

Using PROC GLM to Fit a Two-Way ANOVA Model

PROC GLM uses the method of least squares to fit a general linear model of which ANOVA is a special case. Let's look at the basic syntax of PROC GLM for fitting a two-way ANOVA model. In the PROC GLM statement, you can specify various options. As in other procedures, the DATA= option specifies the data set to use for the ANOVA. The PLOTS= option controls the plots produced through ODS Graphics.

For a two-way ANOVA model, PROC GLM produces an interaction plot of the response values, with the X axis representing one CLASS variable and the marker style representing the other. The predicted means are connected by lines. The CLASS statement enables you to specify the classification variables for the analysis and the MODEL statement specifies dependent and independent variables. The MEANS statement computes the arithmetic means and standard deviations of all continuous variables in the model (both dependent and independent) for each effect listed in the MEANS statement. You can specify only classification effects in the MEANS statement, that is, effects that contain only classification variables. You can also specify options to perform multiple comparisons. However, the MEANS statement performs multiple comparisons only for main-effect means. Notice that the arithmetic means are not adjusted for other effects in the model.

For adjusted means, use the LSMEANS statement. The LSMEANS statement computes least squares means for each effect listed in the LSMEANS statement. You can specify only classification effects in the LSMEANS statement. In contrast to the MEANS statement, the LSMEANS statement performs multiple comparisons on interactions as well as main effects. You can also specify options to perform multiple comparisons. Least squares means are predicted population margins. That is, they estimate the marginal means over a balanced population. In a sense, least squares means are to unbalanced data as class and subclass arithmetic means are to balanced data. The STORE statement enables you to store the results of your analysis for additional processing by PROC PLM. We will discuss the STORE statement in further detail in the Postfitting Analyses section.