Oneway

These values of the group statistics are calculated separately for each group. There are not identical to the values obtained from analyzing the variable as a whole.

These are the standard errors for each mean separately. Notice that the standard errors are equal because all groups have the same standard deviation and sample size.

$$SE_M = SD/\sqrt{N} = 1.000/\sqrt{3} = .57735$$

Score on Quiz

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	3	4.0000	1.00000	.57735	1.5159	6.4841	3.00	5.00
Experimental 1	3	8.0000	1.00000	.57735	5.5159	10.4841	7.00	9.00
Experimental 2	3	9.0000	1.00000	.57735	6.5159	11.4841	8.00	10.00
Total	9	7.0000	2.44949	.81650	5.1172	8.8828	3.00	10.00

"Minimum" and "maximum" values are the lowest and highest scores in each group.

These values are all calculated for the set of data as a whole (i.e., not separately for each group). Because the mean and std. deviation is different from the group values, the SE and CI will also be different:

$$SE_M = SD/\sqrt{N} = 2.44949/\sqrt{9} = .81650$$

$$CI_M = M \pm (CV_t)(SE_M) = 7 \pm (2.306)(.81650)$$

Thus, the researcher would have 95% confidence that the interval ranging from 5.1172 to 8.8828 covers the true population grand (or overall) mean.

This section provides a confidence interval around (centered on) each mean separately. Calculation requires the appropriate critical value. Specifically, the t statistic (with 2 df) that has a probability of .05 would equal 4.303 (see Critical Values of the t Distribution). For example, in the first group:

$$CI_M = M \pm (CV_t)(SE_M) = 4 \pm (4.303)(.57735)$$

Thus, the researcher would have 95% confidence that the interval ranging from 1.5159 to 6.4841 covers the true population mean.

Score on Quiz

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.000	2	21.000	21.000	.002
Within Groups	6.000	6	1.000		
Total	48.000	8			

"Mean Squares" are estimates of the variances between and within groups. For the "Between Groups":

$$MS_{BETWEEN} = \frac{SS_{BETWEEN}}{df_{BETWEEN}} = \frac{42.000}{2} = 21.000$$

"Within Groups" statistics are a function of group variability and sample sizes. Because SS for each group equals 2.00 ($SD^2 = SS/df$):

$$SS_{WITHIN} = SS_1 + SS_2 + SS_3 = 2 + 2 + 2 = 6$$

$df_{WITHIN} = df_1 + df_2 + df_3 = 6$

"Between Groups" statistics are a function of the group means and sample sizes:

$$SS_{BETWEEN} = \sum n(M - M_Y)^2 = 3(4-7)^2 + 3(8-7)^2 + 3(9-7)^2 = 42.000$$

$df_{BETWEEN}$ = # groups – 1 = 2

The "F" statistic is a ratio of the between and within group variance estimates:

$$F = \frac{MS_{BETWEEN}}{MS_{WITHIN}} = \frac{21.000}{1.000} = 21.000$$

SPSS calculated that an *F* with 2 and 6 df that equals 21.000 has a two-tailed probability of .002.