Homework #4. Textbook Questions (5th edition)

4.19 If the **correlation** between two **variables** is close to 0, you can conclude that a **scatterplot** would show

○(a) a strong straight-line pattern.

○(b) a cloud of points with no visible pattern.

○(c) no straight-line pattern, but there might be a strong pattern of another form.

4.21 If women always married men who were 2 years older than themselves, the **correlation** between the ages of husband and wife would be

○(a) 1.

○(b) 0.5.

○(c) Can't tell without seeing the data.

4.33 Attracting beetles. To detect the presence of harmful insects in farm fields, we can put up boards covered with a sticky material and examine the insects trapped on the boards. Which colors attract insects best?Experimenters placed six boards of each of four colors at random locations in a field of oats and measured the number of cereal leaf beetles trapped. Here are the data:[16]

Board color	Beetles trapped					
Blue	16	11	20	21	14	7
Green	37	32	20	29	37	32
White	21	12	14	17	13	20
Yellow	45	59	48	46	38	47

(b) Does it make sense to speak of a positive or **negative association** between board color and beetles trapped? Why? Is **correlation** *r* a helpful description of the relationship? Why?

5.26 Because elderly people may have difficulty standing to have their heights measured, a study looked at predicting overall height from height to the knee. Here are data (in centimeters) for five elderly men:

Knee height x	57.7	47.4	43.5	44.8	55.2
Height y	192.1	153.3	146.4	162.7	169.1

Use your calculator or software: what is the equation of the **least-squares regression line** for predicting height from knee height?

○(a) $\hat{y} = 2.4 + 44.1x$

○(b) $\hat{y} = 44.1 + 2.4x$

○(c) $\hat{y} = -2.5 + 0.32x$

5.40 The effect of changing units. The equation of a **regression line**, unlike the **correlation**, depends on the units we use to measure the explanatory and **response variables**. Here are data on knee height and overall height(in centimeters) for five elderly men:

Knee height x	57.7	47.4	43.5	44.8	55.2
Height y	192.1	153.3	146.4	162.7	169.1

(a) Find the equation of the **regression line** for predicting overall height in centimeters from knee height in centimeters.

(b) A mad scientist decides to measure knee height in millimeters and height in meters. The same data in these units are

Knee height x	577	474	435	448	552
Height y	1.921	1.533	1.464	1.627	1.691

Find the equation of the **regression line** for predicting overall height in meters from knee height in millimeters.

(c) Use both lines to predict the overall height of a man whose knee height is 50 centimeters, which is the same as 500 millimeters. Use the fact that there are 100 centimeters in a meter to show that the two predictions are the same (up to roundoff error).

5.46 Some regression math. Use the equation of the **least-squares regression line** (box on **page 130**) to show that the **regression line** for predicting y from x always passes through the point ($\overline{x}$, $\overline{y}$). That is, when $x = \overline{x}$,the equation gives $\hat{y} = \overline{y}$.