

SPSS TUTORIAL

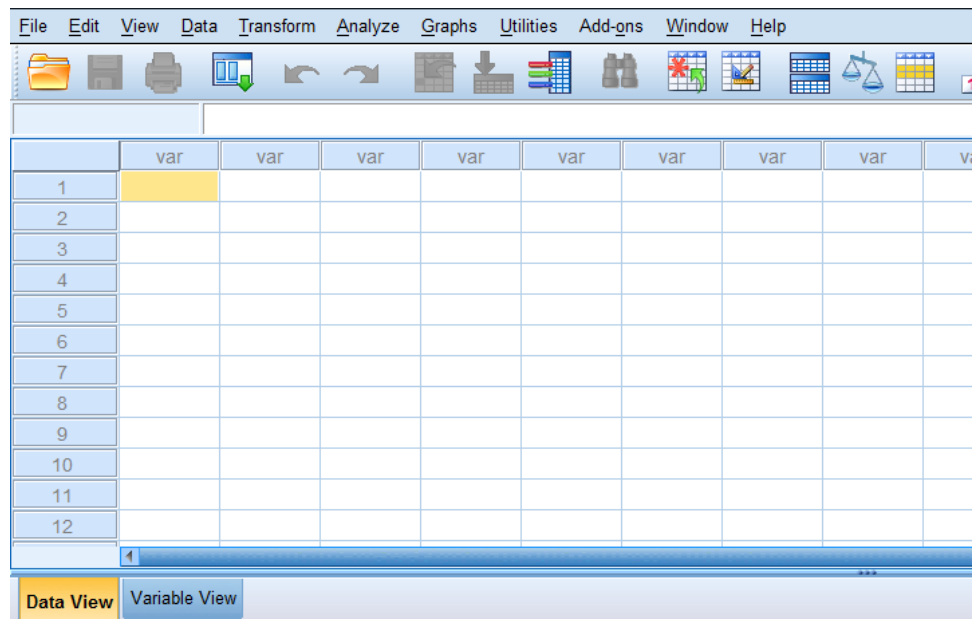
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I. SPSS Windows Environment

Upon entering into an SPSS session, you will see a screen similar to Figure 1. The main portion of the screen is an empty spreadsheet, with columns representing variables and rows representing observations (or cases). The very top of the screen is the SPSS main menu bar, with buttons for the different functions and procedures available. Once you have entered data into the spreadsheet, you can analyze the data by clicking the appropriate menu buttons.

Figure 1 Initial screen viewed by the SPSS user



2. Creating an SPSS Spreadsheet Data File Ready for Analysis

You can create an SPSS data file by entering data directly into the spreadsheet. Figure 2 shows the length-to-width ratio data for the BONES file analyzed in Chapter 1. The variables (columns) can be named by selecting the “Variable View” button at the bottom of the screen and typing in the name of each variable.

To access data already saved as an SPSS data set, select File on the main menu bar, then Open, then Data, as shown in Figure 3. In the resulting “Open Data” dialog box (see Figure 4), select the folder where the data file resides, then select the data set (e.g., CONDO). After clicking Open, the data will appear in the spreadsheet.

Figure 2 Data entered into the SPSS spreadsheet

	RATIO	var	var	va
1	10.73			
2	8.48			
3	8.52			
4	8.91			
5	8.93			
6	9.38			
7	8.89			
8	8.71			
9	8.87			
10	11.77			
11	8.80			
12	9.07			
13	9.57			
14	6.23			
15	10.48			
16	10.02			
17	9.20			
18	9.29			
19	9.41			
20	10.39			
21	8.38			
22	10.33			
23	9.94			
24	6.66			
25	9.39			
26	11.67			
27	9.98			
28	8.07			
29	9.35			
30	9.17			
31	8.30			
32	9.84			
33	8.37			

Figure 3 Accessing an SPSS data file

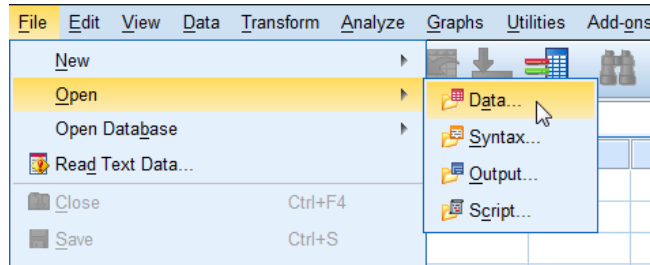
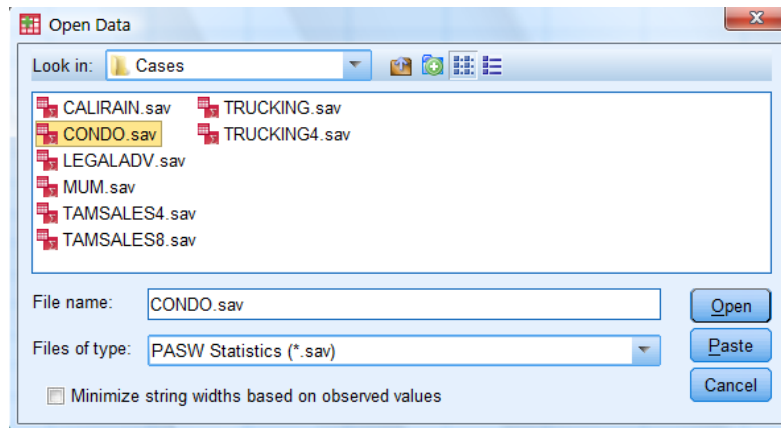


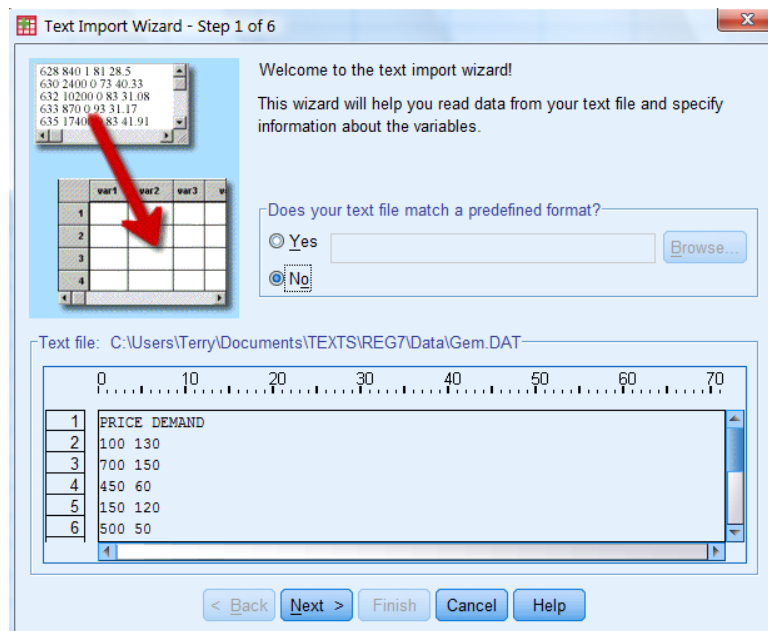
Figure 4 SPSS Open Data dialog box



(Note: Data saved as SAS or Excel files can also be imported into the SPSS spreadsheet using the same menu selections. However, be sure to change the “Files of type” to the proper format in the Open Data dialog box.)

Finally, if the data are saved in an external text file, access it by selecting File on the menu bar, then click Read Text Data (see Figure 3). In the Open Data dialog box, select the text file to Open. This will invoke the SPSS Text Import Wizard. The wizard presents a series of screen menus, the first of which is shown in Figure 5.

Figure 5 Text Import Wizard, screen 1



Make the appropriate selections on the screen, then click Next to go to the next screen menu. When you click Finish, the spreadsheet will reappear with the data from the external text file.

Reminder: The variables (columns) can be named by selecting the Variable View button at the bottom of the spreadsheet screen and typing in the name of each variable.

