREME /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:15.36
	Elapsed Time	00:01:39.31

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Unstandardized Residual	649	100.0%	0	0.0%	649	100.0%
Standardized Residual	649	100.0%	0	0.0%	649	100.0%

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Descriptives

			Statistic	Std. Error
Unstandardized Residual	Mean		.0000000	.04911587
	95% Confidence Interval for Mean	Lower Bound	-.0964455	
		Upper Bound	.0964455	
	5% Trimmed Mean		.0706072	
	Median		-.0858851	
	Variance		1.566	
	Std. Deviation		1.25125024	
	Minimum		-9.08849	
	Maximum		5.72033	
	Range		14.80882	
	Interquartile Range		1.09497	
	Skewness		-2.865	.096
	Kurtosis		18.602	.192
Standardized Residual	Mean		.0000000	.03913209
	95% Confidence Interval for Mean	Lower Bound	-.0768410	
		Upper Bound	.0768410	
	5% Trimmed Mean		.0562549	
	Median		-.0684273	
	Variance		.994	
	Std. Deviation		.99690880	
	Minimum		-7.24108	
	Maximum		4.55756	
	Range		11.79863	
	Interquartile Range		.87239	
	Skewness		-2.865	.096
	Kurtosis		18.602	.192

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Extreme Values

			Case Number	Value
Unstandardized Residual	Highest	1	62	5.72033
		2	308	2.68828
		3	355	2.61223
		4	390	2.60741
		5	519	2.49416
	Lowest	1	164	-9.08849
		2	173	-9.05514
		3	587	-8.21558
		4	640	-7.55617
		5	520	-7.32850
Standardized Residual	Highest	1	62	4.55756
		2	308	2.14184
		3	355	2.08124
		4	390	2.07740
		5	519	1.98717
	Lowest	1	164	-7.24108
		2	173	-7.21451
		3	587	-6.54560
		4	640	-6.02023
		5	520	-5.83884

