7. Comparing the Mean Volumes of INAH3

We would like to know whether there are significant differences in the volumes of INAH3 for the five groups. An appropriate statistical technique to examine the differences is one-way ANOVA. The purpose of ANOVA is to assess whether the observed differences among the five groups are statistically significant. More precisely, the null hypothesis is that the volumes of INAH3 for the five groups are not different on average, while the alternative hypothesis is that at least one group is different, on average, from the others (of course, they could all be different from each other).

SPSS produces the following output:

Variable VOLUME
By Variable CODE

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	4	49611.3712	12402.8428	4.0763	.0079
Within Groups	36	109536.2386	3042.6733		
Total	40	159147.6098			

The analysis of variance F-statistic is F=4.0763, with 4 and 36 degrees of freedom, giving a p-value of 0.0079. That small p-value indicates strong evidence against the null hypothesis of no difference among the mean volumes for the five groups. In other words, there is strong evidence of differences among the group means. The within-group mean square is 3042.6733, so the pooled estimate of a common standard deviation is the square root of the value, which is equal to 55.16043 (0.05516043 mm3).

The output also provides a summary statistics of each group:

Group	Count	Standard Mean	Standard Deviation	Error	95 Pct Conf Int for Mean
Grp 1	6	103.3333	49.2612	20.1108	51.6377 TO 155.0290
Grp 2	10	128.8000	60.7523	19.2116	85.3404 TO 172.2596
Grp 3	19	50.3158	51.6710	11.8541	25.4112 TO 75.2204
Grp 4	1	12.0000			
Grp 5	5	63.6000	63.4965	28.3965	-15.2400 TO 142.4400
Total	41	77.9024	63.0769	9.8510	57.9929 TO 97.8120

As the confidence intervals were obtained for different group sizes, it is not possible to use them to make meaningful comparisons among the five groups.