3. Listing Data

To obtain a listing (printout) of your data, click on the Analyze button on the SPSS main menu bar, then click on Reports, then on Report Summaries in Rows (see Figure 6). The resulting menu, or dialog box, appears as in Figure 7. Enter the names of the variables you want to print in the Data Columns box (you can do this by simply clicking on the variables), then click OK. The printout will show up on your screen.

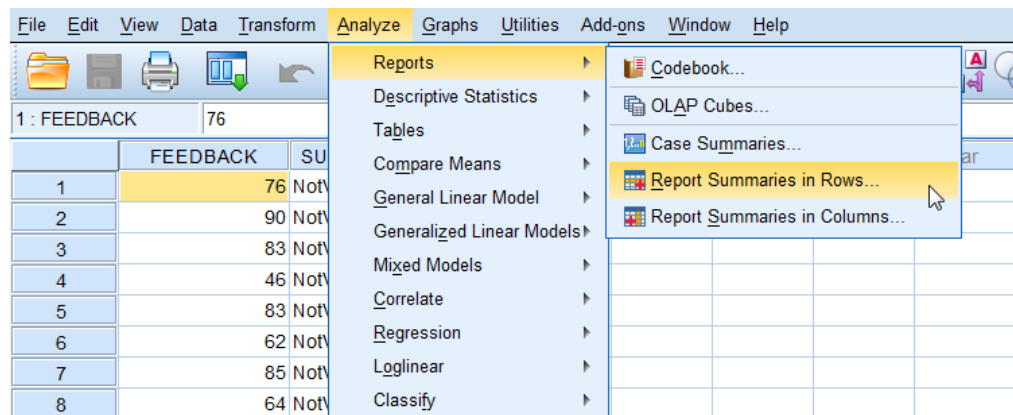
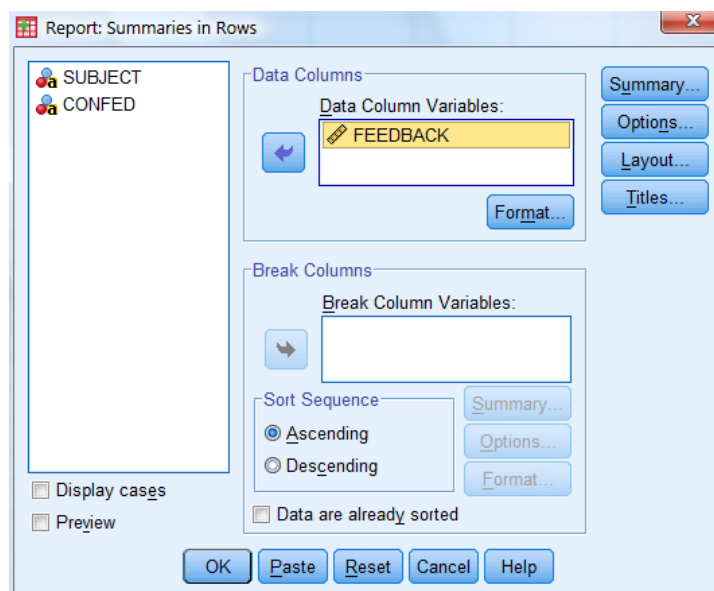


Figure 6 SPSS menu options for listing data

Figure 7 Report data dialog box



4. Graphing Data

To obtain graphical descriptions of your data (e.g., bar charts, histograms, scatterplots, etc.), click on Graphs on the main menu bar, then select Legacy Dialogs. The resulting menu list appears as shown in Figure 8. Several of the options covered in this text are Bar (Chart), Scatter (plot), and Histogram. Click on the graph of your choice to view the appropriate dialog box. For example, the dialog boxes for a histogram and scatterplot are shown, respectively, in Figures 9 and 10. Make the appropriate variable selections, and click OK to view the graph.

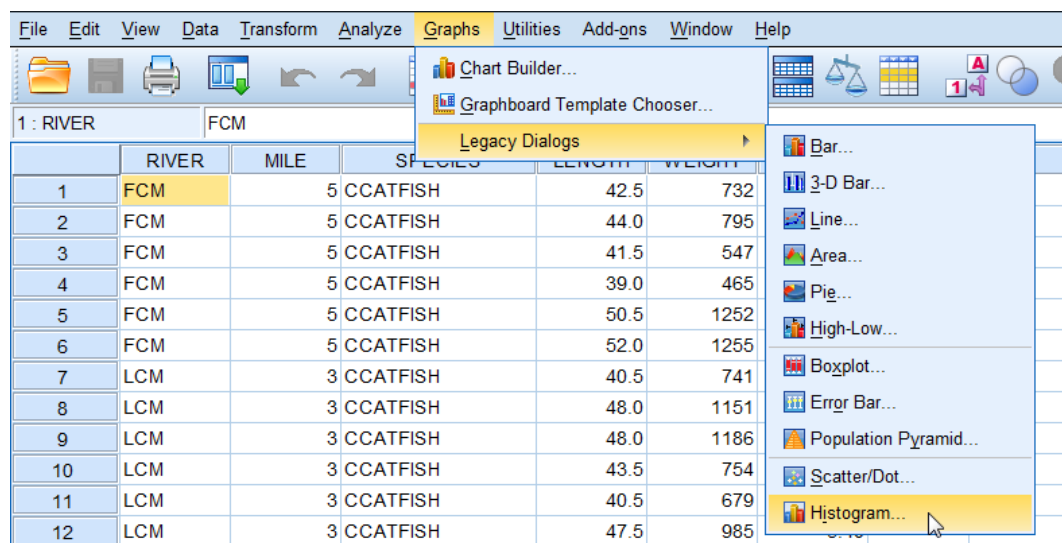


Figure 8 SPSS menu options for graphing data

Figure 9 Histogram dialog box

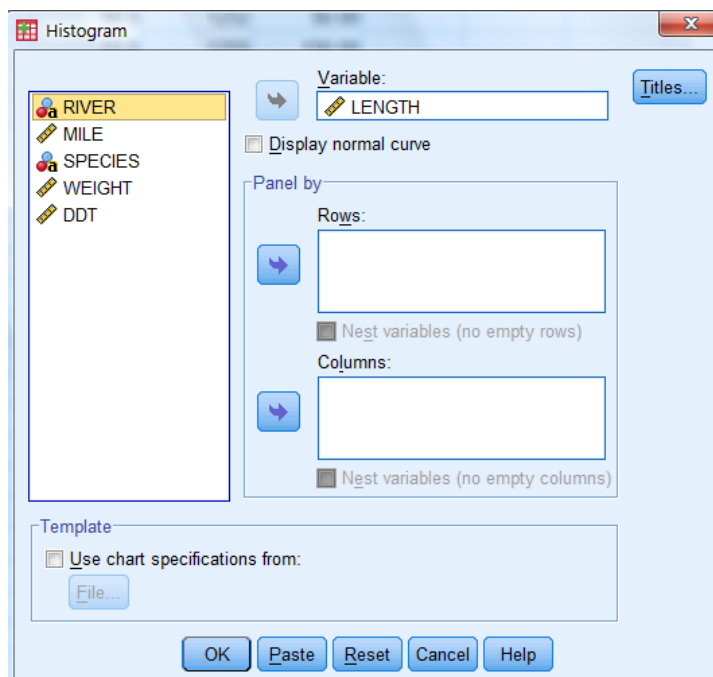
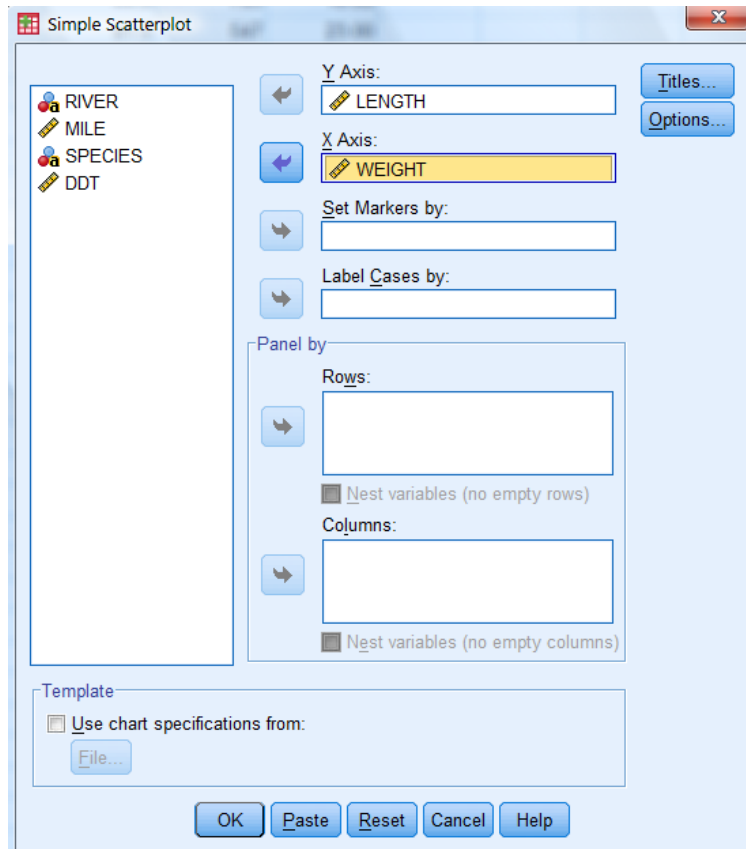


