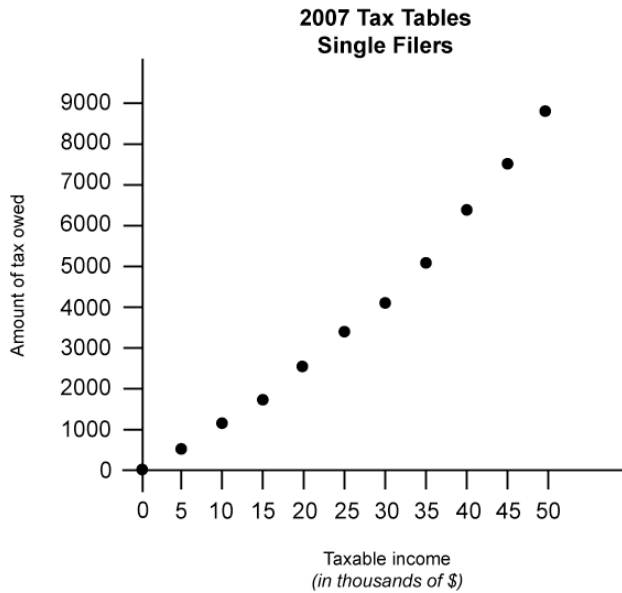Student: _____ Class: _____ Date: _____

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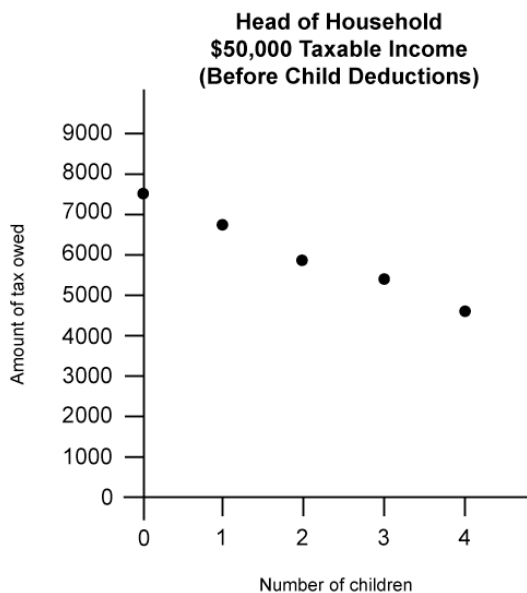IV.A Student Activity Sheet 1: Using Scatterplots in Reports

1. Consider the following graph. Who are the subjects in the study? What are the variables of interest?

   Thoroughly describe the information illustrated by the graph, choosing at least two data points to help with your explanation.

**2007 Tax Tables
Single Filers**

Taxable income
(in thousands of $)

(Data compiled from 2007 tax tables for Form 1040 on www.irs.gov.)

2. Look at this new graph and discuss with your partner the information illustrated. Then compare and contrast this display with the graph in Question 1.

**Head of Household
$50,000 Taxable Income
(Before Child Deductions)**

Number of children

(Data compiled from 2007 tax tables for Form 1040 on www.irs.gov.)

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3. **REFLECTION:** Use the previous graphs to complete the following sentences.