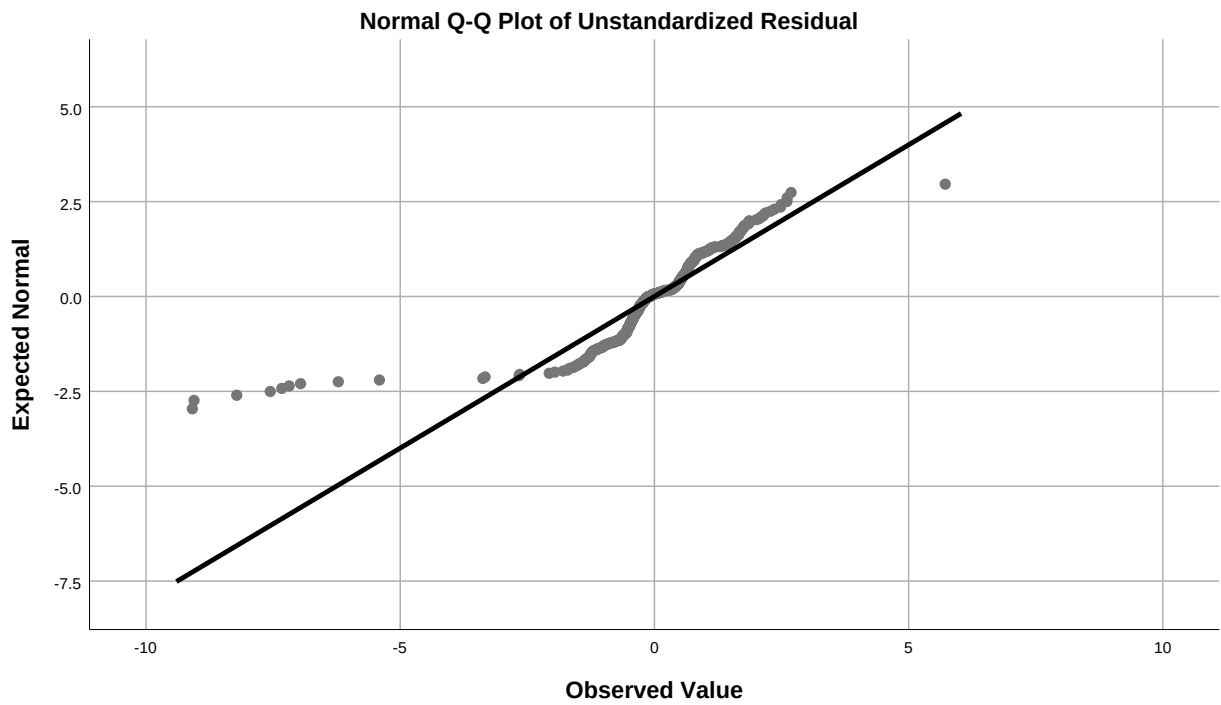
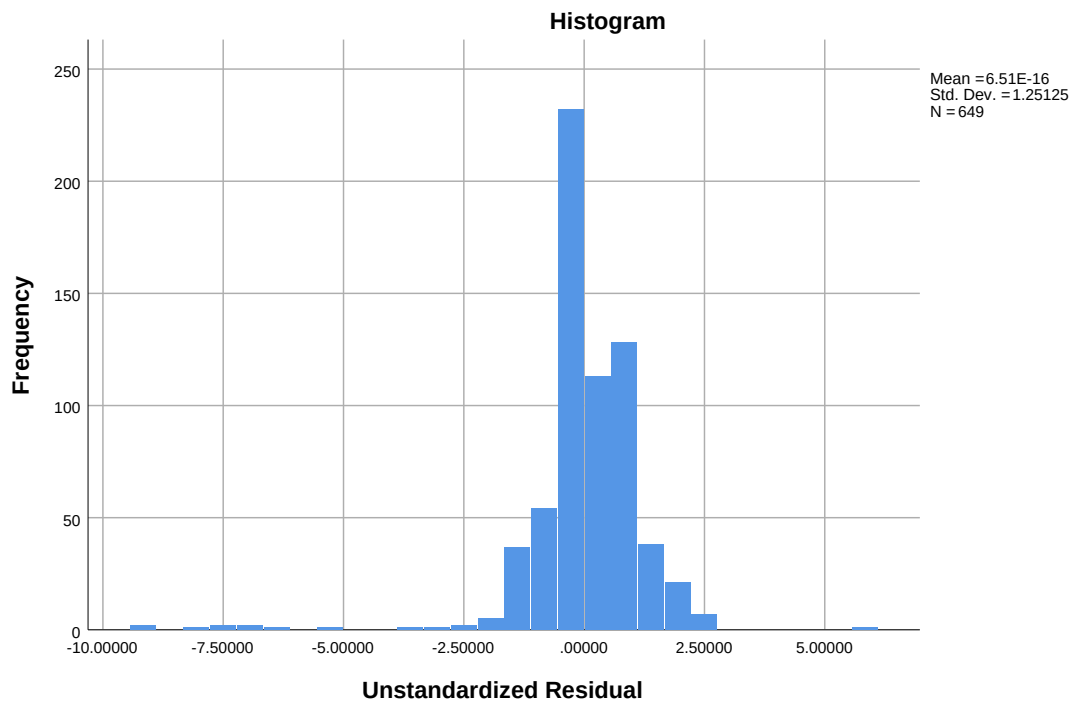
Tests of Normality

Kolmogorov-Smirnov ^a				Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.170	649	.000	.754	649	.000
Standardized Residual	.170	649	.000	.754	649	.000

