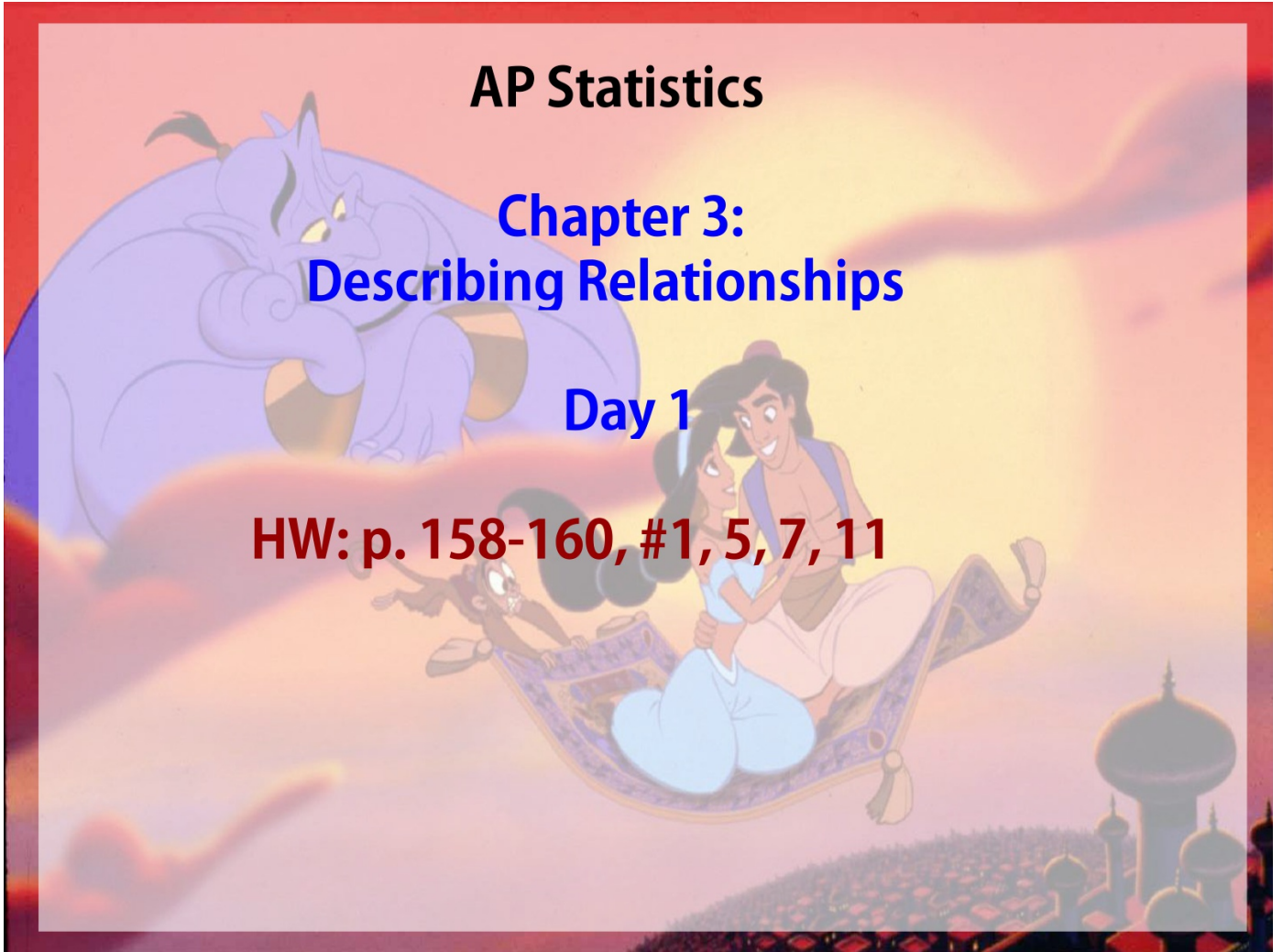


AP Statistics

Chapter 3: Describing Relationships

Day 1

HW: p. 158-160, #1, 5, 7, 11



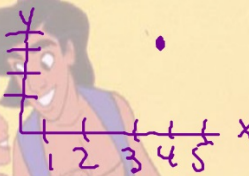
Scatterplots

- Used to describe the shape, direction and strength of the relationship between two variables x (explanatory variable) and y (response variable).

To make a scatterplot:

- Draw an x -axis and a y -axis.
- Scale the x -axis to accommodate the range of data for the first variable.
- Scale the y -axis to accommodate the range of data for the other variable.
- For each pair of measurements, mark the point on the graph where the lines of the x and y values cross.

Depend.



Indep.

$$x = 4$$
$$y = 3$$

Example

Data collected from snack foods included the number of grams of fat per serving and the total number of calories in the food.

