```
SET TVARS NAMES.

GET DATA
  /TYPE=TXT
  /FILE='D:\durbin_watson_test\student_dw_spss_clean.csv'
  /ENCODING='UTF8'
  /DELCASE=LINE
  /DELIMITERS=","
  /QUALIFIER='"'
  /ARRANGEMENT=DELIMITED
  /FIRSTCASE=2
  /IMPORTCASE=ALL
  /VARIABLES=
  school A2
  sex A1
  age F3.0
  address A1
  famsize A3
  Pstatus A1
  Medu F3.0
  Fedu F3.0
  Mjob A20
  Fjob A20
  reason A20
  guardian A20
  traveltime F3.0
  studytime F3.0
  failures F3.0
  schoolsup A3
  famsup A3
  paid A3
  activities A3
  nursery A3
  higher A3
  internet A3
  romantic A3
  famrel F3.0
  freetime F3.0
  goout F3.0
  Dalc F3.0
  Walc F3.0
  health F3.0
```

```
  absences F5.0
  G1 F5.0
  G2 F5.0
  G3 F5.0.
CACHE.
EXECUTE.

DATASET NAME DWClean WINDOW=FRONT.
```

Dataset Name

Warnings

The active dataset will replace the existing dataset named DWClean.

```
COMPUTE caseid = $CASENUM.
EXECUTE.

VALUE LABELS studytime
  1 '<2 hours'
  2 '2 to 5 hours'
  3 '5 to 10 hours'
  4 '>10 hours'.
EXECUTE.

TITLE 'Durbin Watson Test SPSS SAFE Import Check'.
```

```
FREQUENCIES VARIABLES=studytime.
```

Frequencies

```
[DWClean]
```

Statistics

studytime

N	Valid	649
	Missing	0

studytime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<2 hours	212	32.7	32.7	32.7
	2 to 5 hours	305	47.0	47.0	79.7
	5 to 10 hours	97	14.9	14.9	94.6
	>10 hours	35	5.4	5.4	100.0
	Total	649	100.0	100.0	

```
DESCRIPTIVES VARIABLES=G1 G2 G3 absences failures age Medu Fedu traveltime hea
lth
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
G1	649	0	19	11.40	2.745
G2	649	0	19	11.57	2.914
G3	649	0	19	11.91	3.231
absences	649	0	32	3.66	4.641
failures	649	0	3	.22	.593
age	649	15	22	16.74	1.218
Medu	649	0	4	2.51	1.135
Fedu	649	0	4	2.31	1.100
traveltime	649	1	4	1.57	.749
health	649	1	5	3.54	1.446
Valid N (listwise)	649				

```
* ============================================================.
* A. MAIN MODEL: G3 ~ G1 + G2 + studytime + failures + absences + age + Medu +
 Fedu.
* ============================================================.

DATASET COPY DWMain.
```

Dataset Copy

Warnings

Replacing existing dataset named DWMain.

```
DATASET ACTIVATE DWMain.
SORT CASES BY caseid(A).
EXECUTE.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF R ANOVA COLLIN
  /DEPENDENT G3
  /METHOD=ENTER G1 G2 studytime failures absences age Medu Fedu
  /SAVE PRED(prd_main) RESID(res_main).
```

Regression

Durbin Watson Test SPSS SAFE Import Check

[DWMain]

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Fedu, absences, studytime, age, G2, failures, Medu, G1[b]	.	Enter

a. Dependent Variable: G3

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.922[a]	.851	.849	1.256

a. Predictors: (Constant), Fedu, absences, studytime, age, G2, failures, Medu, G1

b. Dependent Variable: G3

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5754.033	8	719.254	456.111	.000[b]
	Residual	1009.234	640	1.577		
	Total	6763.267	648			

a. Dependent Variable: G3

b. Predictors: (Constant), Fedu, absences, studytime, age, G2, failures, Medu, G1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.501	.774		-.648	.518
	G1	.143	.037	.122	3.910	.000
	G2	.885	.034	.798	25.744	.000
	studytime	.097	.062	.025	1.556	.120
	failures	-.235	.095	-.043	-2.471	.014
	absences	.023	.011	.033	2.085	.038
	age	.023	.044	.009	.520	.604
	Medu	-.045	.058	-.016	-.776	.438
	Fedu	.022	.059	.007	.371	.711

a. Dependent Variable: G3

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	G1	G2	studytime
1	1	7.051	1.000	.00	.00	.00	.00
	2	.945	2.731	.00	.00	.00	.00
	3	.570	3.518	.00	.00	.00	.00
	4	.211	5.777	.00	.00	.00	.15
	5	.108	8.064	.00	.01	.01	.83
	6	.062	10.680	.00	.00	.00	.00
	7	.043	12.869	.02	.06	.08	.01
	8	.008	30.135	.00	.87	.88	.00
	9	.002	56.814	.97	.06	.02	.00

Collinearity Diagnostics[a]

Model	Dimension	Variance Proportions: failures	absences	age	Medu	Fedu
1	1	.00	.01	.00	.00	.00
	2	.61	.05	.00	.00	.00
	3	.12	.88	.00	.00	.00
	4	.01	.00	.00	.13	.19
	5	.00	.02	.00	.02	.02
	6	.00	.00	.00	.84	.76
	7	.21	.04	.03	.00	.01
	8	.00	.00	.00	.00	.00
	9	.04	.01	.96	.00	.01

a. Dependent Variable: G3

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.25	19.55	11.91	2.980	649
Residual	-9.051	5.782	.000	1.248	649
Std. Predicted Value	-3.911	2.565	.000	1.000	649
Std. Residual	-7.207	4.605	.000	.994	649

a. Dependent Variable: G3