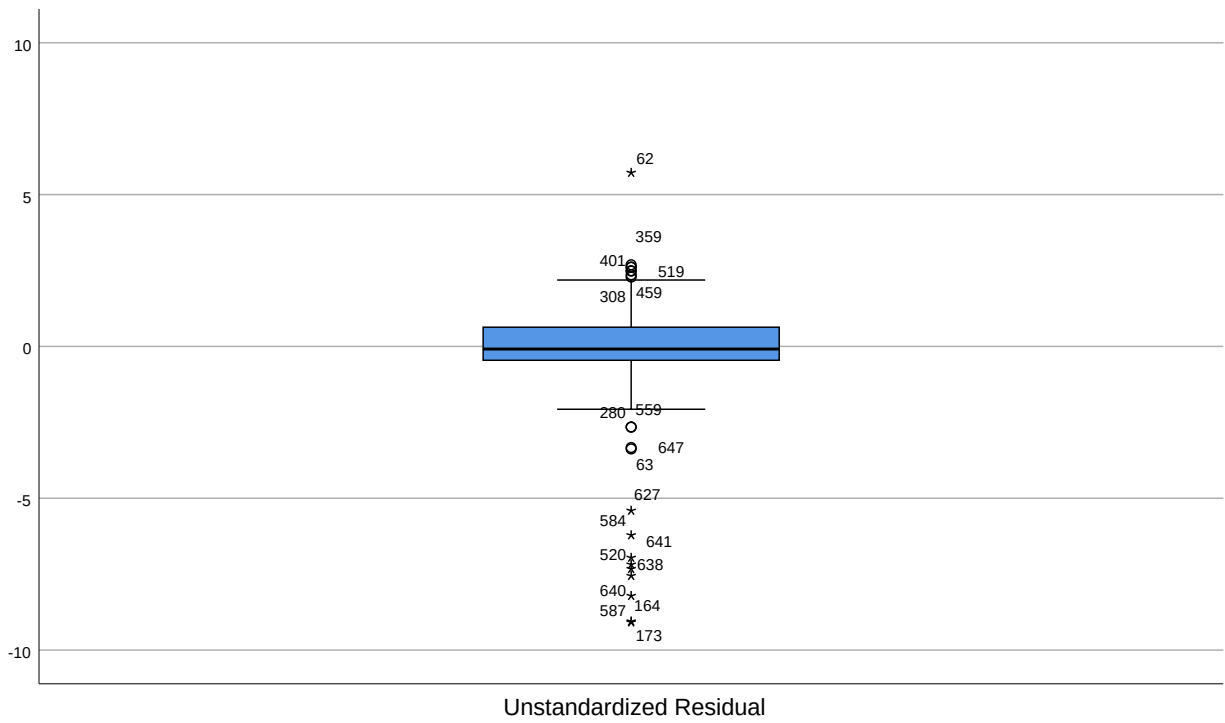
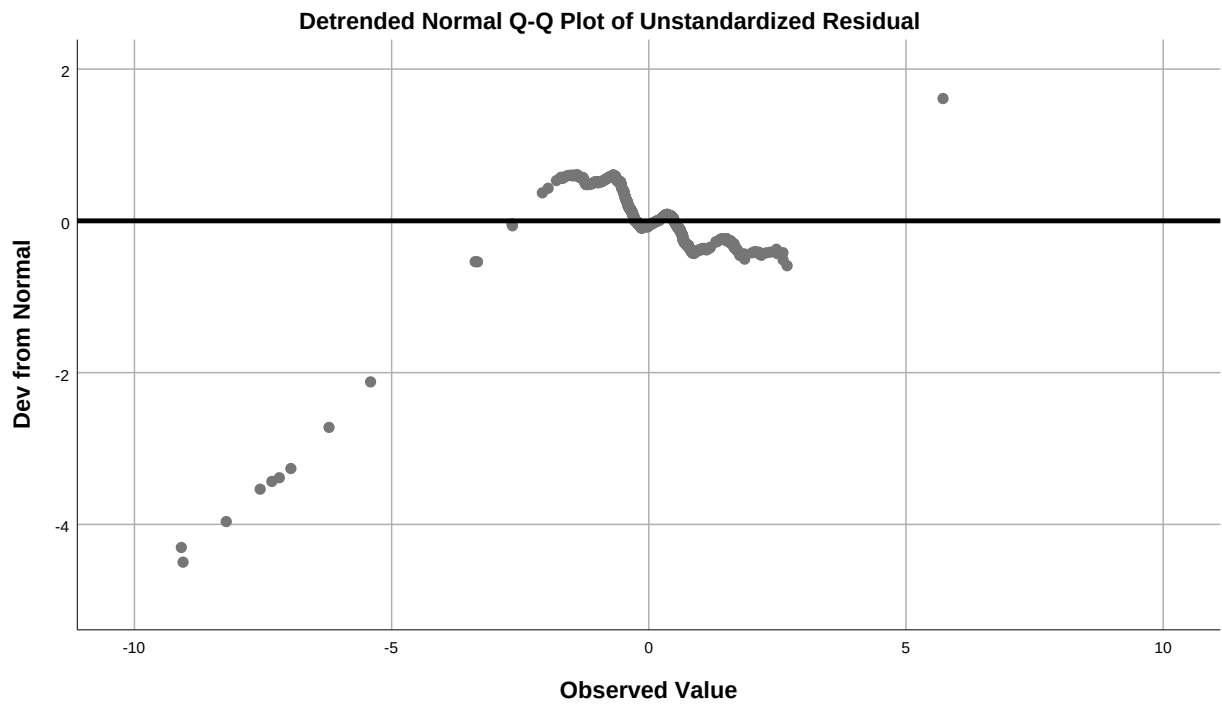
a. Lilliefors Significance Correction

