

## 3.20: Linear Relationships (1 of 4)

### Learning Objectives

- Use a correlation coefficient to describe the direction and strength of a linear relationship. Recognize its limitations as a measure of the relationship between two quantitative variables.

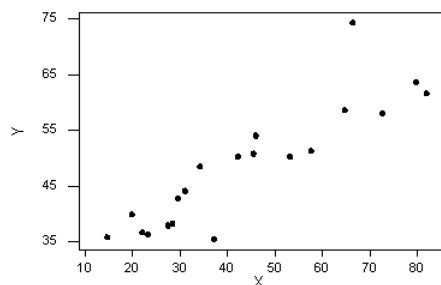
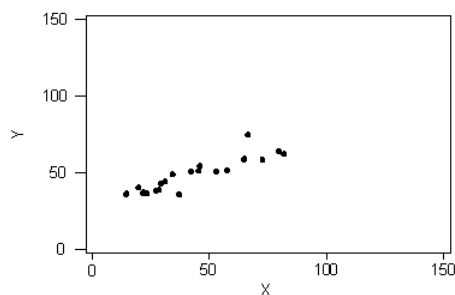
### Introduction

So far, we have visualized relationships between two quantitative variables using scatterplots. We have also described the overall pattern of a relationship by considering its direction, form, and strength. We noted that it is difficult to assess the strength of a relationship just by looking at the scatterplot. In this section, we develop a numerical measure to assess the strength.

We focus only on relationships that have a linear form. Linear forms are quite common and relatively simple to detect. More important, we have a numerical measure that can assess the strength of the linear relationship. We use this measure along with the scatterplot to describe the linear relationship between two quantitative variables.

Even though we now focus only on linear relationships, remember that not every relationship between two quantitative variables has a linear form. We have already seen several examples of relationships that are not linear. However, the measure of strength that we are about to study can be used only with linear relationships. If we use this measure with nonlinear relationships, we will draw incorrect conclusions about the relationship between the variables.

Let's start with an example. Consider the following two scatterplots.



We can see that in both cases, the direction of the relationship is *positive* and the form of the relationship is *linear*. What about the strength? Recall that the strength of a relationship is a description of how closely the data follow its form.

### Try It

<https://assessments.lumenlearning.co...sessments/3465>

The scale used in a scatterplot can sometimes affect our assessment of strength, so we need to develop a measure for the strength of a linear relationship between two quantitative variables.

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