EXERCISES 5.14 - 5.28

5.14 ● ✦ The article "Air Pollution and Medical Care Use by Older Americans" (*Health Affairs* [2002]: 207–214) gave data on a measure of pollution (in micrograms of particulate matter per cubic meter of air) and the cost of medical care per person over age 65 for six geographical regions of the United States:

Region	Pollution	Cost of Medical Care
North	30.0	915
Upper South	31.8	891
Deep South	32.1	968
West South	26.8	972
Big Sky	30.4	952
West	40.0	899

a. Construct a scatterplot of the data. Describe any interesting features of the scatterplot.
b. Find the equation of the least-squares line describing the relationship between y = medical cost and x = pollution.
c. Is the slope of the least-squares line positive or negative? Is this consistent with your description of the relationship in Part (a)?
d. Do the scatterplot and the equation of the least-squares line support the researchers' conclusion that elderly people who live in more polluted areas have higher medical costs? Explain.

5.15 ● The authors of the paper "Evaluating Existing Movement Hypotheses in Linear Systems Using Larval Stream Salamanders" (*Canadian Journal of Zoology* [2009]: 292–298) investigated whether water temperature was related to how far a salamander would swim and whether it would swim upstream or downstream. Data for 14 streams with different mean water temperatures where salamander larvae were released are given (approximated from a graph that appeared in the paper). The two variables of interest are x = mean water temperature (°C) and y = net directionality, which was defined as the difference in the relative frequency of the released salamander larvae moving upstream and the relative frequency of released salamander larvae moving downstream. A positive value of net directionality means a higher proportion were moving upstream than downstream. A negative value of net directionality means a higher proportion were moving downstream than upstream.

Mean Temperature (x)	Net Directionality (y)
6.17	−0.08
8.06	0.25
8.62	−0.14
10.56	0.00
12.45	0.08
11.99	0.03
12.50	−0.07
17.98	0.29
18.29	0.23
19.89	0.24
20.25	0.19
19.07	0.14
17.73	0.05
19.62	0.07

a. Construct a scatterplot of the data. How would you describe the relationship between x and y?
b. Find the equation of the least-squares line describing the relationship between y = net directionality and x = mean water temperature.
c. What value of net directionality would you predict for a stream that had mean water temperature of 15 °C?
d. The authors state that "when temperatures were warmer, more larvae were captured moving upstream, but when temperatures were cooler, more larvae were captured moving downstream." Do the scatterplot and least-squares line support this statement?
e. Approximately what mean temperature would result in a prediction of the same number of salamander larvae moving upstream and downstream?

5.16 ● The article "California State Parks Closure List Due Soon" (*The Sacramento Bee*, August 30, 2009) gave the following data on x = number of visitors in fiscal year 2007–2008 and y = percentage of operating costs covered by park revenues for the 20 state park districts in California:

Number of Visitors	Percentage of Operating Costs Covered by Park Revenues
2,755,849	37
1,124,102	19
1,802,972	32

(continued)

Bold exercises answered in back   ● Data set available online   ✦ Video Solution available