Figure 10 Scatterplot dialog box



5. Descriptive Statistics and Correlations

To obtain numerical descriptive measures for a quantitative variable (e.g., mean, standard deviation, etc.), click on the Analyze button on the main menu bar, then click on Descriptive Statistics and finally click on Descriptives (see Figure 11). The resulting dialog box appears in Figure 12.

Select the quantitative variables you want to analyze and place them in the Variable(s) box. You can control which particular descriptive statistics appear by clicking the Options button on the dialog box and making your selections. Click on OK to view the descriptive statistics printout.

Figure 11 SPSS menu options for Descriptive Statistics

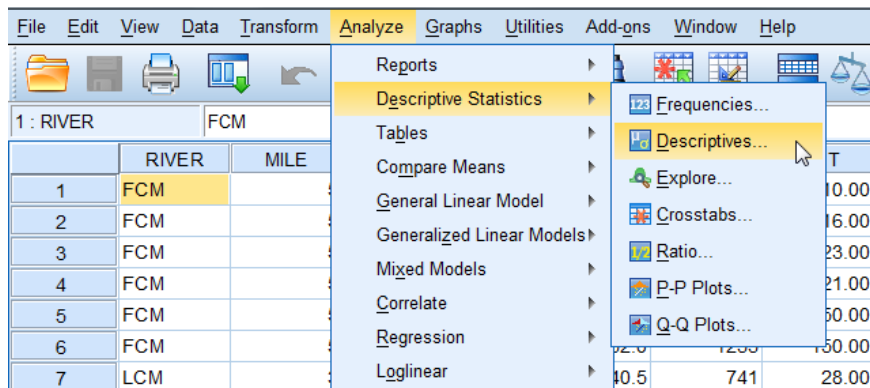
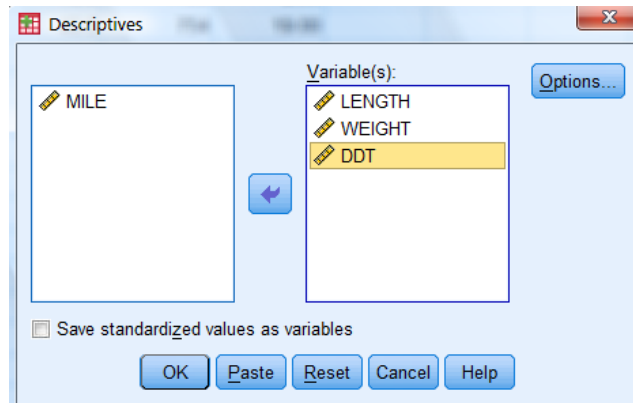
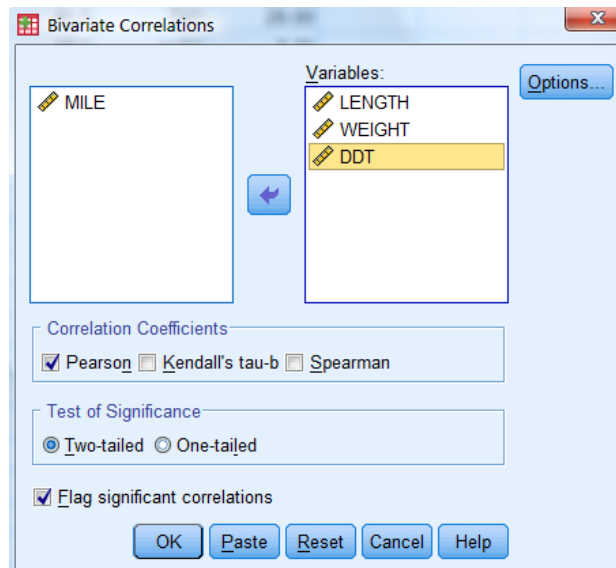


Figure 12 Descriptive Statistics dialog box



To obtain Pearson product moment correlations for pairs of quantitative variables, click on the Analyze button on the main menu bar, then click on Correlate (see Figure 11), and finally click on Bivariate. The resulting dialog box appears in Figure 13. Enter the variables of interest in the Variables box, then click OK to obtain a printout of the correlations.

Figure 13 Bivariate Correlations dialog box



6. Hypothesis Tests on Means

To conduct tests of hypotheses of population means for quantitative variables, click on the Analyze button on the main menu bar, then click on Compare Means. The resulting menu appears as shown in Figure 14.

Click on the test of interest to view the appropriate dialog box. For example, the dialog boxes for a One-Sample t -Test and an Independent-Samples t -Test are shown, respectively, in Figures 15 and 16. For a one-sample t -test, specify the quantitative variable to be tested in the Test Variable(s) box, and the null hypothesis value in the Test Value box. For a two-sample test, you will need to specify the

Figure 14 SPSS menu options for hypothesis tests of means

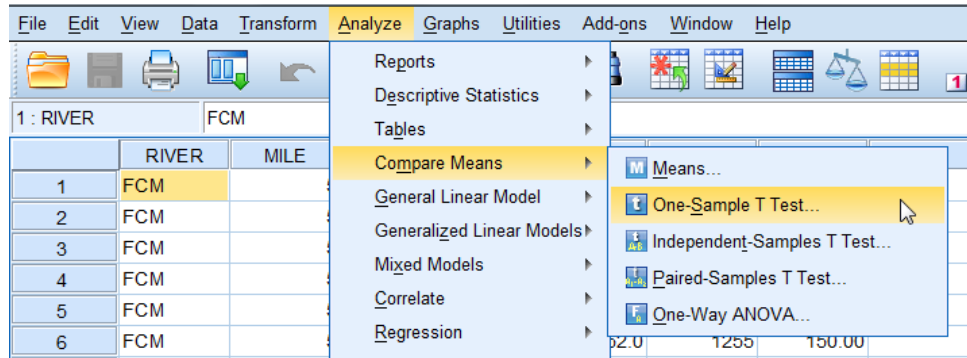


Figure 15 One-Sample t -Test for mean dialog box

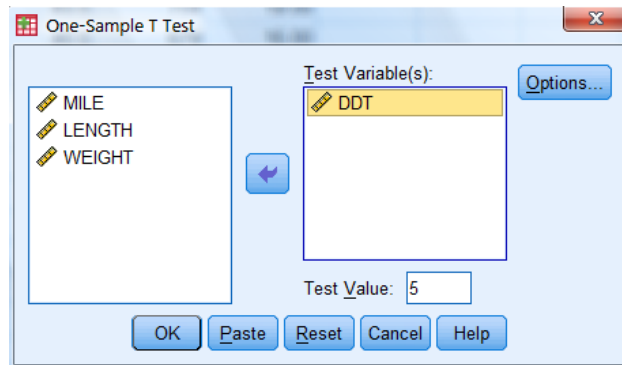
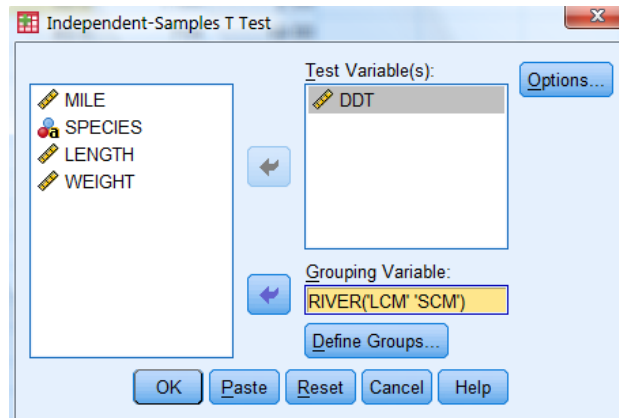


Figure 16 Independent-Samples t -Test for two means dialog box



qualitative variable that represents the two samples in the Grouping Variable box. Optionally, you can obtain a confidence interval for the mean (or difference in means) by clicking the Options box and making the appropriate selection. Click OK to view the test results.

