Lesson 18: More on Scatterplots and Correlation

Daily Data Collection

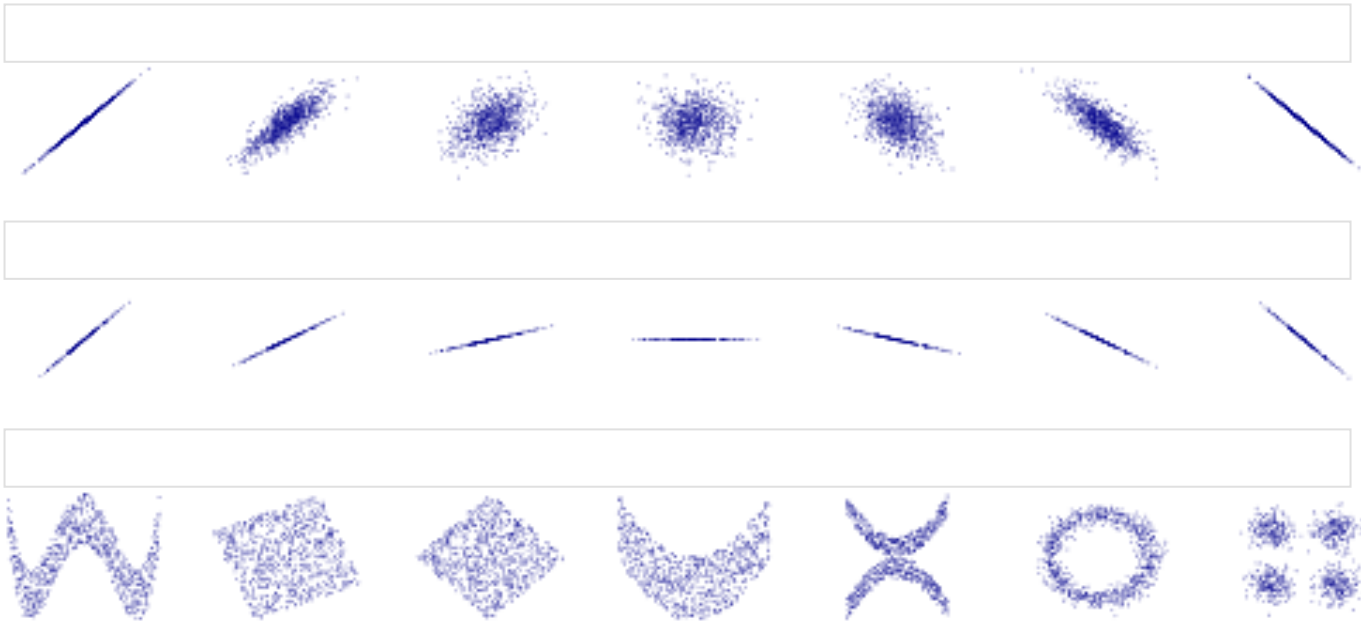
IQ and Common Sense

Making conclusions about a relationship:

Terms to Use	Terms to avoid:
Association Appears to Seams to	Causes Forces Definitely

Outliers:
Outliers are far from the linear pattern and other data points. Outliers affect the direction, form, and strength of the line.

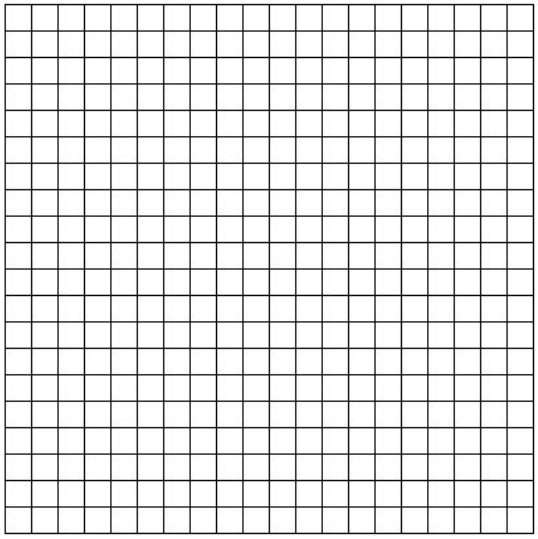
Estimate the correlation of the following plots:



Class Data:

Create a scatterplot.
Explanatory Variable: IQ Score
Response variable: Common Sense Score

Use a spreadsheet!



