

MS Module 5: Hypothesis testing of the mean (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 used in actuarial work (old module 10, “Levene’s test” and old module 11, “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 4 “Hypotheses and Test Procedures” (covering Type 1 and Type 2 errors)
 - " Module 5 “Tests about a population mean”

- ! Module 5 Hypothesis testing of proportions is now split into
 - " Module 6 “Tests About a Population Proportion”
 - " Module 7 “Hypothesis testing – p values”

The old modules 6-9 have been renamed modules 8-11.]

Reading: §9.2: Tests about a population mean

The textbook has three cases:

- ! Case 1: Normal distributions with known variance
- ! Case 2: Samples large enough that the central limit theorem gives a close approximation
- ! Case 3: Normal distributions with unknown variance and small samples, which use t tests

The first sub-sections on hypothesis testing have step-by-step instructions, such as the seven steps right below figure 9.3 and above example 9.10. Once you master the material, you don’t need detailed instructions, but they help you learn the procedures.

The textbook uses three tests: upper tailed, lower tailed, and two tailed; see Figure 9.3. The three tests are the same for a symmetric distribution.

The textbook shows formulas for β (the probability of a Type II error) for each type of confidence interval, and formulas for the needed sample sizes (given α and β).

Know the three equations for H_α directly above example 9.11. They are the same formula for a symmetric distribution.

These formulas are repeated (with appropriate changes) in later chapters, and they are used on final exam problems.

Review example 9.11; a final exam problem may ask you to compute β from the five input values or to compute one of the input values from the others and a given β . For the sample size, the final exam problem will generally ask for the computed value, not the next highest integer value. For example 9.11, the final exam tests if you can compute $n = 29.32$, not if you can round up to $n = 30$.

Skip the text beginning “Exact calculations of power and $\beta(\mu')$ for the one-sample t test ...” through Figure 9.6 “Minitab sample size output for Example 9.14.”

Example 9.12 illustrates the seven step procedure.

Example 9.13 is good advice for testing normality, but the procedure is subjective and is not tested on the final exam.

Skip the section titled "Power, β , and Sample Size Determination for the One-Sample t Test"; it is too complex for an introductory course.

Review end of chapter problems 15, 16, 18, 19, 22 b and d, 24, 27, 28, 29, 31, 32, and 33.