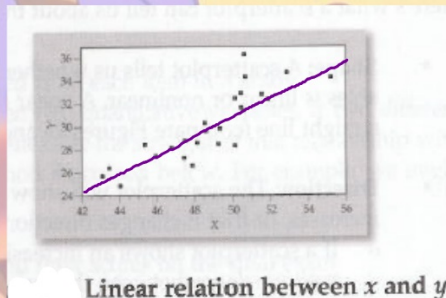
- Identify the explanatory variable. *grams of fat*
- Identify the response variable. *# of calories*
- Are the variables categorical or quantitative?
quantitative
- What is the relationship between fat grams and calories.
The more fat grams you have, the more calories.

Shape of Scatterplots

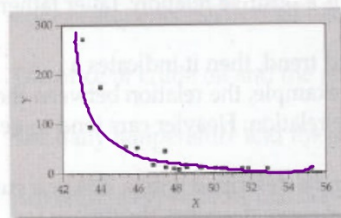
A scatterplot tells us whether the nature of the relation between the two variables is linear or nonlinear.

A linear relation is one that can be described well using a straight line.

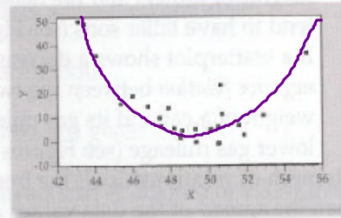
↖
Line of Best Fit



Linear relation between x and y



Nonlinear relation between x and y

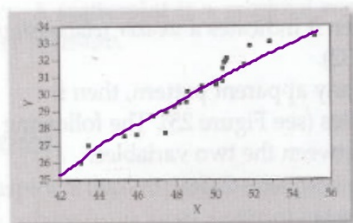


Nonlinear relation between x and y

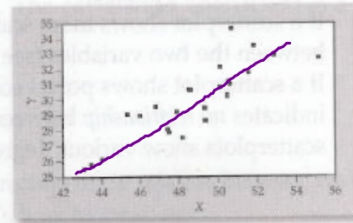
Direction of Scatterplots

The scatterplot will show whether the y -value increases or decreases as the x increases.

- If a scatterplot shows an increasing or upward trend, then it indicates a positive relation between the two variables.
- The relation between the heights of fathers and the heights of their sons is a positive relation: Taller fathers tend to have taller sons.



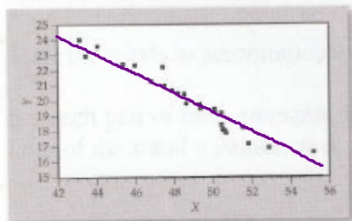
Strong positive linear relation
between x and y



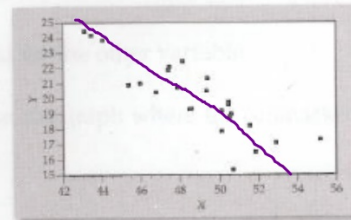
Weaker positive linear relation
between x and y

Direction of Scatterplots

- If a scatterplot shows a decreasing or downward trend, then it indicates a **negative relation** between the two variables.
- The relation between the weight of a car and its gas mileage is a negative relation: Heavier cars tend to get lower gas mileage.



Strong negative linear relation
between x and y

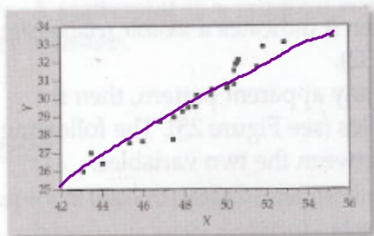


Weaker negative linear relation
between x and y

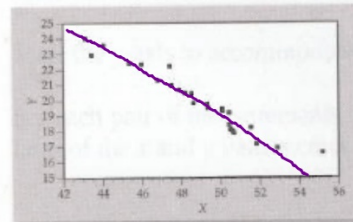
Strength of Relationship of Scatterplots

The strength of the scatterplot describes how tight or spread out the points on a scatterplot are.

- If a scatterplot shows fewer scattered points (points very close to the line), then it indicates a **strong relationship** between the two variables.



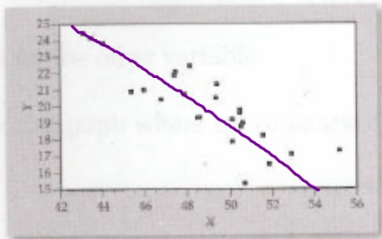
Strong positive linear relation
between x and y



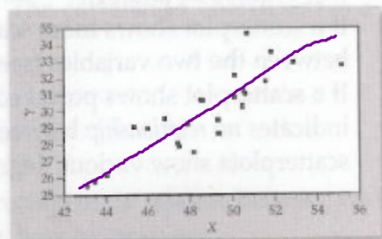
Strong negative linear relation
between x and y

Strength of Relationship of Scatterplots

- If a scatterplot shows more scattered points (points are far from the line), then it indicates a weak relationship between the two variables.