Describe the Direction

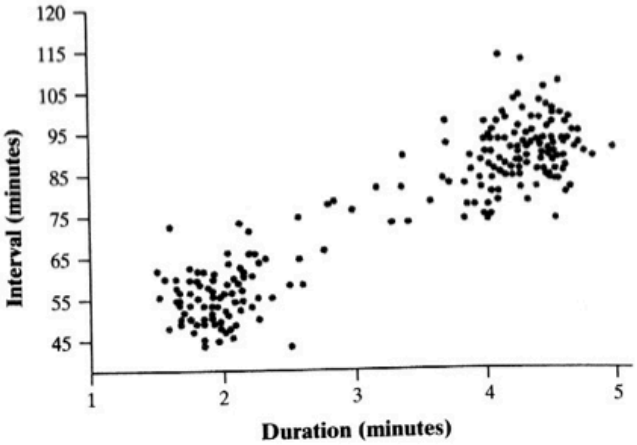
Describe the Form

Describe the Strength, including the correlation

Conclusion/Analysis

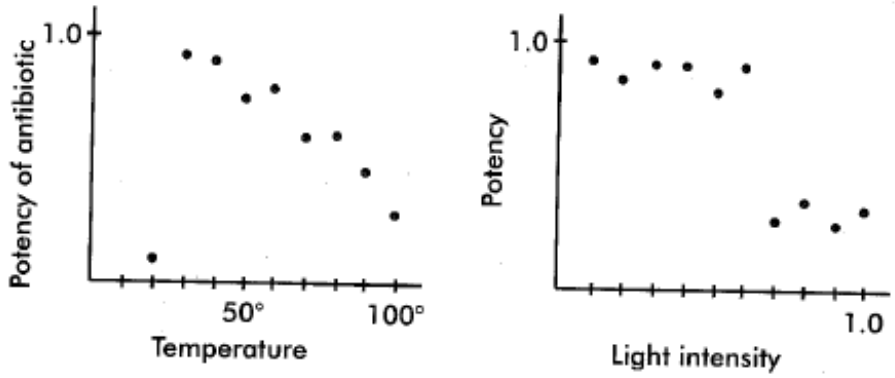
CHECK YOUR UNDERSTANDING

In the chapter-opening Case Study (page 141), the Starnes family arrived at Old Faithful after it had erupted. They wondered how long it would be until the next eruption. Here is a scatterplot that plots the interval between consecutive eruptions of Old Faithful against the duration of the previous eruption, for the month prior to their visit.



1. Describe the direction of the relationship. Explain why this makes sense.
2. What form does the relationship take? Why are there two clusters of points?
3. How strong is the relationship? Justify your answer.
4. Are there any outliers?
5. What information does the Starnes family need to predict when the next eruption will occur?

An experiment was conducted to note the effect of temperature and light on the potency of a particular antibiotic. One set of vials of the antibiotic was stored under different temperatures, but under the same lighting, while a second set of vials was stored under different lightings, but under the same temperature.



In the first scatterplot note the linear pattern with one outlier far outside this pattern. A possible explanation is that the antibiotic is more potent at lower temperatures, but only down to a certain temperature at which it drastically loses potency.

