Homework #07

1. Read Chapters 5 and 6 in the text.

2. Do problems: 6.18, 6.19, 6.20, 6.21. Note that the Data for
   Problem 6.18 can be found on the course's site in the file
   TextBookDataSets/CH06PR18.txt:

3. For the following 5 sub-problems, consider the data given in
   the file **MathSal.txt,** which describes a data set (n = 24) used
   to evaluate the relation between intermediate and senior level
   annual salaries of mathematicians (Y , in thousand dollars)
   and an index of work quality (X1), number of years of
   experience (X2), and an index of grant support success (X3).
   a) Run the multiple linear regression with quality,
      experience, and publications as the explanatory variables
      and salary as the response variable. Summarize the
      regression results by giving the fitted regression
      equation, the value of $R2$, and the results of the
      significance test for the null hypothesis that the three
      regression coefficients for the explanatory variables are
      all zero (give null and alternative hypotheses, test
      statistic with degrees of freedom, *p*-value, and brief
      conclusion in words).

   b) Give 95% confidence intervals (do not use a Bonferroni
      correction) for regression coefficients of quality,
      experience, and grants support based on the multiple
      regression. Describe the results of the hypothesis tests
      for the individual regression coefficients (give null and
      alternative hypotheses, test statistic with degrees of
      freedom, *p*-value, and a brief conclusion in words). What is
      the relationship between these results and the confidence
      intervals?

   c) Plot the residuals versus the *predicted* salary and *each* of
      the explanatory variables (i.e., 4 residual plots). Are
      there any unusual patterns?

   d) Examine the assumption of normality for the residuals using
      a qqplot and histogram. State your conclusions.

   e) Predict the salary for a mathematician with quality index
      equal to 6.2, 8 years of experience, and grant support
      index equal to 5.9 . Provide a 95% prediction interval
      with your prediction.