Unstandardized Residual

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

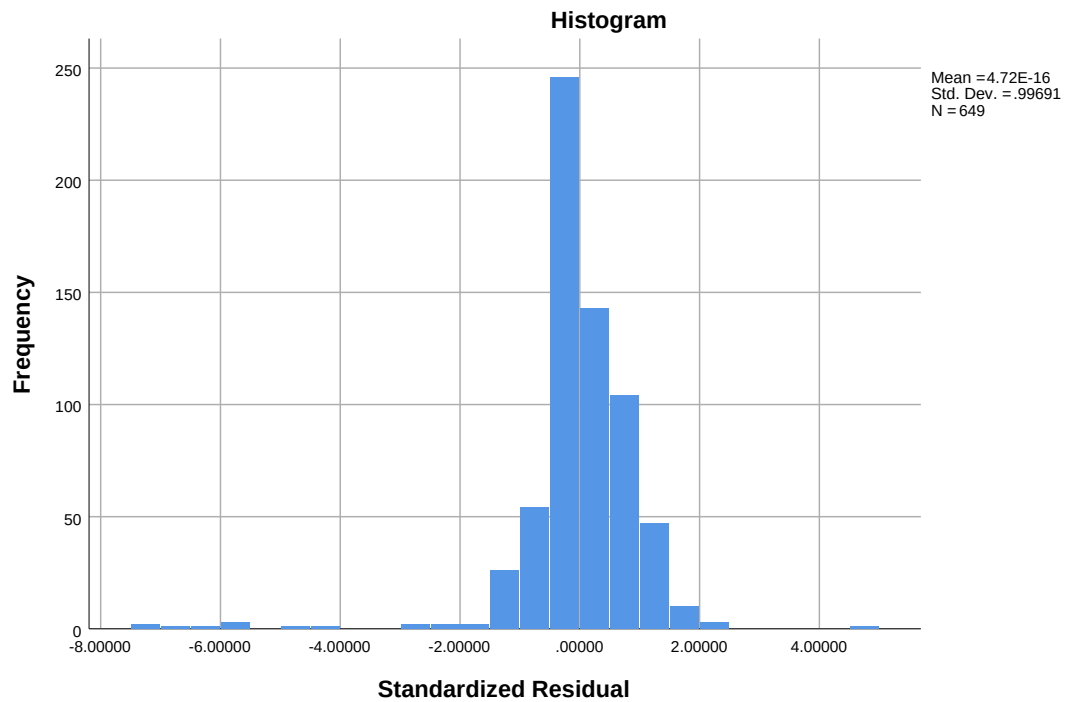


Stepwise Regression
