Data Analysis Exercises for Chapter 7: *Applied Regression Analysis, Generalized Linear Models, and Related Methods, Third Edition* (Sage, 2016)

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Exercise D7.1 Each of the following data sets contains at least one quantitative variable that can be treated as a response variable, at least one quantitative variable that can be treated as an explanatory variable, and at least one categorical variable that can be treated as an explanatory variable (i.e., a factor):

Data Set	*Suggested Response Variable*
`Angell.txt`	moral integration
`Burt.txt`	IQ of the twin raised by biological parents (see Exercise D3.4)
`Davis.txt`	one of reported weight, reported height, height, or weight
`Duncan.txt`	prestige
`Ericksen.txt`	undercount
`Leinhardt.txt`	infant mortality
`Ornstein.txt`	number of interlocks
`Robey.txt`	total fertility rate
`UnitedNations.txt`	total fertility rate, or expectation of life for males or females

Alternatively, select an appropriate data set of interest to you.

(a) Construct dummy regressors for the factor or factors and fit an additive dummy-regression model. Use an incremental F-test to test the null hypothesis that each factor has no effect. Explain what each regression coefficient means. If there is a single factor in the model, write out the regression equation for each category of the factor.

(b) Now include interaction regressors in the model, allowing each quantitative explanatory variable to interact with each factor. Test each interaction by an incremental F-test. If there is a single factor in the model, write out the regression equation for each category of the factor, and confirm that you get the same results (within rounding error) as you obtain by performing the regression on the quantitative explanatory variables *separately* for each category of the factor.

(c) Fit a final model to the data that includes the statistically significant effects. If there are interactions in this model, construct an effect display for each high-order term in the model.