

Instructions: Do not enter anything in the spreadsheet cells that are black, labeled “Grader”.

Answer the questions below by placing the appropriate graph and/or answers in the designated cells of the spreadsheet. **DO NOT CHANGE THE APPEARANCE OR FUNCTIONALITY OF THE SPREADSHEET UNLESS INSTRUCTED TO DO SO.**

Question

To measure value, *Consumer Reports* developed a statistic referred as a value score. The value score is based upon five-year owner costs, overall road-test scores, and predicted-reliability ratings. Five-year owner costs are based upon the expenses incurred in the first five years of ownership, including depreciation, fuel, maintenance and repairs, and so on. Using a national average of 12,000 miles per year, an average cost per mile driven is used as the measure of five-year owner costs. Road-test scores are the results of more than 50 tests and evaluations and are based on a 100-point scale, with higher score indicating better performance, comfort, convenience, and fuel economy. The highest road-test score obtained in the tests conducted by Consumer Reports was a 99 for a Lexus LS 460L. Predicted-reliability ratings (1=Poor, 2=Fair, 3=Good, 4=Very Good, and 5=Excellent) are based upon data from Consumer Reports’ Annual Auto Survey. A car with a value score of 1.0 is considered to be an “average-value” car. A car with a value score of 2.0 is considered to be twice as good a value as a car with a value score of 1.0; a car with a value score of 0.5 is considered half as good as average; and so on. The data for three sizes of cars (13 small sedans, 20 family sedans, and 21 upscale sedans), including price (\$) of each car tested, are provided in spreadsheet tab labeled **Car** (Consumer Reports, April, 2012).

Answer a – e below:

a. To incorporate the effect of size of a car, create two dummy variables in Columns H and I using the following coding.

Family-Sedan: 1 if the car is a family sedan and 0 otherwise.

Upscale-Sedan: 1 if the car is an upscale sedan and 0 otherwise.

b. First treating Cost/Mile as the dependent variable, develop an estimated regression with Family-Sedan and Upscale-Sedan as the independent variables. With Cell K3 as the upper left hand corner of the output, fit the full regression model (report Regression Table only). Summarize your model in Cells K12:S20. Are the coefficients significant? Interpret the coefficients.

c. Next treating Value Score as the dependent variable, develop an estimated regression equation using all other variables as the independent variables. Choose Stepwise as the Regression Type. With Cell K26 as the upper left hand corner of the output, fit the full regression model (report Regression Table only). Does your model support the claim that “smaller car provide better values than larger cars?” The Small Sedans represent the smallest type of car and the Upscale Sedans represent the largest type of car. State your reasons in Cells K39:S47.

d. Using the model developed in part c, calculated the predicted Value Score in Column J. Which car has the smallest Value Score residual and which car has the largest Value Score residual?

e. Place the Residual Plot for the model developed in part c in Cells K62:S78. Are the assumptions being satisfied? Is the variance of the error terms constant? Are residuals scattered randomly around zero? Place your assessments in Cells K80:S88 in in the model. Also shade the *t stat* and *p-value*.