```
SORT CASES BY caseid(A).
EXECUTE.

COMPUTE lag_res_main = LAG(res_main).
IF ($CASENUM = 1) lag_res_main = $SYSMIS.
COMPUTE res_diff_main = res_main - lag_res_main.
COMPUTE res_diff2_main = res_diff_main ** 2.
COMPUTE res2_main = res_main ** 2.
EXECUTE.

AGGREGATE
  /OUTFILE=* MODE=ADDVARIABLES
  /BREAK=
```

```
  /n_main = N(res_main)
  /sum_diff2_main = SUM(res_diff2_main)
  /sum_res2_main = SUM(res2_main)
  /mean_res_main = MEAN(res_main)
  /mean_lag_res_main = MEAN(lag_res_main)
  /sd_res_main = SD(res_main)
  /sd_lag_res_main = SD(lag_res_main).

COMPUTE zres = res_main - mean_res_main.
COMPUTE zlag = lag_res_main - mean_lag_res_main.
COMPUTE cross_main = zres * zlag.
EXECUTE.

AGGREGATE
  /OUTFILE=* MODE=ADDVARIABLES
  /BREAK=
  /sum_cross_main = SUM(cross_main).

COMPUTE dw_main = sum_diff2_main / sum_res2_main.
COMPUTE lag1_corr_main = sum_cross_main / ((n_main - 1) * sd_res_main * sd_lag
_res_main).
COMPUTE approx_dw_main = 2 * (1 - lag1_corr_main).
STRING interpretation_main (A90).
IF (dw_main < 1.5) interpretation_main = 'Possible positive first-order autoco
rrelation'.
IF (dw_main >= 1.5 AND dw_main <= 2.5) interpretation_main = 'No serious first
-order autocorrelation by the 1.5 to 2.5 rule of thumb'.
IF (dw_main > 2.5) interpretation_main = 'Possible negative first-order autoco
rrelation'.
EXECUTE.

FORMATS dw_main lag1_corr_main approx_dw_main sum_diff2_main sum_res2_main (F1
2.6).
TITLE 'Main Durbin Watson Result Computed Manually in SPSS'.
```

```
LIST VARIABLES=n_main dw_main lag1_corr_main approx_dw_main sum_diff2_main sum
_res2_main interpretation_main
  /CASES=FROM 2 TO 2.
```

List

```
The variables are listed in the following order:

LINE   1: n_main dw_main lag1_corr_main approx_dw_main sum_diff2_main sum_res2
_main

LINE   2: interpretation_main
```

```
      n_main:     649     1.861535      .068491     1.863018  1878.723927  100
9.233586
interpretati: No serious first-order autocorrelation by the 1.5 to 2.5 rule of
 thumb


Number of cases read:  2    Number of cases listed:  1

SAVE TRANSLATE
  /TYPE=CSV
  /OUTFILE='D:\durbin_watson_test\durbin_watson_spss_main_result.csv'
  /REPLACE
  /FIELDNAMES
  /KEEP=n_main dw_main lag1_corr_main approx_dw_main sum_diff2_main sum_res2_m
ain interpretation_main
  /CELLS=VALUES.



SAVE TRANSLATE
  /TYPE=CSV
  /OUTFILE='D:\durbin_watson_test\durbin_watson_spss_main_residuals.csv'
  /REPLACE
  /FIELDNAMES
  /KEEP=caseid G3 prd_main res_main lag_res_main res_diff_main res_diff2_main
res2_main
  /CELLS=VALUES.

* Main model charts.
GRAPH
  /SCATTERPLOT(BIVAR)=prd_main WITH G3
  /TITLE='Actual vs Fitted G3 for Durbin Watson Regression Model'.
```