

# KEY

## Chapter 3

1. Many teachers believe that getting more sleep could help their students score higher on final exams. When studying these variables, which of the following is true?

- I. The explanatory variable is sleep, and the response variable is finals grade. **SLEEP HAS AN EFFECT ON SCORES**
- II. The teachers expect to see a moderately strong to strong positive correlation. **YES**
- III. If the correlation of the data gathered is 1, the teachers can assume that sleeping more will raise a student's final grade. **1 IS A 1 TO 1 CORRELATION**

- a. I only
- b. II only
- c. III only
- d. I and II only.

e. I, II, and III.

2. The least squares regression line of data describing the relationship between age (x) and number of driving accidents (y) is  $y = 4.7 - 0.17x$ . Which of the following statements is incorrect?

- a. Typically, the incidence of driving accidents decreases with age. **NEGATIVE SLOPE**
- b. The equation can be used to accurately predict driving accidents for any age. **NO, AFTER 28 YRS OLD, YOUR ACCIDENTS WOULD BE NEGATIVE**
- c. The predicted number of driving accidents for a 16 year old is 1.98  
 $y = 4.7 - .17(16) = 1.98$
- d. Driving accidents, on average, decrease by 0.17 for every year older a driver gets. **-.17 PER YR**
- e. Timmy Tim is 18 years old and has been in two accidents this year. He is above average for his age group. **YES, HE IS EXPECTED TO HAVE 1.64 ACCIDENTS**

b

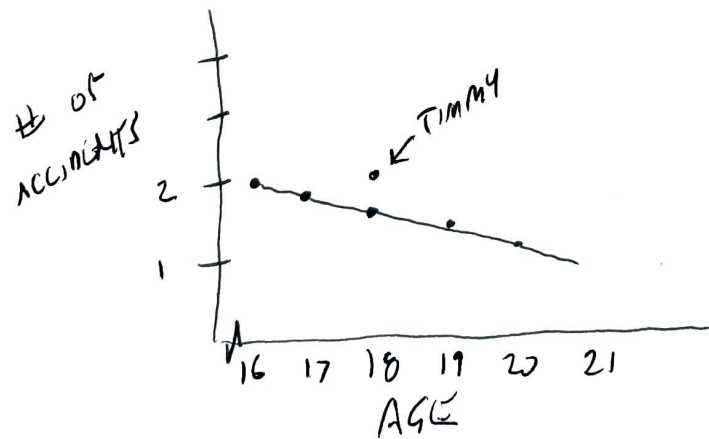
WHEN  $y = 0$

$$0 = 4.7 - .17x$$

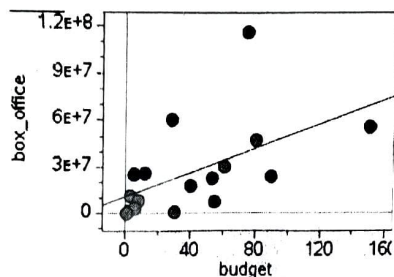
$$-4.7 = -.17x$$

$$\frac{-4.7}{-.17} = \frac{-.17x}{-.17}$$

$$27.6 = x$$



1. An AP statistics student set out to study the relationship between a movie's budget and box office success. The scatterplot below shows her findings (with budget in millions of dollars).



a. Briefly describe the association of the scatterplot.

ALTHOUGH THERE IS SOME CORRELATION, I WOULD SAY IT GETS WEAKER AS A FILM'S BUDGET RISES.

b. The least squares regression line is:  $y = 10936900 + 389535x$ . Analyze this in the context of the study. STARTING AT BOX OFFICE GROSS OF 10.9 MILLION, EVERY 1 MILLION SPENT TO MAKE THE MOVIE WILL INCREASE BOX OFFICE GROSS RECEIPTS BY \$389,535.

c. Calculate and interpret the residual for The Hunger Games, Mockingjay: Part 2, which had a budget of \$160 million dollars, and made \$102,665,981 in the box office its opening weekend. PREDICTED VALUE  $\rightarrow y = 10,936,900 + 389,535(160)$   
 $y = 73,262,500$  \* THIS MOVIE OUTPERFORMED THE EXPECTATION

ACTUAL VALUE  $\rightarrow y = 102,665,981$   
 RESIDUAL = ACTUAL (MEASURED) VALUE - PREDICTED VALUE  $\rightarrow$  RESIDUAL VALUE  
 $= 102,665,981 - 73,262,500 = \$29,403,481$

d. The  $r^2$  of the data is 0.2933. Can the least squares regression line be relied upon to make accurate predictions? NO... IT IS ESSENTIALLY ONLY 29% ACCURATE  
 \* THE  $r^2$  VALUE OF .2933 ACCOUNTS FOR ONLY 29.3% OF THE VARIANCE

2. Explain why a high correlation does not imply causation.

CORRELATION TELLS US THAT 2 VARIABLES MOVE TOGETHER BUT DOES NOT MEAN THAT ONE VARIABLE CAUSES THE OTHER VARIABLE TO MOVE IN THAT DIRECTION