Saved predictions, residuals, and influence diagnostics

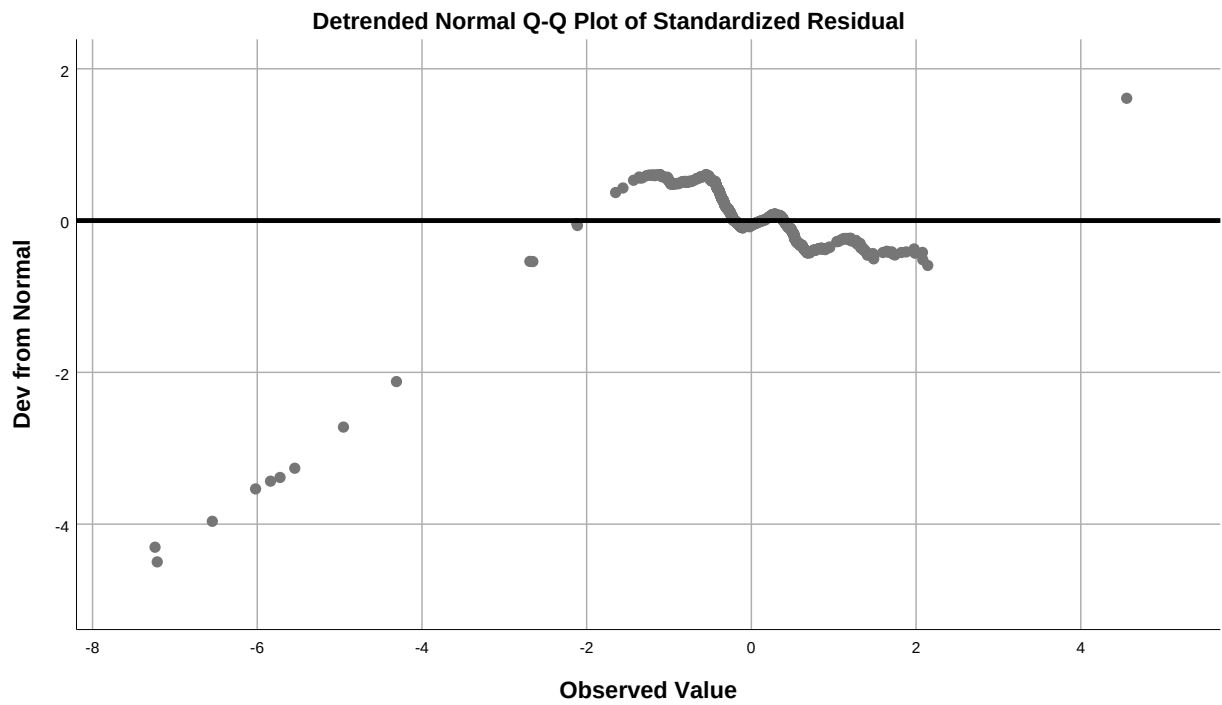
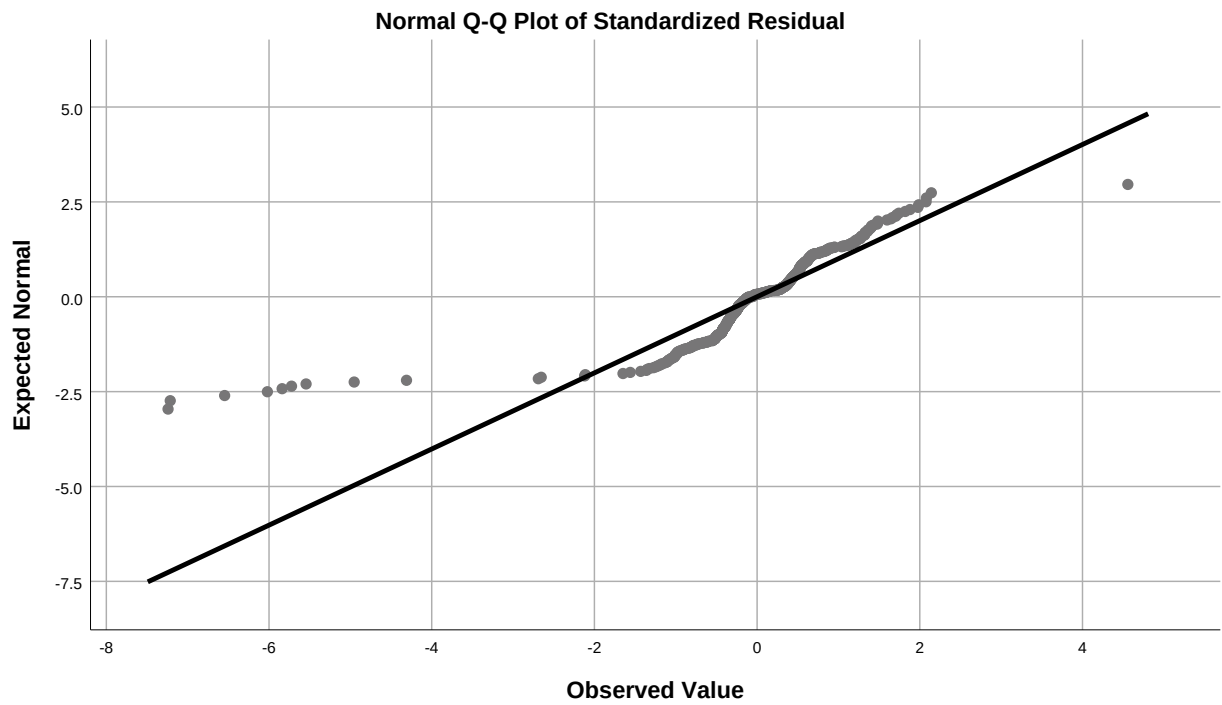