A person with higher taxable income pays _____.
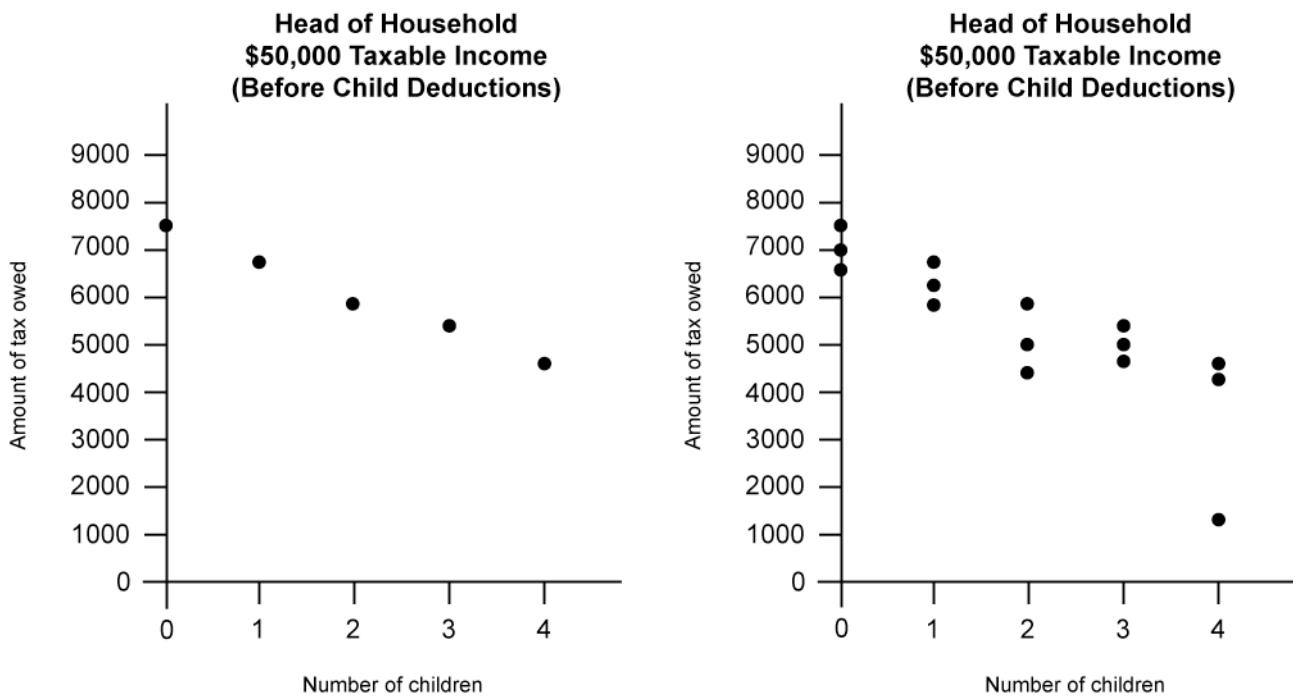
A person with lower taxable income pays _____.

This is an example of a _____ association.

A person with fewer children pays _____.

A person with more children pays _____.

This is an example of a _____ association.

4. In actuality, head-of-household filers with $50,000 in taxable income and the same number of children could pay different amounts of income tax, as shown by the graph on the right. These differences result from tax credits for expenses such as child care that can reduce the amount of tax owed. Compare and contrast this new graph with the original on the left.
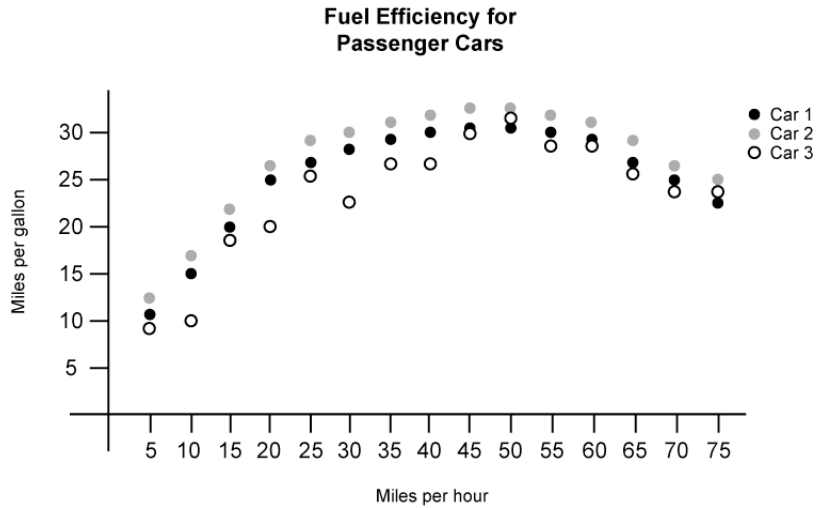
Head of Household
$50,000 Taxable Income
(Before Child Deductions)

Head of Household
$50,000 Taxable Income
(Before Child Deductions)