7. Simple Linear Regression and Multiple Regression

To conduct a regression analysis of a general linear model, click on the Analyze button on the main menu bar, then click on Regression, and finally click on Linear, as shown in Figure 17. The resulting dialog box appears as shown in Figure 18.

Figure 17 SPSS menu options for Regression

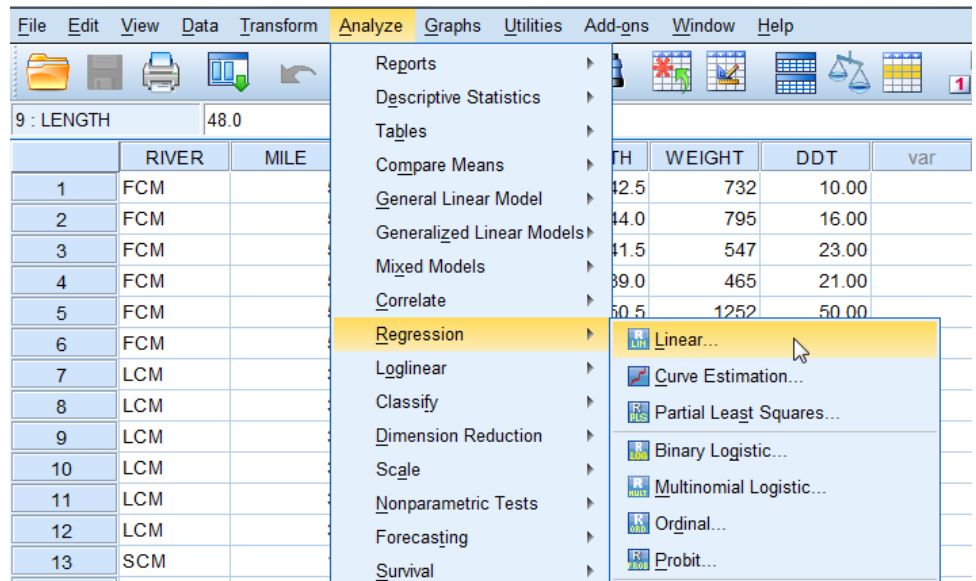
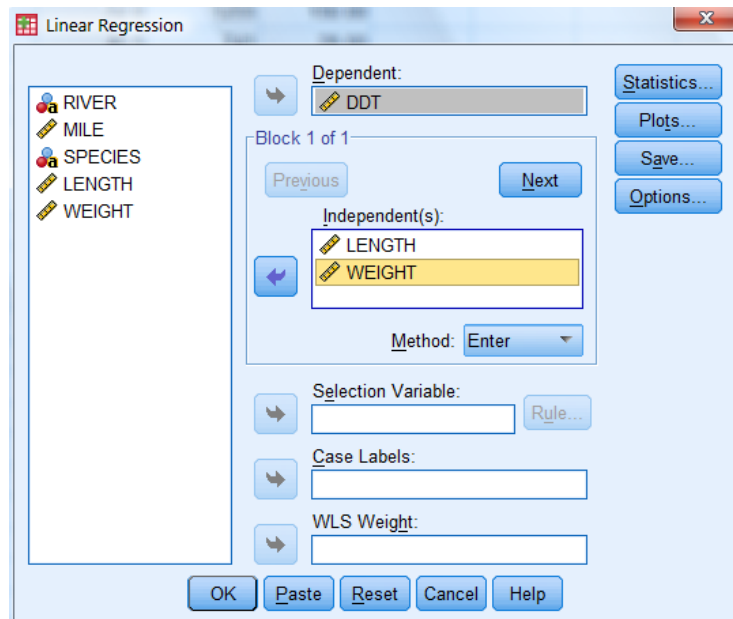


Figure 18 Linear Regression dialog box



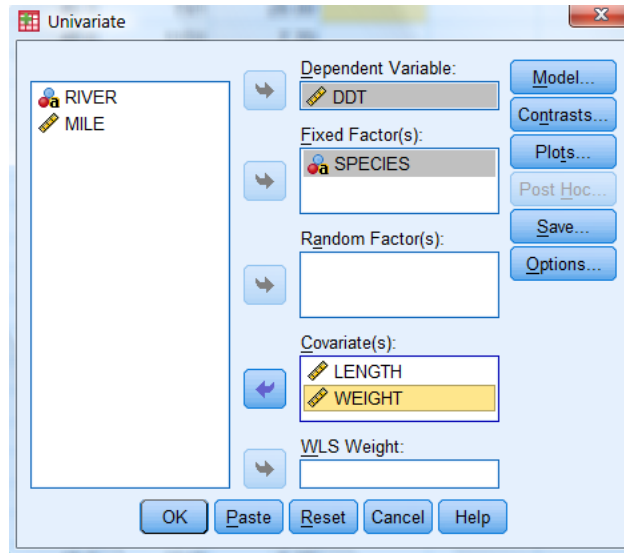
Specify the quantitative dependent variable in the Dependent box and the independent variables in the Independent(s) box. Be sure to select Enter in the Method box. (*Note:* If your model includes interaction and/or squared terms, you must create and add these higher-order variables to the spreadsheet file before running a regression analysis. You can do this by clicking the Transform button on the main menu and selecting the Compute option.)

Optionally, you can get SPSS to produce confidence intervals for the model parameters and variance inflation factors by clicking the Statistics button and checking the appropriate menu items in the resulting menu list. Also, you can obtain prediction intervals by clicking the Save button and checking the appropriate item in the resulting menu list. (The prediction intervals will be added as new columns to the data spreadsheet.) Residual plots are obtained by clicking the Plots button

and making the appropriate selections on the resulting menu. To return to the main Regression dialog box from any of these optional screens, click Continue. Click OK on the Regression dialog box to view the linear regression results.

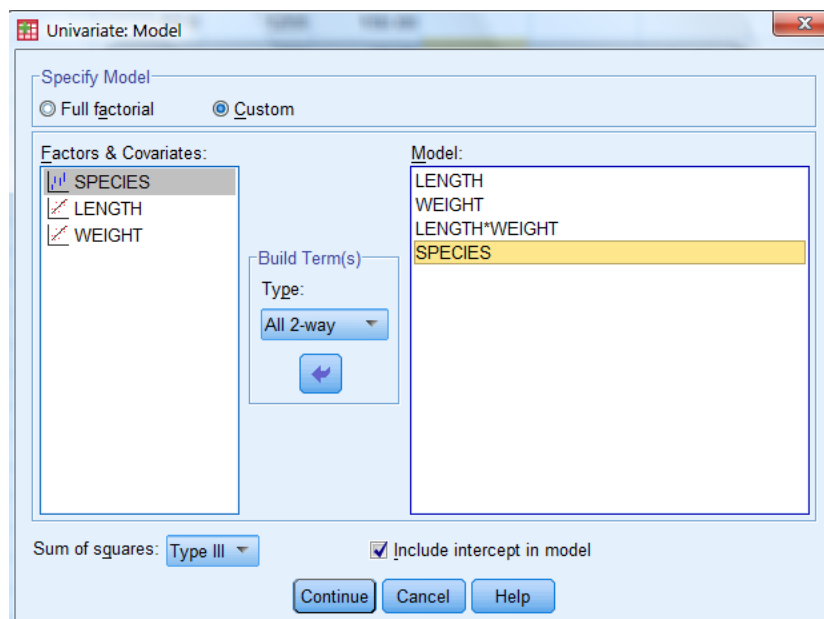
As an alternative, you can fit general linear models by clicking on the Analyze button on the main menu bar, then click on General Linear Models, and finally click on Univariate. The resulting dialog box appears in Figure 19.

