

11-59

Marketers know that tastes differ in various regions of the country. In the rental car business, an industry expert has given the opinion that there are strong regional preferences for size of car and quotes the following data in support of that view:

Relevant or not?

Preferred Car Type	Region of Country			
	Northeast	Southeast	Northwest	Southwest
Full-size	105	120	105	70
Intermediate	120	100	130	150
All other	25	30	15	30

- (a) State the appropriate null and alternative hypotheses.
- (b) Do the data support the expert's opinion at the 0.05 significance level?
- (c) What about at the 0.20 significance level?

(1) SQ TEST

11-67

An investor is interested in seeing whether there are significant differences in the rates of return on stocks, bonds, and mutual funds. He has taken random samples of each type of investment and has recorded the following data.

Analysis of Variance

	Rate of Return (percent)					
	2.0	6.0	2.0	2.1	6.2	2.9
Stocks						
Bonds	4.0	3.1	2.2	5.3	5.9	
Mutual funds	3.5	3.1	2.9	6.0		

- (a) State null and alternative hypotheses.
- (b) Test your hypotheses at the 0.05 significance level.
- (c) State an explicit conclusion.

11-80

In the development of new drugs for the treatment of anxiety, it is important to check the drugs' effects on various motor functions, one of which is driving. The Confab Pharmaceutical Company is testing four different tranquilizing drugs for their effects on driving skill. Subjects take a simulated driving test, and their scores reflect their errors. More severe errors lead to higher scores. The results of these tests produced the following table:

Analysis of Variance

Drug 1	245	258	239	241	
Drug 2	277	276	263	274	
Drug 3	215	232	225	247	226
Drug 4	241	253	237	246	240

At the 0.05 level of significance, do the four drugs affect driving skill differently?

- 12-48 Calculate the sample coefficient of determination and the sample correlation coefficient for Exercise 12-14.

Business Week and *U.S. News & World Report* publish rankings of the top 20 business schools. The *Business Week* overall ranking is based on rankings obtained from students and from firms that recruit MBAs. Along with the rankings, the magazines report information about the cost of getting an MBA degree and the graduates' average starting salaries. Use the data in Table RW12-1 to answer Exercises 12-49 to 12-52.

Business School Ranking Surveys	School	1992 Rank		BW Ranking		Cost	Starting Salary
		BW	USN&WR	by Students	by Firms		
	Northwestern	1	4	3	1	37,600	70,200
	Chicago	2	6	10	4	38,500	68,600
	Harvard	3	2	12	3	37,100	84,960
	Wharton	4	3	15	2	37,600	72,200
	Michigan	5	7	9	6	37,200	58,110
	Dartmouth	6	10	1	12	37,500	74,260
	Stanford	7	1	5	7	38,480	82,860
	Indiana	8	18	6	8	24,600	49,070
	Columbia	9	8	18	5	38,000	66,620
	North Carolina	10	16	8	11	17,360	55,500
	Virginia	11	11	2	15	28,500	65,280
	Duke	12	9	7	14	37,000	59,870
	MIT	13	5	14	10	39,000	73,000
	Cornell	14	12	4	17	37,000	59,940
	NYU	15	17	16	13	36,100	56,730
	UCLA	16	14	11	16	22,500	64,540
	Carnegie-Mellon	17	15	23	9	37,200	56,980
	Berkeley	18	13	13	19	15,400	65,500
	Vanderbilt	19	19	19	20	35,000	47,320
	Washington	20	20	24	18	33,500	48,200

Source: Adapted from *Business Week* (26 October 1992):60, and *U.S. News & World Report* (23 March 1992):66.