Stepwise Regression
Saved predictions, residuals, and influence diagnostics

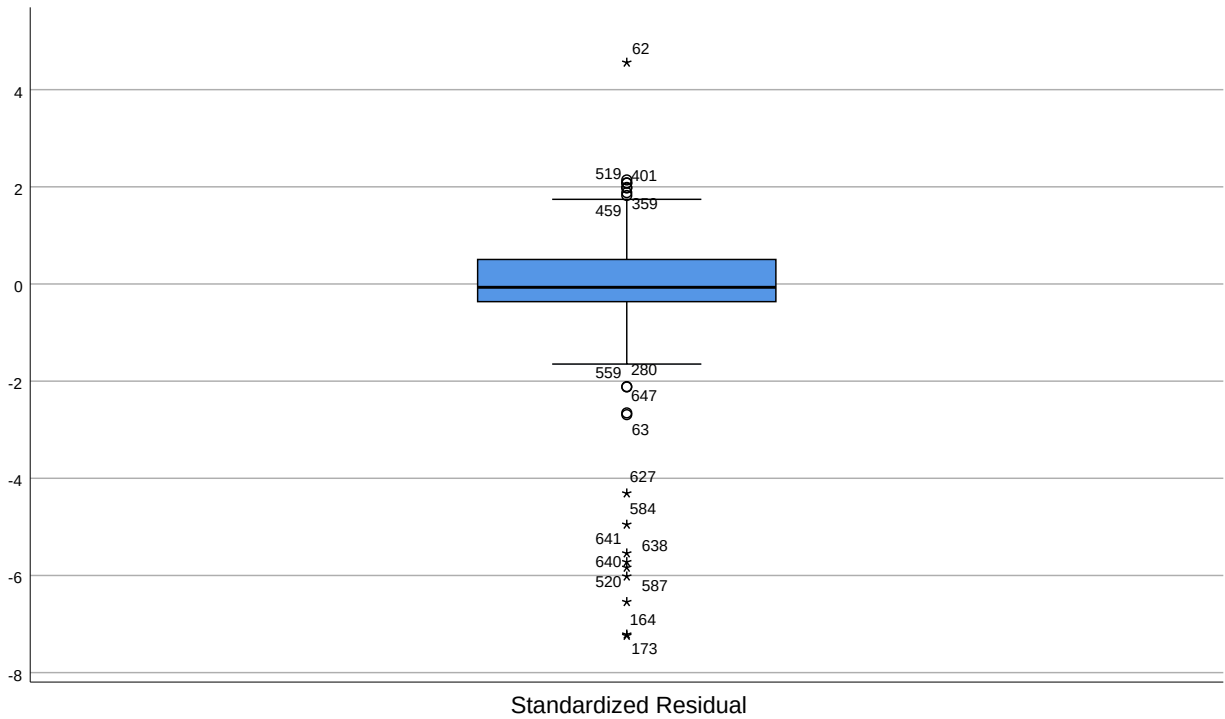
Standardized Residual



Stepwise Regression
Saved predictions, residuals, and influence diagnostics



Stepwise Regression
Saved predictions, residuals, and influence diagnostics



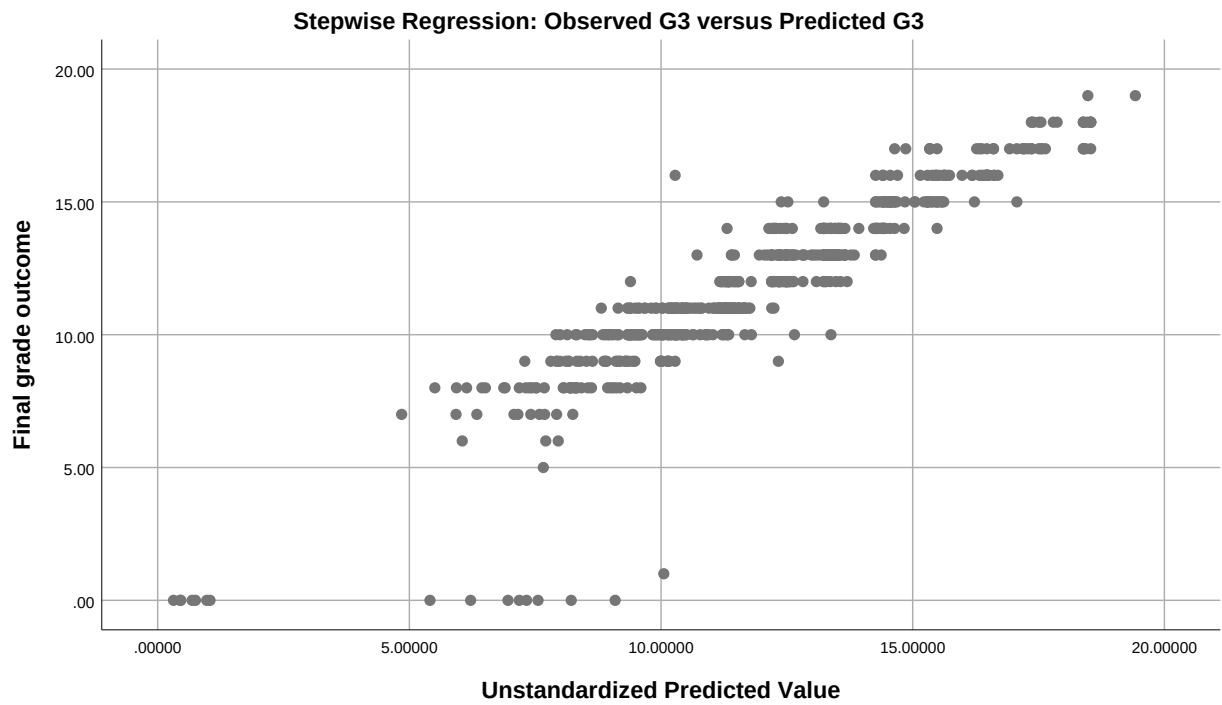
Graph

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Notes

Output Created		12-JUL-2026 14:33:37
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		GRAPH /SCATTERPLOT(BIVAR) =step_pred WITH G3 /TITLE='Stepwise Regression: Observed G3 versus Predicted G3'.
Resources	Processor Time	00:00:00.62
	Elapsed Time	00:00:00.53