Figure 19 General linear models dialog box



Specify the dependent variable in the Dependent box, the quantitative independent variables in the model in the Covariate(s) box, and the qualitative independent variables in the Fixed Factor(s) box. (*Note: SPSS will automatically create the appropriate number of dummy variables for each qualitative variable specified.*) After making the variable selections, click the Model button to view the dialog box shown in Figure 20.

Figure 20 Selecting model terms dialog box

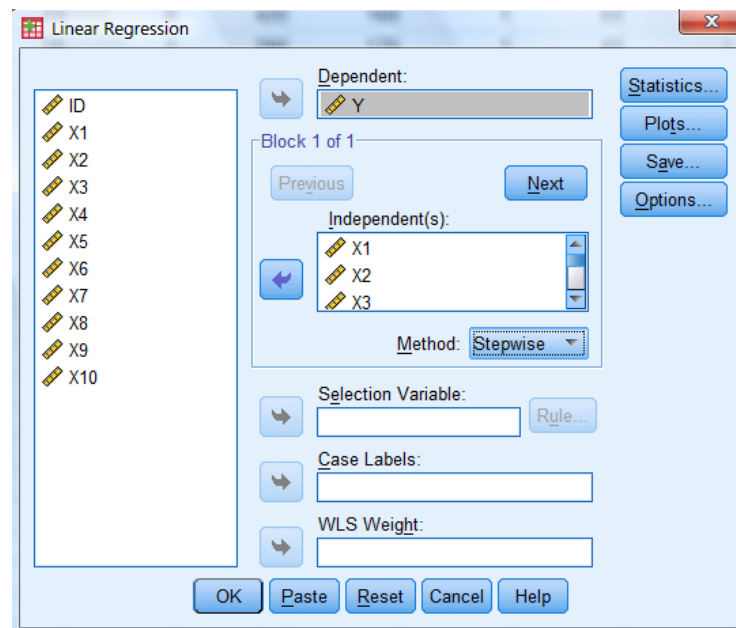


Select the Custom option, then select the terms in the model by clicking on each term. Specify interactions by highlighting the variables to be interacted and then click the Interaction button. (*Note:* Squared or higher-order terms must be previously created using the Transform button.) The model terms will appear in the Model box. Click Continue to return to the General Linear Models dialog box (Figure 19). Click the Options button and check Parameter Estimates on the resulting menu to produce the estimates of the model parameters. To save predicted values and residuals, click the Save button and make the appropriate selections. When all the options you desire have been checked, click OK to view the multiple regression results.

8. Stepwise Regression

To conduct a stepwise regression analysis, click on the Analyze button on the main menu bar, then click on Regression, then click on Linear, as shown in Figure 17. The resulting dialog box appears in Figure 21. Specify the dependent variable in the Dependent box and the independent variables in the stepwise model in the Independent(s) box. Now click on the Method button and select the Stepwise option as shown in Figure 21. (*Note:* The all-possible-regressions-selection procedure is not available in SPSS.)

Figure 21 Linear Regression dialog box

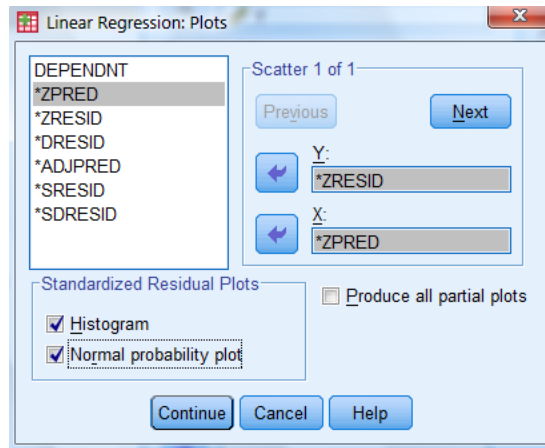


As an option, you can select the value of α to use in the analysis by clicking on the Options button and specifying the value. (The default is $\alpha = .05$.) Click OK to view the stepwise regression results.

9. Residual Analysis and Influence Diagnostics

To conduct a residual analysis, click on the Analyze button on the SPSS main menu bar, then click on Regression, then click on Linear, as shown in Figure 17. The resulting dialog box appears in Figure 18. Specify the dependent variable in the

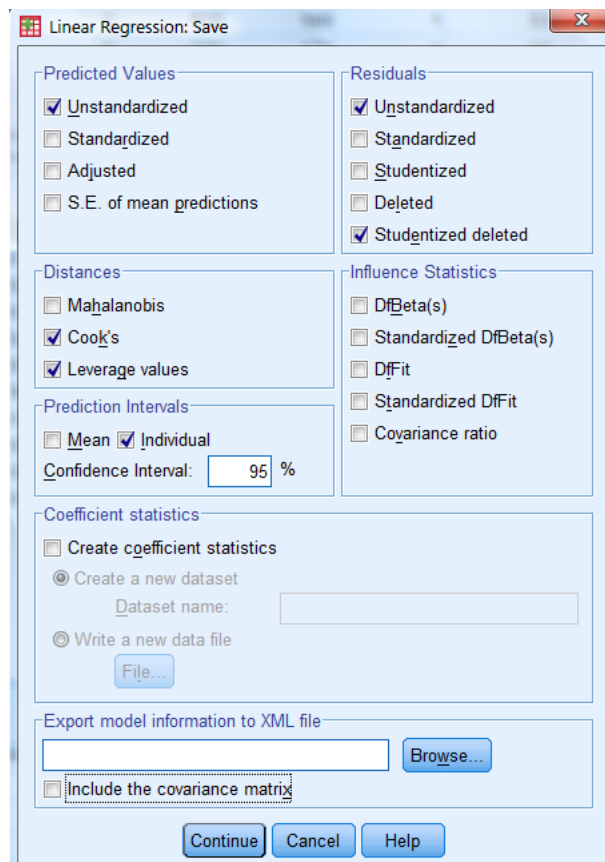
Figure 22 Residual Plots dialog box



Dependent box and the independent variables in the model in the Independent(s) box. To produce residual plots, click on the Plots button. The resulting menu appears as shown in Figure 22.

A residual scatterplot is produced by selecting the appropriate variables for the Y axis and the X axis. (The selections shown in Figure 22 will produce a plot of residuals against predicted values.) A histogram and normal probability plot of the

Figure 23 Save menu for Linear Regression



residuals can also be produced by checking the appropriate boxes. Click Continue to return to the Linear Regression main menu, then click OK to view the residual plots.

To produce influence diagnostics, click on the Save button in the Linear Regression dialog box (Figure 19). The resulting menu appears as shown in Figure 23.

Click the influence diagnostics you want to save (e.g., Cook's and Leverage), then click Continue to return to the Linear Regression dialog box. Now click OK. The influence diagnostics will appear as additional columns on the SPSS spreadsheet.

10. Logistic Regression

To conduct a logistic regression analysis for a two-level (bivariate) dependent qualitative variable, click on the Analyze button on the main menu bar, then click on Regression, and finally click on Binary Logistic, as shown in Figure 24. The resulting dialog box appears in Figure 25.

Specify the dependent variable in the Dependent box and the independent variables in the Covariates box. You can include interactions in the model by highlighting the variables to be interacted and clicking the $a * b$ button on the menu. If any of the independent variables are qualitative, click the Categorical box and select these variables. SPSS will automatically create dummy variables for these categorical predictors. After making the variable selections, click the OK button to view the logistic regression results.

