Moore SCC 8e

Chapter 15

1. A straight line that is drawn through a scatterplot to summarize the relationship between explanatory and response variables is called:

a. Correlation line

b. Standard deviation line

*c. Regression line

d. None of the choices are correct.

A. Incorrect. A *regression line* is a straight line that describes how a response variable *y* changes as an explanatory variable *x* changes.
B. Incorrect. A *regression line* is a straight line that describes how a response variable *y* changes as an explanatory variable *x* changes.
C. Correct. A regression line is a straight line that describes how a response variable *y* changes as an explanatory variable *x* changes.
D. Incorrect. A *regression line* is a straight line that describes how a response variable *y* changes as an explanatory variable *x* changes.

Text Reference: Section 15.1: Regression lines

2. A correlation of either _____ has an r^2 value about halfway between 0 and 1.

a. -0.3 or +0.3

b. -0.5 or +0.5

*c. -0.7 or +0.7

d. -1 or +1

A. Incorrect. If $r = -0.7$ or $r = 0.7$ then $r^2 = 0.49$. About half the variation is accounted for by the straight-line relationship with the other variable. Therefore, ±0.7 is about halfway between 0 and 1.
B. Incorrect. If $r = -0.7$ or $r = 0.7$ then $r^2 = 0.49$. About half the variation is accounted for by the straight-line relationship with the other variable. Therefore, ±0.7 is about halfway between 0 and 1.
C. Correct. ±0.7 is about halfway between 0 and 1.
D. Incorrect. If $r = -0.7$ or $r = 0.7$ then $r^2 = 0.49$. About half the variation is accounted for by the straight-line relationship with the other variable. Therefore, ±0.7 is about halfway between 0 and 1.

Text Reference: Section 15.4: Correlation and regression

3. The best evidence of causation comes from:

a. Surveys

b. Observational studies

*c. Experiments

d. None of the choices are correct.

A. Incorrect. Experiments actively impose a treatment, which provides the best evidence of causation.
B. Incorrect. Observational studies are passive. Experiments actively impose a treatment which provides the best evidence of causation.
C. Correct. Experiments actively impose a treatment which provides the best evidence of causation.
D. Incorrect. Experiments actively impose a treatment which provides the best evidence of causation.

Text Reference: Section 15.5: The question of causation

4. True or False: We can use the regression line to predict a response.

*a. True. Prediction is based upon the regression line and works best when the model fits the data closely.

b. True. Prediction is based upon the regression line and works even if the data does not have strong patterns.

c. True. Prediction is a risk-free way to use the regression line to predict a response outside the data set.

d. False. Regression lines cannot be used to predict a response.

A. Correct. When data follows closely with the data line, our predictions are more accurate.
B. Incorrect. Although prediction is based on the regression line, if the data does not have strong patterns, prediction may be inaccurate.
C. Incorrect. Although prediction is based on the regression line, prediction outside the range of available data is always risky.
D. Incorrect. Regression lines can help predict a response and work best when the model fits the data closely.

Text Reference: Section 15.3: Understanding prediction

5. A variable that may cause changes in the relationship between the response and the explanatory variable is called:

a. Direct causation

b. Common response

*c. Lurking variable

d. None of the choices are correct.

A. Incorrect. The lurking variable may confound a cause and effect relationship.
B. Incorrect. The lurking variable may confound a cause and effect relationship.
C. Correct. The lurking variable may confound a cause and effect relationship.
D. Incorrect. The lurking variable may confound a cause and effect relationship.

Text Reference: Section 15.5: The question of causation

6. What is the explanatory variable and the response variable in the situation: Temperature and the number of chirps a cricket makes per minute?

*a. Explanatory: temperature Response: number of chirps

b. Explanatory: number of chirps Response: temperature

c. Explanatory: temperature Response: time (minutes)

d. Explanatory: time (minutes) Response: temperature

A. Correct. The explanatory variable (*x* - temperature) determines the response (*y* - number of chirps)
B. Incorrect. The explanatory variable (*x* - temperature) determines the response (*y* - number of chirps)
C. Incorrect. The explanatory variable (*x* - temperature) determines the response (*y* - number of chirps)
D. Incorrect. The explanatory variable (*x* - temperature) determines the response (*y* - number of chirps)

Text Reference: Section 15.1: Regression lines

7. The Aimco Job Placement Agency gathers data from a survey about the number of years of college and their clients' starting salaries. The results were tabulated and a least-squares regression line was generated. The regression equation $y = 8.2 + 11.44x$ represents the relationship between number of years of college experience (x) and starting salary (y) (in thousands). The r^2 value is 0.888.

