Fox Module 8 Linear least squares regression

- Least squares fit
- Pearson correlation

Read Section 5.1, “Least squares fit,” on pages 78-82. Know the formulas in the gay box on page 82 and the example on page 81. The final exam tests these formulas many ways.

Read Section 5.2, “Simple correlation,” on page 82-86. You know how to form correlations from other actuarial exams. Know to use n-2 degrees of freedom (page 82) for the standard error of the regression. Know well the three items on the bottom of page 83: the regression sum of squares, the residual sum of squares, and the R^2. The final exam tests each one.

Figure 5.5 on page 85, “decomposition of the total deviation,” helps you grasp the intuition.

Know equation 5.4 on page 85, and its use in the example on page 86.

This module is the crux of the regression analysis course. Spend the time to understand each item in this module; otherwise you will have to come back again and again as you progress through the later modules.

The homework assignment is similar to the final exam problems. Work through each item with a calculator, so you are prepared for exam problems. Then verify your answers with Excel’s *REGRESSION* add-in or R’s *LM* function or other statistical software.

Fox uses RSS for residual sum of squares and RegSs for regression sum of squares. Some other authors, including those of the previous text for the VEE regression analysis on-line course, use ESS for the error sum of squares (= residual sum of squares) and RSS for the regression sum of squares. The final exam problems follow Fox’s usage. Software packages and other books may use RSS to mean regression sum of squares and ESS to mean error sum of squares.

Fox uses B for the least squares estimator of β and A for the least squares estimator of α. Other authors use $\hat{\beta}$ ar $\hat{\alpha}$, which are the standard terms (Fox’s usage is not standard). We use both sets of variable names in this course. On the final exam, A and B are choices in the multiple choice questions, so $\hat{\beta}$ a $\hat{\alpha}$ are often clearer.