

MS Module 7: Two-Sample t Test and Confidence Interval (overview 3rd edition)

(The attached PDF file has better formatting.)

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

Read § 10.2 The Two-Sample t Confidence Interval and Test.

If the populations are normally distributed but at least one of the samples is small, we use t distributions and t tests. The t distribution depends on the degrees of freedom, or the number of observations in the sample minus one. For the difference of means in two samples, we do not have an appropriate t distribution, since we do not have the degrees of freedom.

The textbook gives a formula for an approximate degrees of freedom (Welch's degrees of freedom [Expression (10.3)]). You need not know the justification in the textbook for this formula, but you must use it for final exam problems. Work through the exercises in the textbook and on the discussion forum so that you can apply the method on the final exam.

The confidence intervals for differences of means are similar to hypothesis testing for differences of means.

Review end of chapter exercises 14, 15, 17, 18 a and b, 19, 24, 26, 27, 28, 29, 30, and 38b.

Exercises 14, 15, and 19 have large sample sizes; the others listed above have small samples. Note that #24 asks for the prediction interval, and #27 asks about possible error types.

Focus on several items:

- ! Is the sample size large enough to use a z test instead of a t test?
- ! Is the test one sided or two sided?
- ! Does the problem ask for a confidence interval or a prediction interval?
- ! Does the problem ask about type 1 or type 2 errors?

Many social scientific studies are plagued by errors of causation, though the final exam problems do not test causation errors. Many research studies show correlations, from which researchers infer causation.

Illustration: Economists assume more police reduces street crime. Some social scientists show that more police spending is associated with more street crime. Well, of course: districts with more street crime spend more on police. Identifying cause and effect is often difficult.

Pooled procedures assuming equal variances simplify the arithmetic, but verifying equal variances is hard. The textbook recommends using the two sample t test; the final exam problems follow this recommendation. You may skip the section on "Pooled t Procedures."