Homework 11 - STAT 231
Due in class, Thursday, December 5

The following problems are from the Devore textbook. You may use JMP whenever possible, but please print/include any relevant JMP output.

1. Chapter 13: Problem 35
   This is a MLR model after transforming both sides by $\ln(\cdot)$ (i.e, $\tilde{y} = \ln(y)$). (If you use JMP, you can enter y & x and make $\ln(y)$ and x^2 in new columns using 'Formula' when clicking on a new column heading; to evaluate $\ln(\cdot)$ in JMP under 'Formula', choose 'Transcendental' and then 'Log' (not 'Ln' for some reason).)

2. Chapter 13: Problem 38

3. Chapter 13: Problem 42 & use JMP for parts(c)-(d)

4. Chapter 13: Problem 44(a)-(e)
   You have to read the "Minitab" output given in the problem. (Minitab is a different statistical software than JMP.) That should be ok, noting that R^2 for (b) is given in the output, just in a different way than JMP.

5. Chapter 13: Problem 51 with some changes for parts (b),(d),(e)

   - For (b), first use the output given in the textbook to find the F statistic based on $R^2 = .836$.

   - Then complete (b) using JMP to enter the data/conduct the F test.

   - For (d), use JMP to make the interval.

   - For (e), just use the output given by JMP from part (b) & make a quantile plot too (under 'Row Diagnostics', pick 'Plot Residual by Normal Quantiles')

   Note: For (b), when using the text output to compute F, note that $R^2 = SSR/SST$ and $1 - R^2 = SSE/SST$ since $SST = SSR + SSE$; so $SSR/SSE = R^2/(1 - R^2)$ and $F = SSR/SSE \times (n - k - 1)/(k) = MSR/MSE$.

6. Use the 2015 Small Cars dataset posted in Canvas (by the assignment).

   (a) Fit a multiple regression model to predict High Price using explanatory variables Length, Weight, and QtrMile. Report the test statistics and p-values for the overall F-test and each t-test in the table of parameter estimates. For each of the 4 tests, write the null hypothesis that is being tested (you may use either either words or symbols, but be specific), and state the conclusion of each test.

   (b) Conduct a partial F-test to determine whether there is evidence that a larger model including the variables HwyMPG, FuelCap, and UTurn in addition to the 3 variables in part (a) would provide useful information for predicting sale price that is not provided by the model in (a). Clearly identify your test statistic, its distribution (including degrees of freedom), the p-value, and state your conclusion.
   Note: You can compute the p-value for an F-distribution in JMP: create a new column, right click the column header and select "Formula". Then, go to "Probability" and "F Distribution". In the formula table, enter "1-" before the F-distribution part and then enter the test statistic value and degrees of freedom. Click "apply." ("F distribution" in computes a lower tail area in JMP or $P(F_{df1,df2} \le x)$. But, one wants $(F_{df1,df2} > x) = 1 - P(F_{df1,df2} \le x)$ for the p-value.)