- 12-49 Plot a scatter diagram of the *USN&WR* ranking vs. the cost of the MBA degree. Do more expensive schools appear to get higher rankings? Calculate the sample coefficient of correlation between these two variables.
- 12-50 Is there a payoff for spending more on an MBA degree? Plot a scatter diagram of starting salary vs. cost. Fit a regression equation to the data and test appropriate hypotheses about its slope.
- 12-51 Do graduates from the higher-ranking schools get higher starting salaries? Plot a scatter diagram of starting salary vs. the *Business Week* overall ranking. Fit a regression equation to the data and test appropriate hypotheses about its slope.
- 12-52 How strongly are the starting salaries related to the rankings? Calculate the sample coefficients of determination between the starting salaries and the three *Business Week* rankings (overall, by students, and by firms). Which of these rankings explains the largest fraction of the variation in starting salaries?

- 14-71 Highway crashes killed more than 75,000 occupants of passenger cars during 1993–1996. Using that grim statistic as a starting point, researchers at the Insurance Institute for Highway Safety computed death rates for the 103 largest-selling vehicle series. Vehicles were categorized as station wagons & vans, four-door cars, two-door cars, or sports & specialty cars. Further stratification in each category labeled vehicles as large, midsize, or small. Looking at the rates (deaths per 10,000 registered vehicles) for four-door cars, the figures are as follows:

Large	1.2	1.3	1.4	1.5	1.5	1.5	1.6	1.8		
Midsize	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4
	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.9	2.0	2.3
	2.3	2.4	2.5	2.6	2.9					
Small	1.1	1.5	1.6	1.7	1.8	2.0	2.0	2.0	2.3	2.5
	2.6	2.8	3.2	4.1						

Use the Kruskal–Wallis test to test whether the three population means are equal. Test at the 0.05 level of significance.

- 14-78 Several groups were given a list of 30 activities and technological advances and were asked to rank them, considering the risk of dying as a consequence of each. The results are in the following table. Calculate the rank correlation coefficient of each group relative to the experts' ranking. Which group seemed to have the most accurate perception of the risks involved?

A = Experts
 B = League of Women Voters
 C = College Students
 D = Civic Club Members

Risk	A	B	C	D
Motor vehicles	1	2	5	3
Smoking	2	4	3	4
Alcoholic beverages	3	6	7	5
Handguns	4	3	2	1
Surgery	5	10	11	9
Motorcycles	6	5	6	2
X-rays	7	22	17	24
Pesticides	8	9	4	15
Electric power (nonnuclear)	9	18	19	19
Swimming	10	19	30	17
Contraceptives	11	20	9	22
General (private) aviation	12	7	15	11
Large construction	13	12	14	13
Food preservatives	14	25	12	28
Bicycles	15	16	24	14
Commercial aviation	16	17	16	18
Police work	17	8	8	7
Fire fighting	18	11	10	6
Railroads	19	24	23	20
Nuclear power	20	1	1	8
Food coloring	21	26	20	30
Home appliances	22	29	27	27
Hunting	23	13	18	10
Prescription antibiotics	24	28	21	26
Vaccinations	25	30	29	29
Spray cans	26	14	13	23
High school & college football	27	23	26	21
Power mowers	28	27	28	25
Mountain climbing	29	15	22	12
Skiing	30	21	25	16

- 15-60 RJ's Grocers has added broiled whole chickens to its line of takeout food for busy professionals who don't have time to cook at home. The number of precooked chickens sold in the first 7 weeks are as follows:

Week	1	2	3	4	5	6	7
Sales	41	52	79	76	72	59	41

- (a) Find the linear regression line that best fits these data.
- (b) Estimate the expected number of sales for week 8.
- (c) Based on the estimate in part (b) and the available data, does the regression accurately describe the sales trend for this item?

- 15-44 The number of people admitted to Valley Nursing Home per quarter is given in the following table:

	Spring	Summer	Fall	Winter
1992	29	30	41	43
1993	27	34	45	48
1994	33	36	46	51
1995	34	40	47	53

- (a) Calculate the seasonal indices for these data (use a 4-quarter centered moving average).
- (b) Deseasonalize these data using the indices from part (a).
- (c) Find the least-squares line that best describes the trend of the deseasonalized figures.