MS Module 21: Multiple regression analysis (overview 2nd edition)

(The attached PDF file has better formatting.)

(Readings from the second 2nd edition of the Devore text.)

Logistic regression was moved from §12.1 in the second edition to §12.10 in the third 3rd edition, making this the longest module in the course. You will be tested on both multiple regression and logistic regression.

Reading §12.7: Multiple regression analysis, including subsections on

- σ^2 and the Coefficient of Multiple Determination
- A Model Utility Test

Know the format of a multiple regression equation. Read the text of the section so that you grasp the logic. Know that the degrees of freedom for the SSE is $n - (k + 1)$.

You will not be asked to estimate the parameters, which is difficult by pencil and paper.

Read the subsection on "σ^2 and the Coefficient of Multiple Determination." Know how the degrees of freedom differ between simple linear regression and multiple regression. Given the total sum of squares and the error sum of squares, know how to derive the R^2.

- Given the R^2 and the number of β parameters, know how to derive the adjusted R^2.
- Given the adjusted R^2 and the number of β parameters, know how to derive the R^2.

Review examples 12.25 and 12.26, which explain the meaning of each β coefficient. Note the definitions and equations for the degrees of freedom, the residual standard deviation, and the R^2 coefficient of determination. You will be asked to compute R^2 on the final exam, for which you must compute the degrees of freedom.

Read the subsection on "A Model Utility Test."

Know the *F* test for the null hypothesis H_0: $\beta_1 = \beta_2 = \ldots = \beta_k = 0$.

The *F* test for multiple regression is similar to the *F* test for analysis of variance; see Equation 12.18. Review example 12.27; a final exam problem may give you SSR and SSE and ask you to compute the *F* test.

Read the subsection on "Inferences about Individual Regression Coefficients"; note the degrees of freedom for the *t* distribution and the formulas for the confidence interval and the prediction interval. Example 12.28 illustrates the formulas for the confidence interval and the prediction interval.

Review end of chapter exercises 78, 79 a and b, 80, 81, 82 a, b, c, and d, 84, and 86 a, b, c, and d.

Skip the sections "Assessing Model Adequacy," "Multiple Regression Models," and "Models with Predictors for Categorical Variables," which are too complex for an introductory course.