Text Exercise Set 9 NAME:

9-1 For each pair of quantitative variables listed, indicate what type of scatter plot is likely to be observed if data were taken.

(a) The variable "test score" is measured from 0 to 100 on a history chapter test, and the variable "study hours" is measured from 0 to 20, for each of several high school students.

(b) The variable "test score" is measured from 0 to 100 on a history chapter test, and the variable "study hours" is measured from 0 to 80, for each of several high school students.

(c) The variable "test score" is measured from 0 to 100 on a history chapter test, and the variable "height" is measured in inches, for each of several high school students.

(d) The length of time to perform a certain complicated, assembly line task is measured in minutes, and the length of time spent in training to perform the task in measured in hours, for each of several employees in a factory.

(e) The variable "height in inches" and the variable "height in centimeters" are measured for each of several grade school students.

9-2 For each pair of quantitative variables listed, indicate what type of scatter plot is likely to be observed if data were taken.

(a) The variable "right hand grip strength" is measured in pounds of force, and the variable age is measured in years, for each of several right handed males from grades 1 through 12.

(b) The variable "right hand grip strength" is measured in pounds of force, and the variable age is measured in years, for each of several right handed males from the ages of 5 to 50 years old.

(c) The variable "weekly TV hours" and the variable "grade point average" are measured for each of several high school students.

(d) The variable "number of bars" and the variable "number of churches" are measured for each of several cities.

(e) The variable "shoe size" and the variable "IQ score" are measured for each of several high school students.

9-2 - *continued*

(f) A multiple choice test is administered to several sections of a college course. The variable "number of questions answered correctly" and the variable "number of questions answered incorrectly" are measured for each student.

(g) The variable "gas mileage" and the variable "weight of car" are measured for each of several different cars.

(h) The variable "gas mileage" and the variable "average speed" are measured for several different trips with the same automobile, where the average speed ranged between 35 and 70 miles per hour.

Table 9-2
Prices and Quantities Sold for Three Alloys Labeled A, B, and C

	Alloy A		Alloy B		Alloy C	
Year	Price per Ton	Millions of Tons Sold	Price per Ton	Millions of Tons Sold	Price per Ton	Millions of Tons Sold
2007	$10.51	5.5	$5.50	2.8	$7.55	3.0
2008	$11.10	6.0	$5.53	3.0	$7.75	3.0
2009	$12.00	6.0	$5.60	3.1	$8.10	3.1

9-3 Use the prices and quantities sold for the alloys of Table 9-2 (reproduced above) to do the following:

(a) With alloy C, find and interpret the simple price index number for 2009, with 2008 as the base year.

(b) With alloy A, find and interpret the simple quantity index number for 2008, with 2007 as the base year.

(c) Suppose that in the year 2010, the price of alloy B is $5.10, and 2.4 million tons are sold. Find and interpret the simple price index number for 2010, with 2007 as the base year.

(d) Using the additional information given in part (c), find and interpret the simple quantity index number for 2010 with 2007 as the base year.

9-4 Table 9-3 contains the prices and quantities sold for cassette tapes of two different lengths over a period of four years. Use the table to do the following:

(a) With 90-minute tape, find and interpret the simple price index number for 2009, with 2007 as the base year.

Table 9-3
Data for Exercise 9-4

	60-Minute Tape		90-Minute Tape	
Year	Price	Millions Sold	Price	Millions Sold
2007	$2.60	70	$3.60	75
2008	$2.90	80	$3.70	100
2009	$3.15	60	$3.75	90
2010	$2.80	100	$3.50	150

(b) With 60-minute tape, find and interpret the simple quantity index number for 2010, with 2008 as the base year.

(c) With 60-minute tape, find and interpret the simple price index number for 2010, with 2009 as the base year.

(d) With 90-minute tape, find and interpret the simple quantity index number for 2009, with 2008 as the base year.

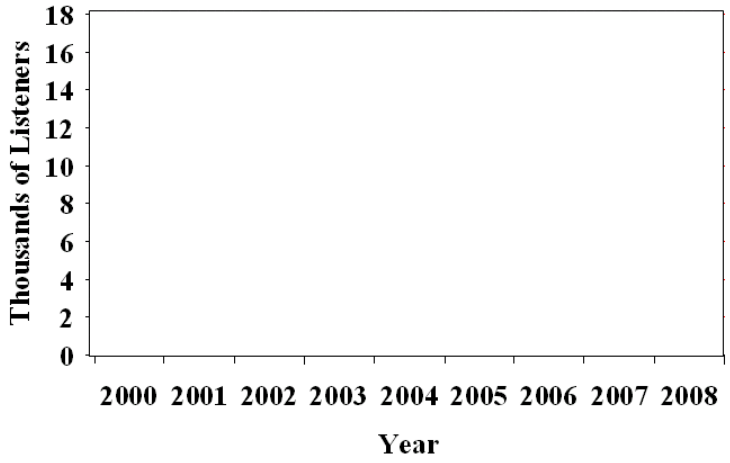
9-5 Suppose the price of a book increases by 10% from the year 2005 to the year 2006 and decreases by 10% from the year 2006 to the year 2007. Will the price of the book in the year 2007 be the same as the price of the book in the year 2005? Why or why not?

9-6 A factory manager reports that he has reduced labor costs by 110%. Explain why this is impossible.

9-7 The number of thousands of regular listeners per year to a radio station over a nine-year period are recorded as follows:

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Listeners	3	3	6	7	10	11	14	14	17

(a) Complete the construction of the line graph for this data, and describe the apparent trend in number of regular listeners.



(b) Suppose the index number for the number of listeners were found for each year, using 2000 as the base year. What would be the difference between the line graph based on the number of listeners constructed in part (a) and a line graph constructed from the index numbers.