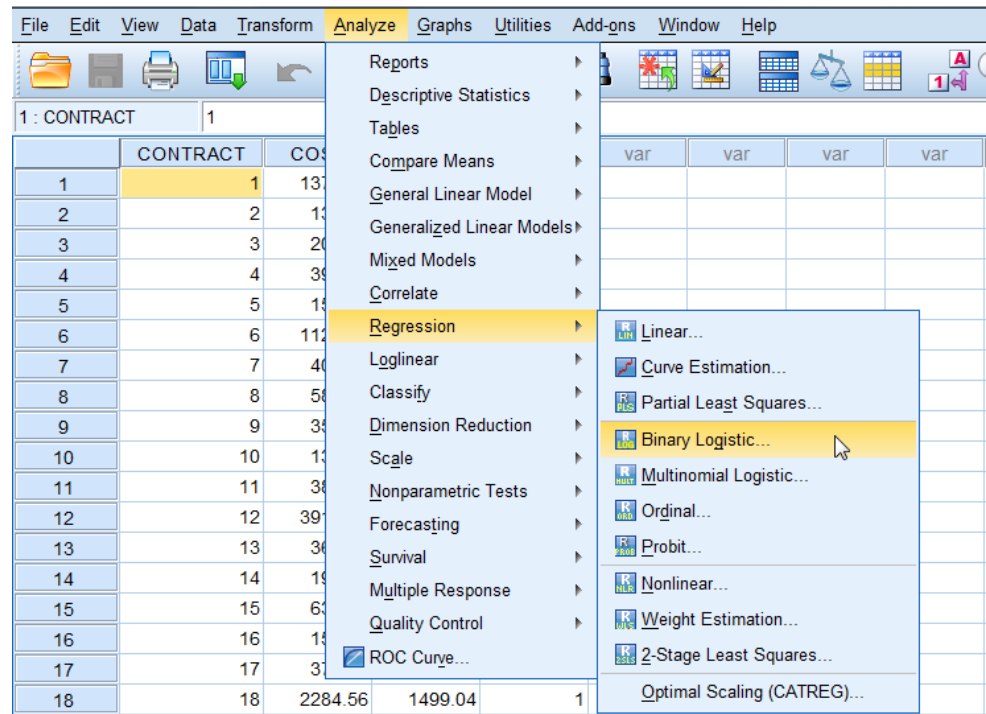
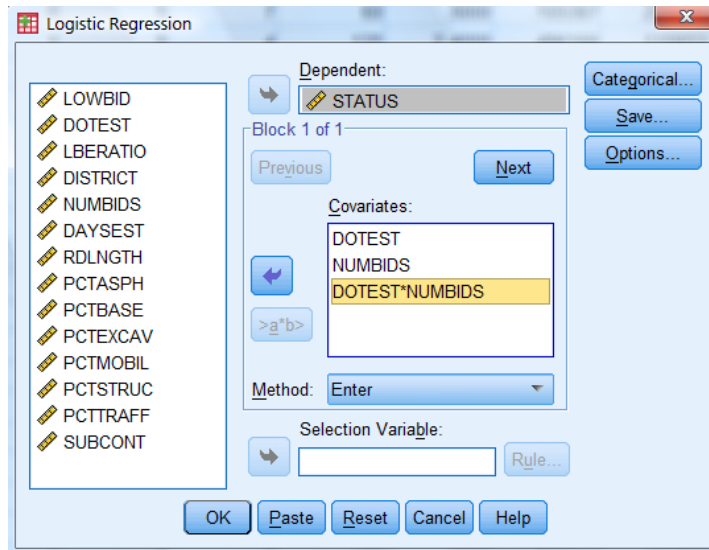


Figure 24 SPSS menu options for logistic regression

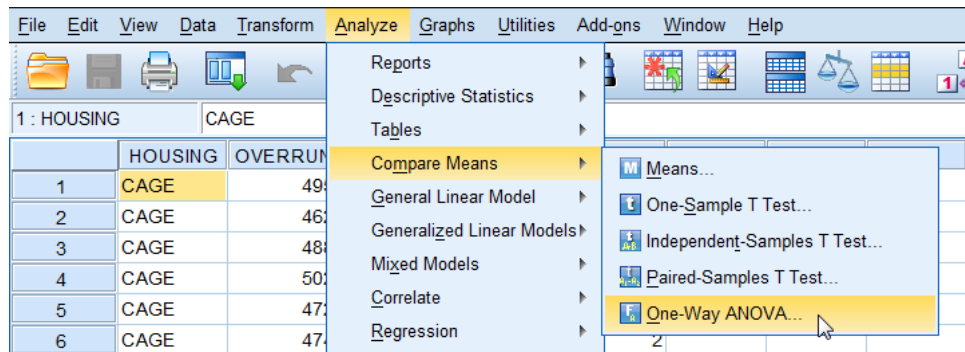
Figure 25 Logistic Regression dialog box



11. One-Way Analysis of Variance

To conduct a one-way ANOVA for a completely randomized design, click on the Analyze button on the main menu bar, then click on Compare Means, and finally click on One-Way ANOVA, as shown in Figure 26. The resulting dialog box appears in Figure 27.

Figure 26 SPSS menu options for One-Way ANOVA



Specify the dependent variable in the Dependent List box and the variable that represents the single factor in the Factor box. (*Note:* SPSS One-Way ANOVA requires the factor variable to be numerical in nature [e.g., 1 for group A, 2 for group B, etc.]) To perform multiple comparisons of treatment means, click the Post Hoc button to obtain the dialog box shown in Figure 28. On this box, select the comparison method (e.g., Bonferroni) and the comparison-wise error rate (e.g., significance level of .05). Click Continue to return to the One-Way ANOVA dialog box (Figure 27).

To perform a test of equality of variances, click the Options button on the One-Way ANOVA dialog box to obtain the menu shown in Figure 29. From this menu, select Homogeneity of variance test, then click Continue to return to the One-Way ANOVA dialog box (Figure 27). Click OK to view the ANOVA results.

Figure 27 One-Way ANOVA dialog box

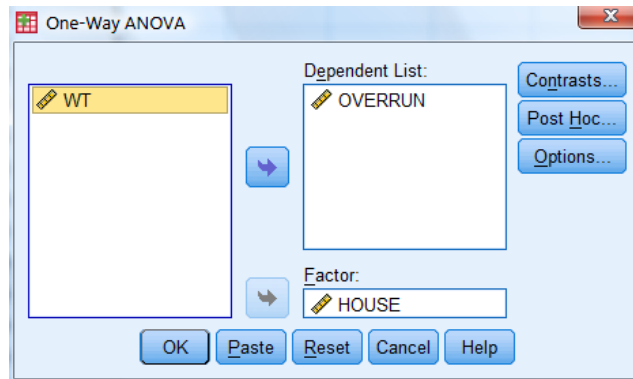


Figure 28 Multiple Comparisons dialog box for ANOVA

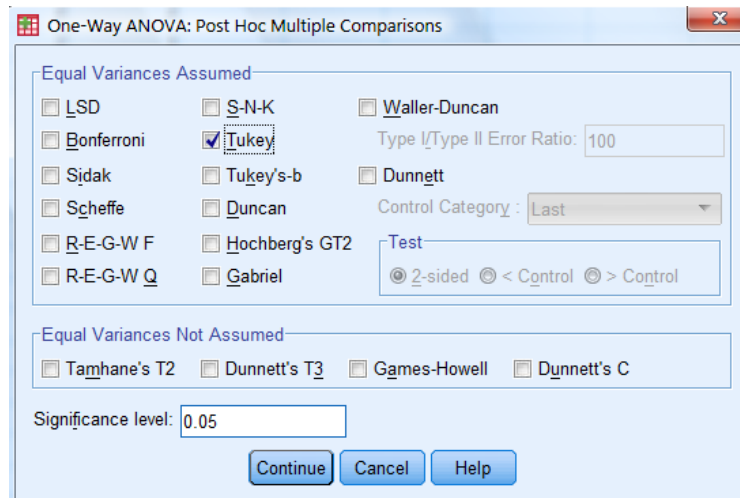
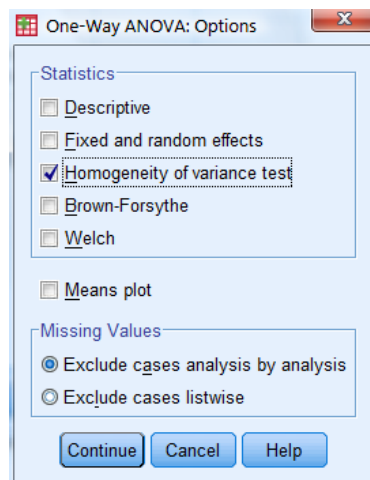