Stepwise Regression
Saved predictions, residuals, and influence diagnostics



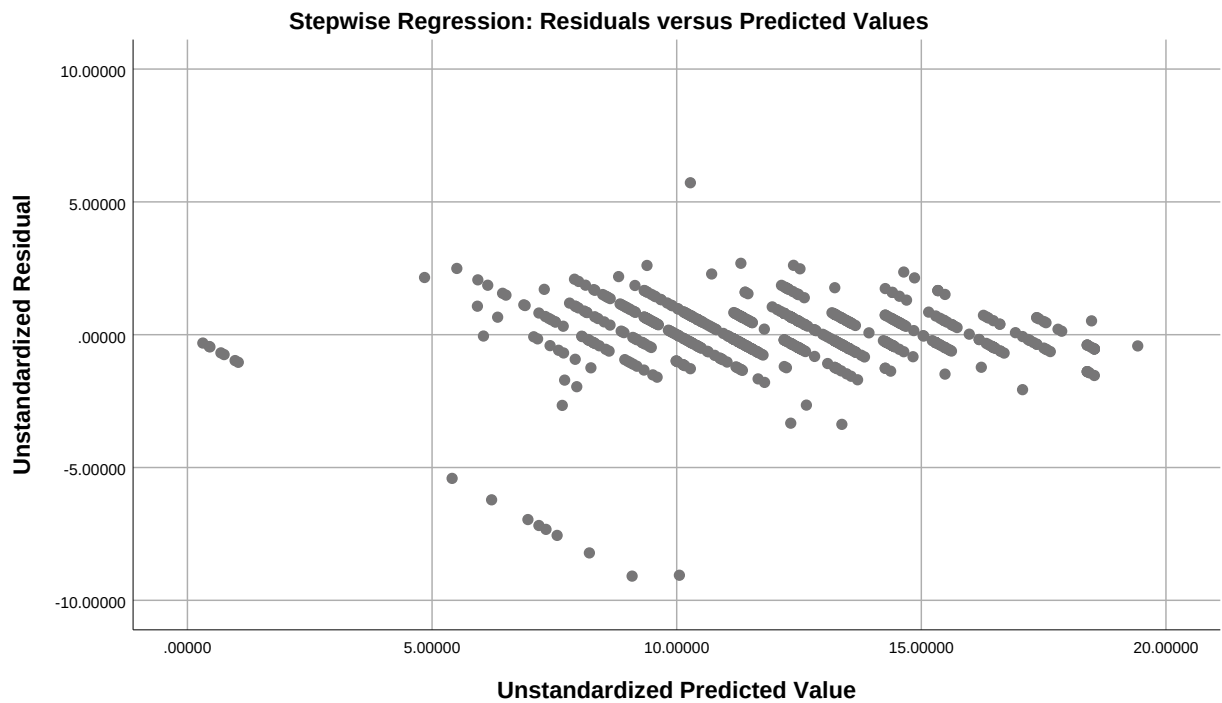
Graph

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Notes

Output Created		12-JUL-2026 14:33:38
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		GRAPH /SCATTERPLOT(BIVAR) =step_pred WITH step_resid /TITLE='Stepwise Regression: Residuals versus Predicted Values'.
Resources	Processor Time	00:00:01.03
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Stepwise Regression
Saved predictions, residuals, and influence diagnostics



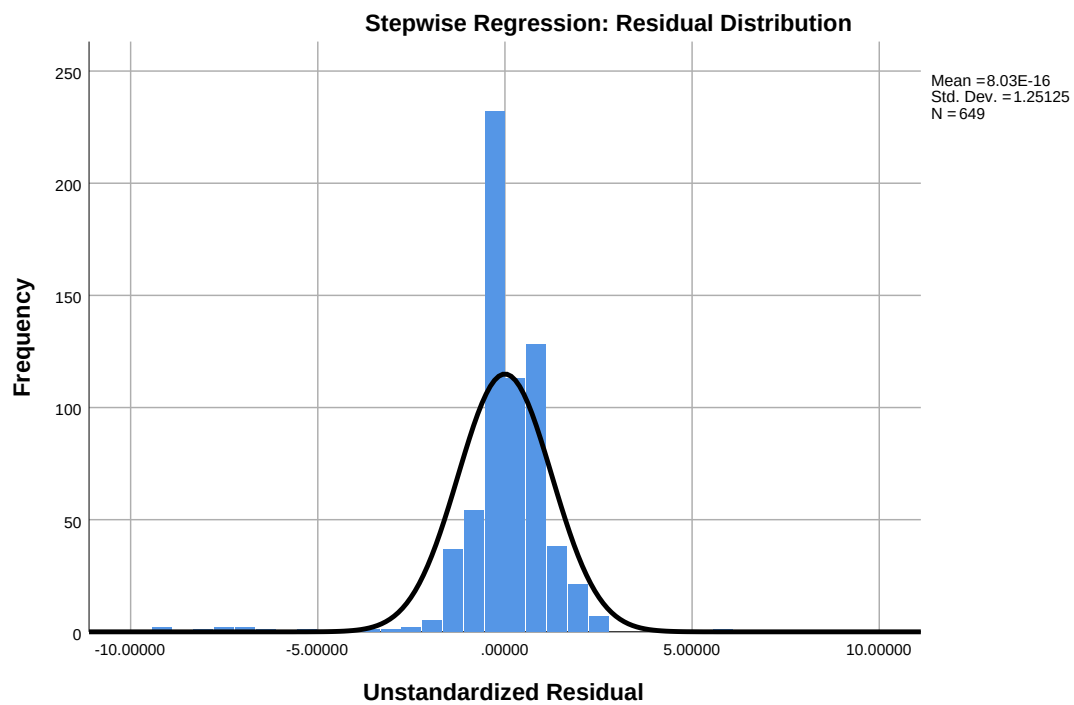
Graph

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Notes

Output Created		12-JUL-2026 14:33:39
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		GRAPH /HISTOGRAM(NORMAL) =step_resid /TITLE='Stepwise Regression: Residual Distribution'.
Resources	Processor Time	00:00:01.02
	Elapsed Time	00:00:00.44

Stepwise Regression
Saved predictions, residuals, and influence diagnostics



Graph

Stepwise Regression
Saved predictions, residuals, and influence diagnostics

Notes

Output Created		12-JUL-2026 14:33:39
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Stepwise Regression\SPSS_Output\ sav\stepwise_regression_ analysis_data.sav
	Active Dataset	StepwiseRegressionData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		GRAPH /SCATTERPLOT(BIVAR) =step_lev WITH step_cook /TITLE='Stepwise Regression: Leverage versus Cook Distance'.
Resources	Processor Time	00:00:00.47
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Stepwise Regression
Saved predictions, residuals, and influence diagnostics

