ANOVA

The One-Way ANOVA compares the mean of one or more groups based on one independent variable (or factor). We assume that the dependent variable is normally distributed and that groups have approximately equal variance on the dependent variable.

Null Hypothesis: There are no significant differences between groups' mean scores.
Alternate Hypothesis: There is a significant difference between groups' mean scores.

In this example, we compare "frequency of sex" by church attendance, which was recoded from 9 groups to 3 groups (0=not often, 1=sometimes, 2=often).

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ONEWAY
  sexfreq BY church
  /STATISTICS DESCRIPTIVES
  /MISSING ANALYSIS
  /POSTHOC = TUKEY BONFERRONI ALPHA(.05).
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Descriptives

FREQUENCY OF SEX DURING LAST YEAR

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Not Often (1)	879	2.92	2.007	.068	2.79	3.06	0	6
Sometimes (2)	625	3.03	1.960	.078	2.88	3.19	0	6
Often (3)	638	2.47	2.039	.081	2.31	2.63	0	6
Total	2142	2.82	2.015	.044	2.74	2.91	0	6

It appears that those who attend church "sometimes" have the highest (3.03) mean frequency of sex, and those who attend church "often" have the lowest (2.47) mean frequency of sex.

ANOVA

FREQUENCY OF SEX DURING LAST YEAR

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	114.423	2	57.212	14.261	.000
Within Groups	8581.451	2139	4.012		
Total	8695.875	2141			

$$F = \frac{\text{variance between groups}}{\text{variance expected due to chance (error)}} = \frac{57.212}{4.012} = 14.26$$

If the sample means are clustered closely together (i.e., small differences), the variance will be small; if the means are spread out (i.e., large differences), the variances will be larger.

Our F value is 14.261. Our significance level is .000. We can conclude that there is a significant difference between the three groups. To determine which groups are different from one another, we use the "multiple comparisons" results below.

General Rule: If there are equal number of cases in each group, choose Tukey. If there are not equal numbers of cases of each group, choose Bonferroni. For this example, we will use Bonferroni.

Multiple Comparisons

Dependent Variable: FREQUENCY OF SEX DURING LAST YEAR

	(I) CHURCH	(J) CHURCH	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Not Often	Sometimes	-.11	.105	.563	-.35	.14
		Often	.45*	.104	.000	.21	.70
	Sometimes	Not Often	.11	.105	.563	-.14	.35
		Often	.56*	.113	.000	.29	.82
	Often	Not Often	-.45*	.104	.000	-.70	-.21
		Sometimes	-.56*	.113	.000	-.82	-.29
Bonferroni	Not Often	Sometimes	-.11	.105	.921	-.36	.14
		Often	.45*	.104	.000	.20	.70
	Sometimes	Not Often	.11	.105	.921	-.14	.36
		Often	.56*	.113	.000	.29	.83
	Often	Not Often	-.45*	.104	.000	-.70	-.20
		Sometimes	-.56*	.113	.000	-.83	-.29

*. The mean difference is significant at the .05 level.

SPSS notes a significant difference with an asterisk (*). In this example, we can see that those attending church "often" are significantly different from both of the other groups. However, there is not a significant difference between "not often" and "sometimes."