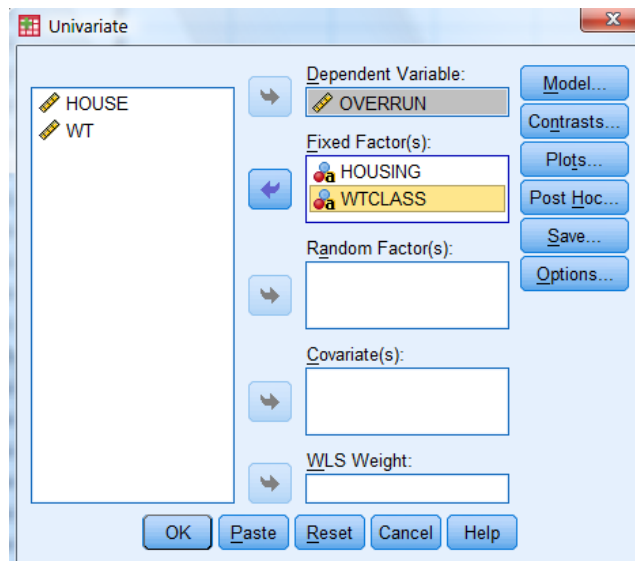
Figure 29 Options menu for One-Way ANOVA



12. Analysis of Variance for Factorial Designs

To conduct an ANOVA for a factorial design, click on the Analyze button on the main menu bar, then click on General Linear Model, and finally click on Univariate. The resulting dialog box appears in Figure 30.

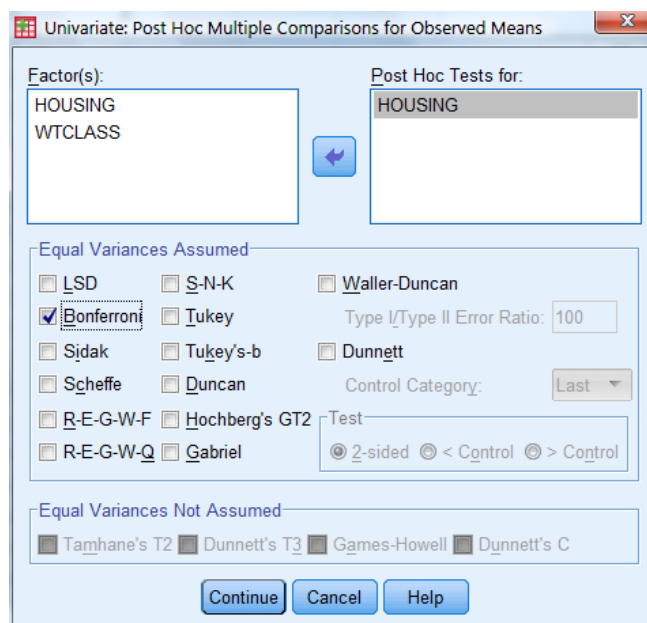
Figure 30 General linear model dialog box for factorial ANOVA



Specify the dependent variable in the Dependent box and the qualitative variables that represent the factors in the Fixed Factor(s) box. To specify the factorial model, click on the Model button, then select the Full Factorial option for a model with all possible main effects and interactions. Click Continue to return to the Factorial ANOVA dialog box (Figure 30).

To run multiple comparisons of means for treatment main effects, click the Post Hoc button on the Factorial ANOVA dialog box. The dialog box shown in Figure 31 appears. Specify the main effects to be tested in the Post Hoc Tests box and select the comparison method (e.g., Bonferroni), then click Continue to return to the Factorial ANOVA dialog box (Figure 30). (*Note:* A test of equality of variances is produced by clicking Options on the Factorial ANOVA dialog box,

Figure 31 Multiple comparisons of factorial means dialog box

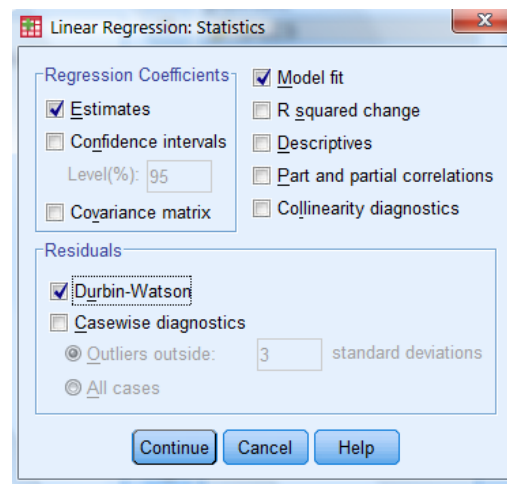


and selecting Homogeneity tests on the resulting menu.) Click OK on the Factorial ANOVA dialog box (Figure 30) to run and view the ANOVA results.

13. Time Series Forecasting

To conduct the Durbin–Watson test for autocorrelated errors in a model for time series data, first specify the model to be fit. That is, click on the Analyze button on the main menu bar, then click on Regression, then click on Linear, as shown in Figure 17. Specify the dependent and independent variables in the model on the resulting dialog box (see Figure 18). Once the model has been specified, click on the Statistics button on the Linear Regression dialog box to obtain the menu shown in Figure 32.

Figure 32 Linear Regression dialog box for the Durbin–Watson test



Check the Durbin–Watson box, then click Continue to return to the Linear Regression dialog box. Click OK to view the results.

To produce forecasts using exponential smoothing or the Holt–Winters method, click on the Analyze button on the main menu bar, then click Forecasting, and select Create Models, as shown in Figure 33. The resulting dialog box is shown in Figure 34.

Select the quantitative variable to be smoothed and place it in the Dependent Variables box. Choose Exponential Smoothing as the Method of analysis, then click the Criteria button. In the resulting screen menu (see Figure 35), select Simple for simple exponential smoothing or Holt’s linear trend for the Holt–Winters model. Click Continue to return to the Time Series Modeler dialog box (Figure 34), then click OK to view the results.

To fit a time series model with a first-order autoregressive error term, click on the Analyze button on the main menu bar, then click Forecasting, and select Create Models, as shown in Figure 33. On the resulting dialog box (see Figure 36), specify the Dependent and Independent Variables in the appropriate boxes and select ARIMA as the modeling method. Then click Criteria to reveal the dialog box shown in Figure 37. Specify “1” in the Autoregressive (p) row to fit an AR(1) error model. Click Continue to return to the Time Series Modeler dialog box, then click OK to view the results.