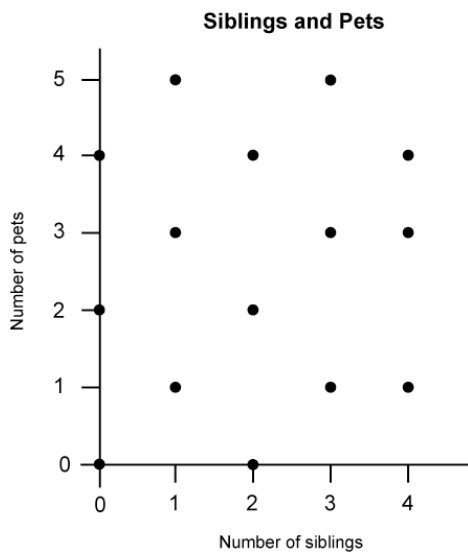(Data compiled from 2007 tax tables for Form 1040 on www.irs.gov.)

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5. Now consider the following graph. What information is displayed? Compare and contrast this graph with the others you have analyzed.

Fuel Efficiency for Passenger Cars

- Car 1
- Car 2
- Car 3

Miles per gallon

Miles per hour

(Data compiled from www.fueleconomy.gov.)

6. A survey of students asked, "How many siblings live in your house with you?" and "How many pets does your family have?" The results are displayed below. Comment on the graph, comparing and contrasting it with the previous graphs.
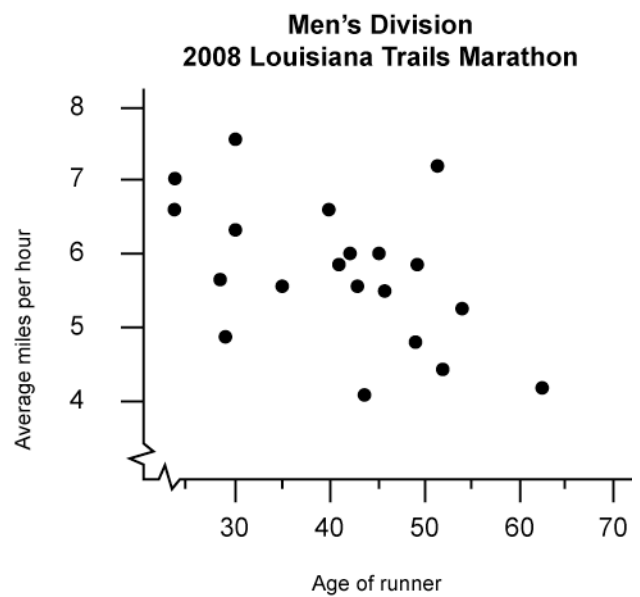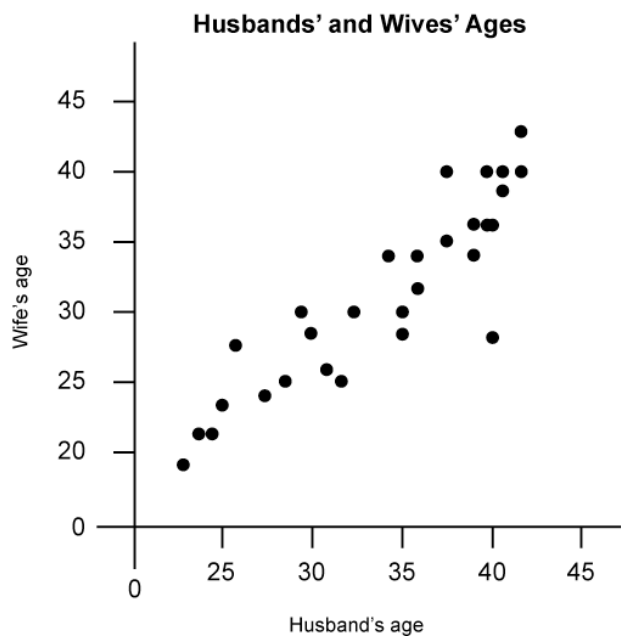
Siblings and Pets

Number of pets

Number of siblings

Using Recursion in Models and Decision Making: Relationships in Data
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7. When analyzing a display of bivariate statistics, you need to consider the following:

- Form—Does the graph exhibit a linear or nonlinear pattern?
- Direction—Does the graph exhibit a positive relationship, a negative relationship, or neither?
- Relative strength—Are the data points tightly clustered along the line or curve (strongly associated) or are they more scattered (weakly associated)?

