

Review Exercises

1. Car Weight and Fuel Consumption Data Set 14 in Appendix B includes highway fuel consumption amounts for cars with 4 cylinders, 6 cylinders, and 8 cylinders. (The 5-cylinder Volvo S60 is excluded from this exercise.) Analysis of variance is used with the highway fuel consumption amounts (mi/gal) categorized according to the number of cylinders (4, 6, 8); the results are shown in the following display. Identify the null hypothesis, test statistic, and P -value, and state the final conclusion in nontechnical terms.

MINITAB

Source	DF	SS	MS	F	P
Factor	2	215.3	107.7	10.10	0.001
Error	17	181.3	10.7		
Total	19	396.6			

2. Poplar Tree Experiment Weights (kg) of poplar trees were obtained from trees planted in one region that was rich and moist and a second region that was sandy and dry. The trees were given different treatments as identified in the table below. The data are from a study conducted by researchers at Pennsylvania State University and were provided by Minitab, Inc.; the Minitab results are displayed. What do you conclude?

	No Treatment	Fertilizer	Irrigation	Fertilizer and Irrigation
Site 1 (rich, moist)	0.15	1.34	0.23	2.03
	0.02	0.14	0.04	0.27
	0.16	0.02	0.34	0.92
	0.37	0.08	0.16	1.07
	0.22	0.08	0.05	2.38
Site 2 (sandy, dry)	0.60	1.16	0.65	0.22
	1.11	0.93	0.08	2.13
	0.07	0.30	0.62	2.33
	0.07	0.59	0.01	1.74
	0.44	0.17	0.03	0.12

MINITAB

Source	DF	SS	MS	F	P
Site	1	0.2722	0.27225	0.81	0.374
Treatment	3	7.5470	2.51567	7.50	0.001
Interaction	3	0.1716	0.05721	0.17	0.915
Error	32	10.7267	0.33521		
Total	39	18.7176			

3. Tar in Cigarettes Data Set 10 in Appendix B includes the amounts of tar (mg per cigarette) in the king-size cigarettes, the 100-mm menthol cigarettes, and the 100-mm nonmenthol cigarettes. (The data are listed on the next page.) The king-size cigarettes are nonfiltered, nonmenthol, and nonlight. The 100-mm menthol cigarettes are filtered and nonlight. The 100-mm nonmenthol cigarettes are filtered and nonlight. Use a 0.05 significance level to test the claim that the three categories of cigarettes yield the same mean amount of tar. Given that only the king-size cigarettes are not filtered, do the filters appear to make a difference?