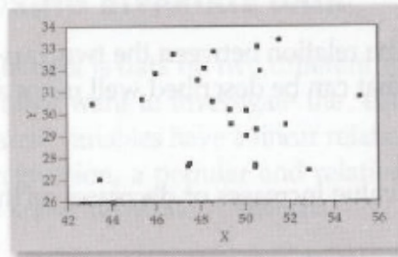
Weaker negative linear relation
between x and y



Weaker positive linear relation
between x and y

Strength of Relationship of Scatterplots

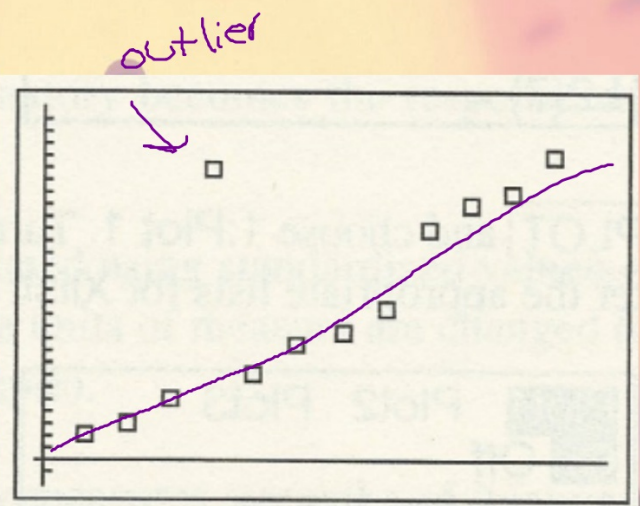
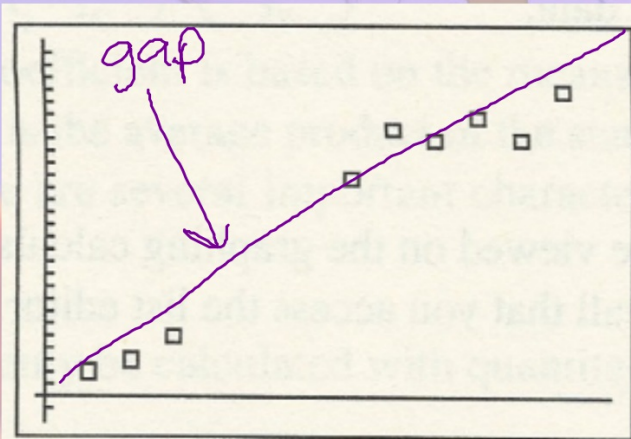
- If a scatterplot shows points scattered without any apparent pattern, then it indicates no relationship between the two variables.



No relation between x and y

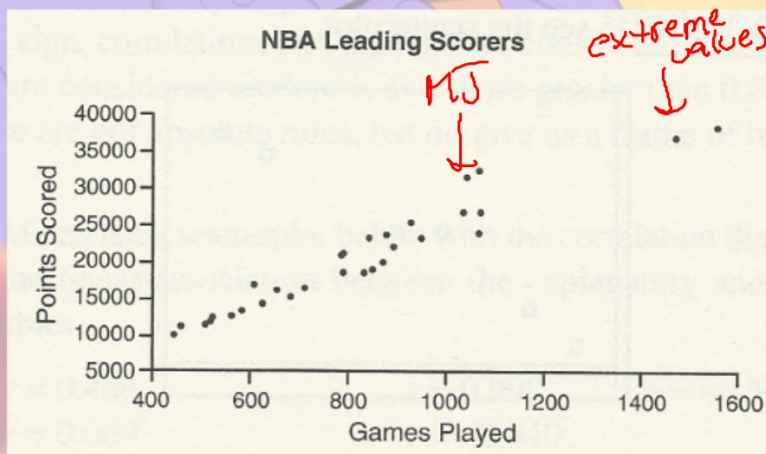
Analyzing Patterns in Scatterplots

When analyzing a scatterplot, it is also a good idea to look for outliers, clusters, or gaps in the data.



Example

A scatterplot of the top 30 scorers in NBA history is shown below. Identify the explanatory variables and the response variables. Describe the association between the two variables.



Explanatory: games Played
Response: Points Scored

The data is strong, positive and linear. There is a gap between 1000 and 1400 games played.

The two extreme values might be players with very long careers.

Classwork

Lesson 2 U3C3 Practice Worksheet

"Shake It Up" Scatterplott