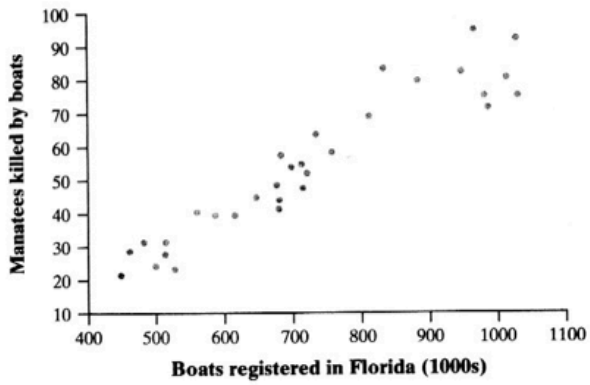
In the second histogram note the two clusters. It appears that below a certain light intensity the potency is one value, while above that intensity it is another value. In each cluster there seems to be no association between intensity and potency.

CHECK YOUR UNDERSTANDING

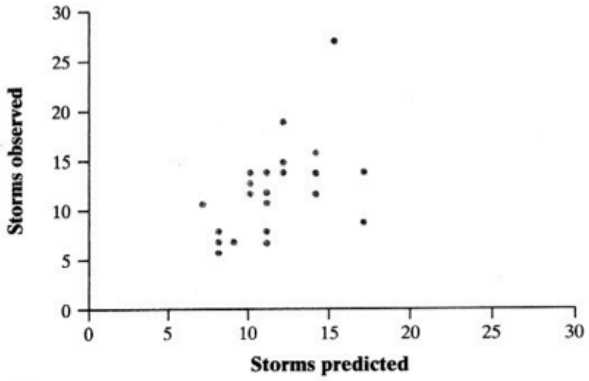
The scatterplots below show four sets of real data: (a) repeats the manatee plot in Figure 3.4 (page 148); (b) shows the number of named tropical storms and the number predicted before the start of hurricane season each year between 1984 and 2007 by William Gray of Colorado State University; (c) plots the healing rate in micrometers (millionths of a meter) per hour for the two front limbs of several newts in an experiment; and (d) shows stock market performance in consecutive years over a 56-year period.

1. For each graph, estimate the correlation r. Then interpret the value of r in context.

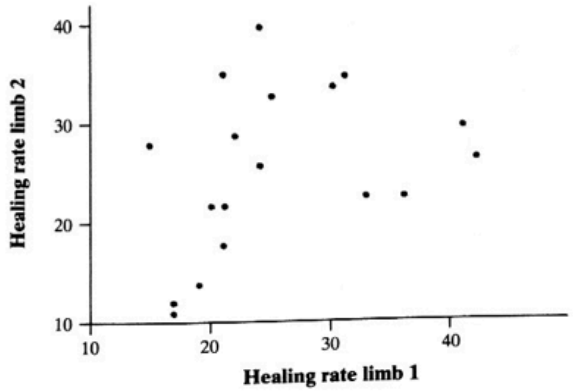
2. The scatterplot in (b) contains an outlier: the disastrous 2005 season, which had 27 named storms, including Hurricane Katrina. What effect would removing this point have on the correlation? Explain.



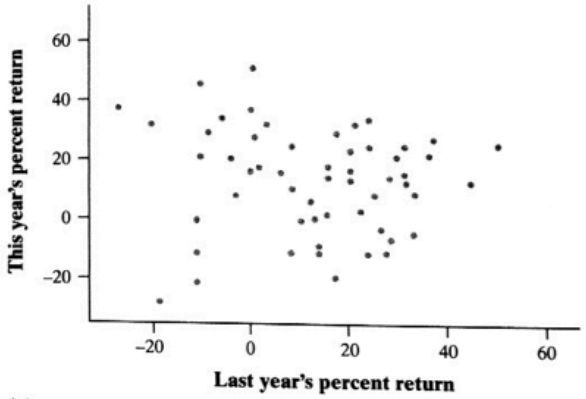
(a)



(b)



(c)



(d)

HW 18 - Section 3-1: 14-18, 27-32