Use the regression equation to determine the starting salary of someone who has 6 years of college experience.

a. 68.64 thousand dollars

*b. 76.84 thousand dollars

c. 8.2 thousand dollars

d. 11.44 thousand dollars

A. Incorrect. Substitute 6 for *x* and simplify. 11.44 x 6 + 8.2 is 76.84.
B. Correct.
C. Incorrect. Substitute 6 for *x* and simplify. 11.44 x 6 + 8.2 is 76.84.
D. Incorrect. Substitute 6 for x and simplify. 11.44 x 6 + 8.2 is 76.84.

Text Reference: Section 15.2: Regression equations

8. The Aimco Job Placement Agency gathers data from a survey about the number of years of college and their clients' starting salaries. The results were tabulated and a least-squares regression line was generated. The regression equation $y = 8.2 + 11.44x$ represents the relationship between number of years of college experience (x) and starting salary (y) (in thousands). The r^2 value is 0.888.

The slope of the graph states:

*a. For each year of experience the salary increases 11.44 thousand each year

b. For each year of experience the salary increases 8.2 thousand each year

c. For each thousand earned as starting salary, the years of experience increase by 11.44

d. For each thousand earned as starting salary, the years of experience increase by 8.2.

A. Correct. Slope is the amount by which y changes when x increases by one unit.
B. Incorrect. Slope is the amount by which y changes when x increases by one unit. The salary (y) increases 11.44 thousand each year (x).
C. Incorrect. Slope is the amount by which y changes when x increases by one unit. The salary (y) increases 11.44 thousand each year (x).
D. Incorrect. Slope is the amount by which y changes when x increases by one unit. The salary (y) increases 11.44 thousand each year (x).

Text Reference: Section 15.2: Regression equations

9. The Aimco Job Placement Agency gathers data from a survey about the number of years of college and their clients' starting salaries. The results were tabulated and a least-squares regression line was generated. The regression equation $y = 8.2 + 11.44x$ represents the relationship between number of years of college experience (x) and starting salary (y) (in thousands). The r^2 value is 0.888.

What would be the starting salary if you had no college experience?

*a. 8.2 thousand dollars

b. 11.44 thousand dollars

c. 0 dollars

d. Cannot be determined from the information given.

A. Correct. This is the *y*-intercept, or the value of *y* when *x*=0.
B. Incorrect. The *y*-intercept, or the value of *y* when *x*=0, determines the starting salary with no years of experience. Substitute 0 in for *x* and you will find that the value is 8.2 thousand dollars.
C. Incorrect. The *y*-intercept, or the value of *y* when *x*=0, determines the starting salary with no years of experience. Substitute 0 in for *x* and you will find that the value is 8.2 thousand dollars.
D. Incorrect. The *y*-intercept, or the value of *y* when *x*=0, determines the starting salary with no years of experience. Substitute 0 in for *x* and you will find that the value is 8.2 thousand dollars.

Text Reference: Section 15.2: Regression equations

10. The Aimco Job Placement Agency gathers data from a survey about the number of years of college and their clients' starting salaries. The results were tabulated and a least-squares regression line was generated. The regression equation $y = 8.2 + 11.44x$ represents the relationship between number of years of college experience (x) and starting salary (y) (in thousands). The r^2 value is 0.888.

The r^2 value tells us that:

a. It is a weak correlation.

b. It is a negative correlation.

*c. Approximately 89% of the observed variation is explained by the straight-line relationship between *x* and *y*.

d. There is extreme variation observed in starting salaries.

A. Incorrect. It is a strong correlation. The variation “along the line” as college experience pulls starting salary accounts for 89% of all the variation in starting salaries. The scatter of the points accounts for the remaining 11%.
B. Incorrect. The correlation is positive. The variation “along the line” as college experience pulls starting salary accounts for 89% of all the variation in starting salaries. The scatter of the points accounts for the remaining 11%.
C. Correct. The variation “along the line” as college experience pulls starting salary accounts for 89% of all the variation in starting salaries. The scatter of the points accounts for the remaining 11%.
D. Incorrect. The scatter of the points accounts for 11%. The variation “along the line” as college experience pulls starting salary accounts for 89% of all the variation in starting salaries.

Text Reference: Section 15.4: Correlation and regression