Using these guidelines, analyze the following graphical displays. Conduct your analysis in the context of the situation.
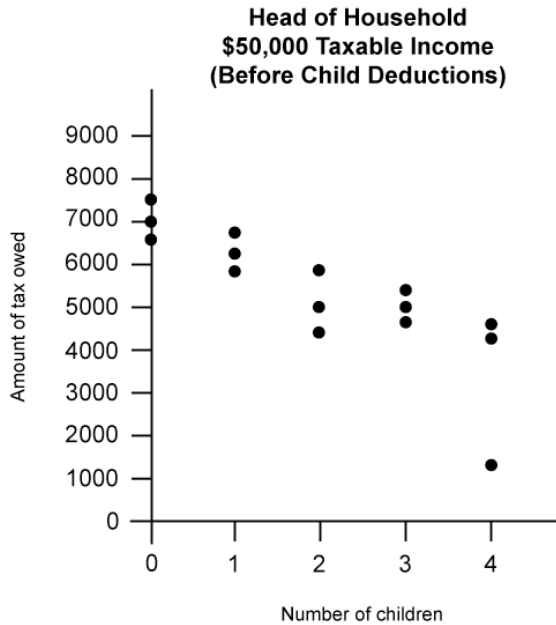

(Data adapted from marathonguide.com.)

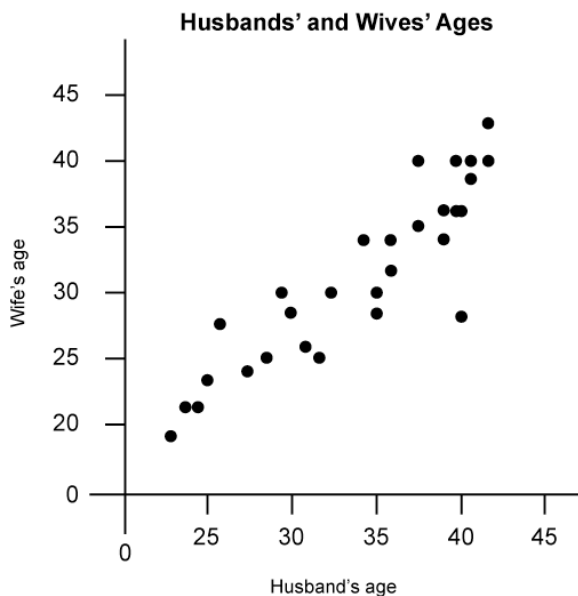# Using Recursion in Models and Decision Making: Relationships in Data
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8. The following graph illustrates the fact that for a designated filing status and taxable income level, the amount of tax owed depends on the number of children. Does this sound like a cause-and-effect relationship or simply a matter of an association between the variables?

Head of Household
$50,000 Taxable Income
(Before Child Deductions)

(Data compiled from 2007 tax tables for Form 1040 on www.irs.gov.)

9. The graph shown below illustrates that in general older men have wives about their age and younger men have wives about their age. Does this sound like a cause-and-effect relationship or simply a matter of an association between the variables?

Husbands' and Wives' Ages

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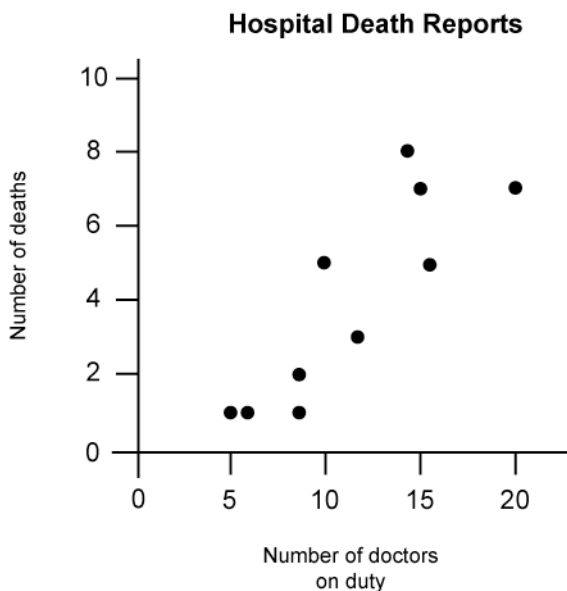Activity Sheet 1, 7 pages

