MS Module 6: Hypothesis testing of proportions (overview 3rd edition)

(The attached PDF file has better formatting.)

(Readings from the third 3rd edition of the Devore, Berk, and Carlton text.)

Two complex statistical procedures that are not use in actuarial work (Levene's test and Tukey's procedure) have been removed from the syllabus, simplifying modules 10-14 on analysis of variance (ANOVA). To keep the 24 module sequence,

- Module 4 Hypotheses and Test Procedures is now split into
  - Module 4a Type 1 and Type 2 errors:
  - Module 4b Tests about a population mean

- Module 5 Hypothesis testing of proportions is now split into
  - Module 5a Tests About a Population Proportion
  - Module 5b Hypothesis testing – *p* values

Separate homework assignments are posted for Module 4*a* and Module 4*b* and for Module 5*a* and Module 5*b*.]

MS Module 5a: Hypothesis About a Population Proportion

Reading: §9.3: Tests About a Population Proportion

- Large sample tests use the central limit theorem and an approximate normal distribution.
- Small sample tests use the binomial distribution.

Know equation 9.5 for large sample tests. Review §3.5 if you are not familiar with the binomial distribution. Example 9.15 shows the seven step procedure.

If the null hypothesis is not true, the Z statistic is still normally distributed but its mean and variance are not 0 and 1. The β values (probabilities of Type II errors) depend on the type of null hypothesis (one-tailed or two-tailed) and the value of p_0 and p' (the proportions in the null hypothesis and the assumed alternative).

For two-sided null hypotheses, we use the absolute value of $p' - p_0$. For a one-side (single tailed) null hypothesis, check whether p' is larger or smaller than p_0 before plugging values into the formula. If p' is in the null hypothesis, computing β makes no sense.

The equations right above Example 9.16 seem complex, but they all use the same adjustment to previous equations. The formulas use the additional parameters $\sqrt{(p'q')}$ and $\sqrt{(p_0q_0)}$. Know Example 9.16 (large sample) and Example 9.17 (small sample), on which final exam problems may be modeled.

Review end of chapter exercises 39, 40, 41, 42, 43, 45, 46 a and c, and 47.