MS Module 15: Linear and logistic regression models (overview)

(The attached PDF file has better formatting.)

Reading: §12.1 The simple linear and logistic regression models

Regression analysis uses conditional distributions, expectations, and predictions. Distinguish between the *y* values in the sample and the fitted *y* value for a given value of *x*. The textbook expresses this as

> Rather than assuming that the dependent variable itself is a linear function of x, the model assumes that the expected value of Y is a linear function of x. For any fixed x value, the observed value of Y will deviate by a random amount from its expected value.

Know the form of both linear regression and logistic regression.

- *Linear regression:* the slope parameter β_1 is the expected or true average increase in Y associated with a 1-unit increase in x.
- *Logistic regression:* the slope parameter β_1 is the change in the log odds associated with a 1-unit increase in x (or) the odds ratio changes by the multiplicative factor $\exp(\beta_1)$ when x increases by 1 unit.

Know the format of a logistic regression, the logit function, and the odds ratio.

For linear regression, final exam problems give summary statistics and derive parameters and estimates. For logistic regression, final exam problems may give the *y* values for two *x* values in a logistic regression and ask for the *y* value at a third *x* value. One must convert the probabilities (the *y* values) to odds ratios, derive the β_1 parameter, and compute the odds ratio at the third point.