9-8 The quarterly wide-screen television sales per year for a specific manufacturer are recorded over a four-year period and displayed in Table 9-4.

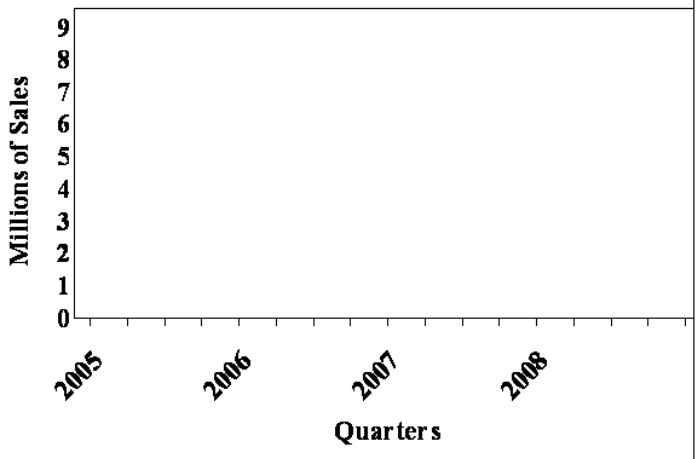


Table 9-4
Wide-Screen Television Sales

Year	Quarter	Millions Sold
2005	I	4.8
	II	4.1
	III	6.0
	IV	6.5
2006	I	5.8
	II	5.2
	III	6.8
	IV	7.4
2007	I	6.0
	II	5.6
	III	7.5
	IV	7.8
2008	I	6.3
	II	5.9
	III	8.0
	IV	8.4

9-8 - *continued*

(a) Complete the construction of the line graph for this data, and describe the apparent trend in wide-screen television sales.

(b) Suppose the index number for the sales were found for each quarter, using the first quarter of 2005 as the base time period. What would be the difference between the line graph based on the sales constructed in part (a) and a line graph constructed from the index numbers?

9-9 There are 2000 resident students attending Watsamatta University. Exactly 1000 of these resident students live on the south side of campus, and 1000 live on the north side of campus. Among the 1000 on the south side, 200 are male and 800 are female; among the 1000 on the north side, 800 are male and 200 are female.

Table 9-5a
South Side of Campus

Sex	Greek Organization: *Yes*	Greek Organization: *No*
Male	80	120
Female	320	480

Table 9-5b
North Side of Campus

Sex	Greek Organization: *Yes*	Greek Organization: *No*
Male	400	400
Female	100	100

(a) Table 9-5a is a contingency table for resident students living on the south side of campus; the two variables in the contingency table are sex of the student and whether or not the student is a member of a Greek organization. Find the percentage of members of a Greek organization among south side males, and find the percentage of members of a Greek organization among south side females.

(b) Table 9-5b is a contingency table for resident students living on the north side of campus; the two variables in the contingency table are sex of the student and whether or not the student is a member of a Greek organization. Find the percentage of members of a Greek organization among north side males, and find the percentage of members of a Greek organization among north side females.

9-9 - *continued*

(c) Based on the percentages you found in parts (a) and (b), how do you think the percentage of members of a Greek organization among all males combined compares with the percentage of members of a Greek organization among all females combined?

(d) Complete the construction of the contingency table for all 2000 resident students combined with rows labeled by sex, and columns labeled by whether or not a student is a member of a Greek organization; then, find the percentage of members of a Greek organization among all males combined, and find the percentage of members of a Greek organization among all females combined.

All Students Combined

	Greek Organization	
Sex	*Yes*	*No*
Male		
Female		

(e) Why does the comparison of males and females in part (d) seem inconsistent with the comparison of males and females in each of part (a) and part (b)? Can you explain the apparent inconsistency? (What you see happening here is known as *Simpson's paradox*.)

9-10 There are 20,000 voters in an election for mayor, with candidates Smith and Jones. Exactly 10,000 of these voters are republicans, and 10,000 are democrats. Among the 10,000 republicans, 2,000 are male and 8,000 are female; among the 10,000 democrats, 8,000 are male and 2,000 are female.

(a) Table 9-6a is a contingency table for republican voters; the two variables in the contingency table are sex of the voter and which candidate (Smith or Jones) the voter is voting for. Find the percentage voting for Smith among republican males, and find the percentage voting for Smith among republican females.

9-10 - *continued*

(b) Table 9-6a is a contingency table for democrat voters; the two variables in the contingency table are sex of the voter and which candidate (Smith or Jones) the voter is voting for. Find the percentage voting for Smith among democrat males, and find the percentage voting for Smith among democrat females.

Table 9-6a
Republican Voters

Sex	Voting for *Smith*	Voting for *Jones*
Male	800	1,200
Female	3,440	4,560

Table 9-6b
Democrat Voters

Sex	Voting for *Smith*	Voting for *Jones*
Male	4,000	4,000
Female	1,060	940

(c) Based on the percentages you found in parts (a) and (b), how do you think the percentage voting for Smith among all males combined compares with the percentage voting for Smith among all females combined?

(d) Complete the construction of the contingency table for all 20,000 voters combined with rows labeled by sex, and columns labeled by which candidate (Smith or Jones) the voter is voting for; then, find the percentage voting for Smith among all males combined, and find the percentage voting for Smith among all females combined.

All Voters Combined

Sex	Voting for *Smith*	Voting for *Jones*
Male		
Female		

(e) Why does the comparison of males and females in part (d) seem inconsistent with the comparison of males and females in each of part (a) and part (b)? Can you explain the apparent inconsistency? (What you see happening here is known as *Simpson's paradox*.)

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