

ENGINEERING STATISTICS HANDBOOK

TOOLS & AIDS

SEARCH

BACK NEXT

- 7. Product and Process Comparisons
- 7.4. Comparisons based on data from more than two processes
- 7.4.3. Are the means equal?

7.4.3.5. Confidence intervals for the difference of treatment means

Confidence intervals for the difference between two means

This page shows how to construct a confidence interval around $(\mu_i - \mu_j)$ for the one-way ANOVA by continuing the <u>example</u> shown on a previous page.

Formula for the confidence interval

The formula for a $100(1 - \alpha)$ % confidence interval for the difference between two treatment means is:

$$(\hat{\mu_i} - \hat{\mu_j}) \pm t_{1-lpha/2,\,N-k} \,\,\, \sqrt{\hat{\sigma}_\epsilon^2 \left(rac{1}{n_i} + rac{1}{n_j}
ight)} \;,$$

where $\hat{\sigma}^2_{\epsilon} = MSE$.

Computation of the confidence interval for $\mu_3 - \mu_1$

For the example, we have the following quantities for the formula.

•
$$\bar{y}_3 = 8.56$$

•
$$\bar{y}_1 = 5.34$$

•
$$\sqrt{1.454(1/5+1/5)} = 0.763$$

•
$$t_{0.975, 12} = 2.179$$

Substituting these values yields $(8.56 - 5.34) \pm 2.179(0.763)$ or 3.22 ± 1.616 .

That is, the confidence interval is (1.604, 4.836).

Additional 95 % confidence

A 95 % confidence interval for $\mu_3 - \mu_2$ is: (-1.787, 3.467).

A 95 % confidence interval for $\mu_2 - \mu_1$ is: (-0.247, 5.007).

Contrasts discussed later

intervals

Later on the topic of <u>estimating more general linear</u> <u>combinations of means</u> (primarily <u>contrasts</u>) will be discussed, including how to put <u>confidence bounds around</u>

contrasts.



HOME

TOOLS & AIDS

SEARCH

BACK NEXT