MS Module 13: Two-Factor ANOVA without interaction effects (overview)

(The attached PDF file has better formatting.)

Reading: §11.4, Two-Factor ANOVA with $K_{ij} = 1$

Most actuarial applications have two or more factors. The simple two-factor models in this section treat each factor independently of the other factor.

- Derive the treatment sums of squares for Group A and the treatment sums of squares for Group B.
- Test each one separately with an *F* test.

Know how to compute the degrees of freedom for each dimension. The degrees of freedom affect

- the divisor to convert the sum of squares to the mean square
- the *p* value of the *F*-statistic.

Understand additive vs non-additive models. For additive models, the line segments in the textbook's graphic for this module are parallel, even if the lines are kinked. Actual observations do not produce parallel lines, but additive models assume that any slope differences of the observed data stem from random fluctuations.

Know the expected mean squares for each classification dimension. The expected mean squares help one understand the *F* test.

Tukey's honestly statistical difference applies to two-factor ANOVA just as it applies to one-factor ANOVA. The arithmetic is more complex and no concepts are new.

Later modules discuss multiplicative models used for insurance pricing and risk classification. If a two-factor ANOVA is a multiplicative model, the logarithm of the ANOVA is an additive model.

- Early statisticians transformed the values by taking logarithms and using methods for additive models.
- Now most statisticians use algorithms for multiplicative models.

The two-factor ANOVA in this section has no interaction effects.