Figure 33 SPSS menu options for forecasting with exponential smoothing

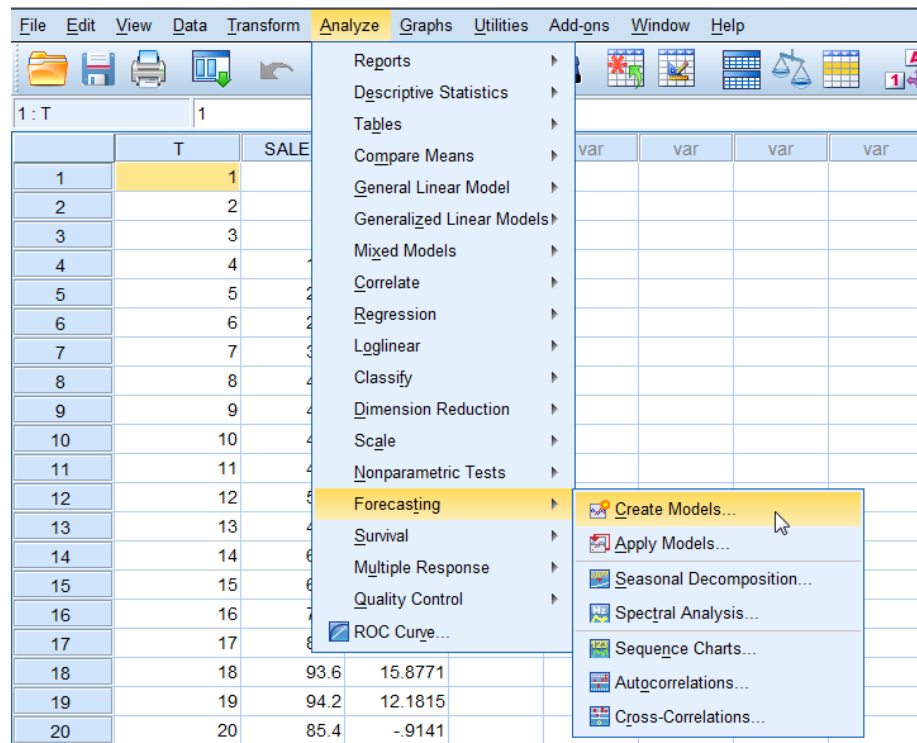


Figure 34 Time Series Modeler dialog box for exponential smoothing

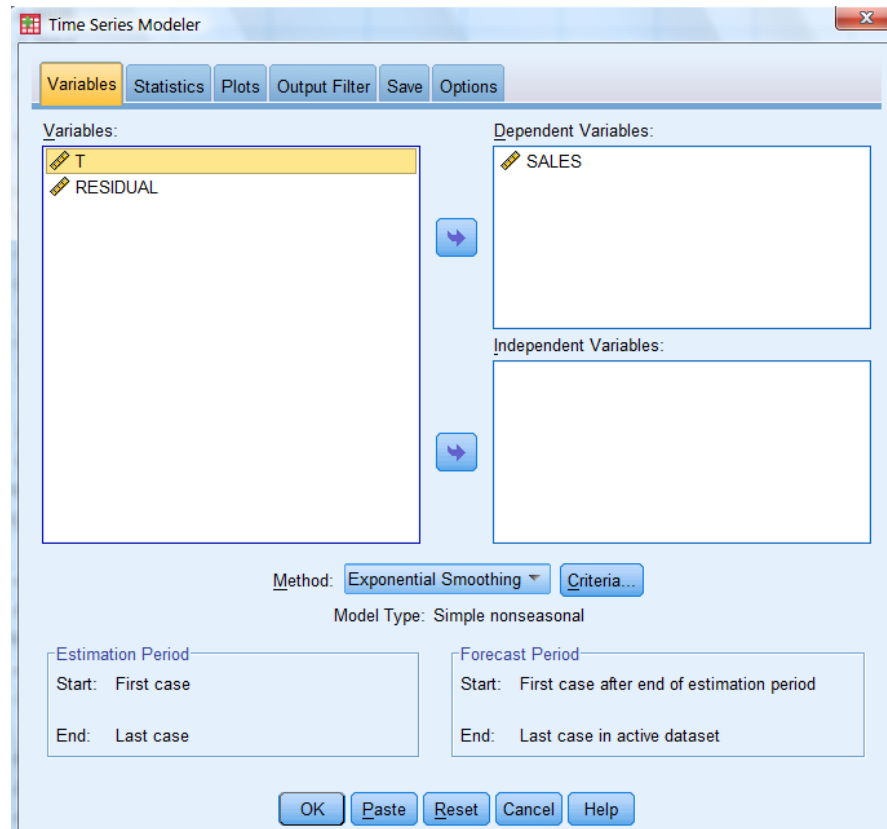


Figure 35 Menu options for exponential smoothing

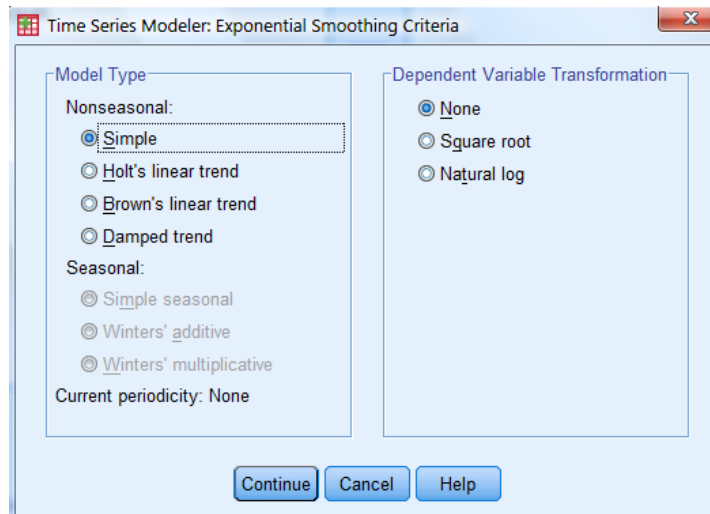


Figure 36 Time Series Modeler dialog box options for an AR(1) error model

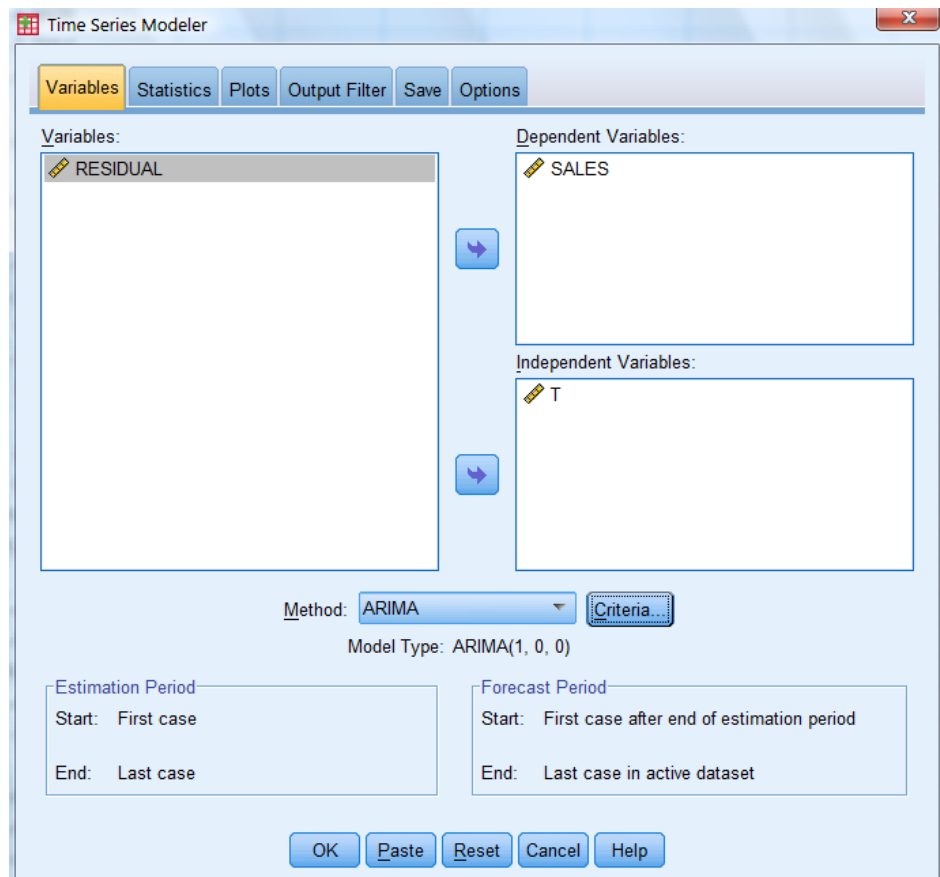


Figure 37 Time Series Modeler options for an AR(1) error model

Time Series Modeler: ARIMA Criteria

Model Transfer Function Outliers

ARIMA Orders

Structure:

	Nonseasonal	Seasonal
Autoregressive (p)	1	0
Difference (d)	0	0
Moving Average (q)	0	0

Current periodicity: None

Transformation

None

Square root

Natural log

Include constant in model

Continue Cancel Help