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10. **EXTENSION:** A news report noted, "As men age, they begin to run slower." Does this report imply cause and effect or association? What is your opinion of this implication?

Men's Division
2008 Louisiana Trails Marathon


(Data adapted from marathonguide.com)
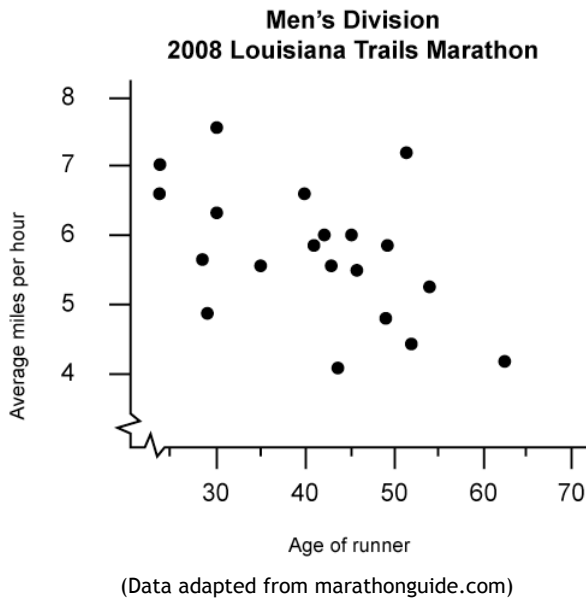
11. **EXTENSION:** A special report on the evening news exposed a startling fact: When more doctors are on duty at a hospital, more deaths occur. Does this mean that doctors are killing patients? What are some other explanations?

Hospital Death Reports

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12. **EXTENSION:** In the last 40 years, spending on education has increased, while SAT scores have gone down. Sketch a scatterplot that represents these trends. Does increased spending cause a drop in SAT scores? Explain your reasoning.

13. **EXTENSION:** Doctors have become concerned about the effect of backpack weights on students' backs. Studies showed that, in general, students weighing more carry heavier backpacks. Write an analysis of the situation for the school newspaper. Clearly indicate in the analysis whether this is a situation of cause and effect or association.
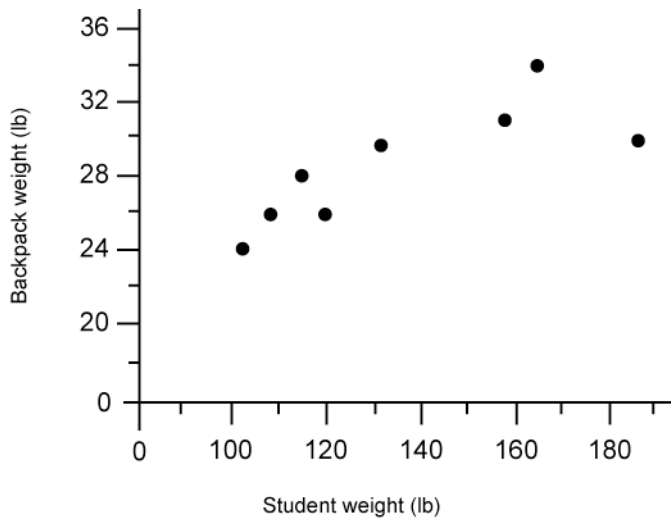
14. **EXTENSION:** In the computer lab, conduct searches for examples of causation and correlation. If you find a misleading report, write a new report that clarifies the issue. If you cannot find a misleading report, describe how such a report might be written and how you would improve on it.

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