12-3 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Two-Way ANOVA Data Set 13 in Appendix B lists results from car crash tests. Included in results from car crash tests are loads (pounds) on the left femur and right femur, and those values are shown in the table below. What characteristic of the data suggests that the appropriate method of analysis is *two-way* analysis of variance? That is, what is "two-way" about the data entered in the table?

	Small	Midsize	Large
Left Femur	1188	399	215
	289	317	1636
	329	301	738
	707	297	882
	602	810	937
	245	280	882
	334	411	472
Right Femur	1261	844	752
	324	713	1202
	446	133	772
	1048	236	554
	1474	687	669
	1046	905	554
	455	547	290

2. Two-Way ANOVA If we have a goal of using the data described in Exercise 1 to (1) determine whether size of a car has an effect on the load measurements and (2) to determine whether the location of the femur (left or right) has an effect on the load measurements, should we use one-way analysis of variance for the two individual tests? Why or why not?

3. Interaction What is an interaction between two factors? In general, when using two-way analysis of variance, if we find that there is an interaction effect, how does that affect the procedure?

4. Balanced Design Does the table given in Exercise 1 constitute a *balanced design*? Why or why not?

5. Car Crash Tests If we use the data described in Exercise 1 with two-way analysis of variance, we get the accompanying display. What do you conclude?

MINITAB

Two-way ANOVA: LOAD versus FEMUR, SIZE

Source	DF	SS	MS	F	P
FEMUR	1	166069	166069	1.39	0.246
SIZE	2	532912	266456	2.23	0.122
Interaction	2	410436	205218	1.72	0.194
Error	36	4302397	119511		
Total	41	5411813			