**Multiple Choice Questions**

1. *Simple* regression refers to the idea that:

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| a. | we’re using the mean to predict unknown scores. |
| b. | we are using a predictor with only two categories/levels. |
| c. | there is only one predictor variable (and one outcome variable). |
| d. | a regression analysis involves only a few steps. |

1. How do regression and correlation compare to one another?

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| a. correlation allows us to examine the relationship between two variables but regression does not allow us to examine the relationship between variables. |
| b. correlation allows us to detect positive and negative relationships between variables but regression only allows us to detect positive relationships. |
| c. regression and correlation both allow us to examine relationships between variables, but only correlation allows us to make specific predictions about one variable from another. |
| d. regression allows us to make specific predictions about one variable from another, whereas correlation only allows us to make general predictions (e.g., as X goes up, Y will also go up). |

1. For the linear equation *Ŷ* = 4 + 2*X*, if X increases by 1 unit, how much will *Ŷ* increase?

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| --- | --- | --- | --- |
| a. | 1/2 point | c. | 2 points |
| b. | 1 point | d. | 6 points |

1. For the linear equation *Ŷ* = 2*X* – 3, which of the following points will not be on the line?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | X=0, Y= −3 | c. | X=3, Y=0 |
| b. | X=2, Y=1 | d. | X=4, Y=5 |

1. For the regression equation *Ŷ* = –2*X* + 6, what can be determined about the relationship between X and Y?

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| --- | --- |
| a. | The relationship will be positive because 2 is positive. |
| b. | The relationship will be negative because 2 is negative. |
| c. | The relationship will be positive because 6 is positive. |
| d. | The relationship will be negative because 6 is negative. |

1. If there is a positive relationship between X and Y, then the regression equation *Ŷ* = *b0* + *b1*X will have:

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| --- | --- | --- | --- |
| a. | *b1* > 0 | c. | *b0* > 0 |
| b. | *b1*  < 0 | d. | *b0* < 0 |

1. If your regression equation is *Ŷ* = 3 – 5.50X, then for every one unit increase in X:

|  |  |
| --- | --- |
| a. | Ŷ will increase by 3 units. |
| b. | Ŷ will decrease by 3 units. |
| c. | Ŷ will increase by 5.50 units. |
| d. | Ŷ will decrease by 5.50 units. |

1. In a study related to foot length and height, where height is the outcome variable, the intercept value is 37.05 and the regression coefficient is 3.08. If a person had a 7-inch foot, what is a good prediction for their height?

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| --- | --- |
| a. | 58.61 inches |
| b. | 47.13 inches |
| c. | 107.11 inches |
| d. | 69.87 inches |

1. If two regression equations are graphed on the same set of axes, and they have the same value for the regression coefficient, which of the following must be true?

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| --- | --- |
| a. | They intersect the Y axis at the same point. |
| b. | They intersect the X axis at the same point. |
| c. | They have lines with the same slope |
| d. | Both a and c are true. |

1. The “line of best fit” in regression:

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| --- | --- |
| a. | will have a relatively large *p* value. |
| b. | will have a relatively large *t*-statistic. |
| c. | Both a and b are true. |
| d. | None of these are necessarily true. |

1. The regression coefficient reveals all of the following *except*:

|  |  |
| --- | --- |
| a. | the slope of the regression line. |
| b. | b0. |
| c. | the strength of the relationship between the predictor and outcome. |
| d. | the direction of the relationship between the predictor and outcome. |

1. Which of the following can have a value less than zero?

|  |  |
| --- | --- |
| a. | b1 |
| b. | b0 |
| c. | *p-value* |
| d. | Both a and b. |
| e. | All of the above. |

1. As an example of a test statistic, the *t*-statistic is a ratio of:

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| --- | --- |
| a. | error variance to systematic variance |
| b. | error variance to total variance |
| c. | variance in the outcome explained by the predictor to variance in the outcome unexplained by the predictor |
| d. | total variance in the outcome divided by outcome variance explained by the predictor |

1. Assuming all else is held constant, the larger the absolute value of *b*1 is:

|  |  |
| --- | --- |
| a. | the more the predictor changes with every unit change in the outcome. |
| b. | the more negative the slope of the line is. |
| c. | the closer the intercept is to zero. |
| d. | the smaller the *p*-value associated with the predictor is likely to be. |

1. A researcher ran a regression analysis predicting college GPA from HS GPA, and calculated an *R*2 = .20. All of the following are TRUE EXCEPT FOR:

|  |  |
| --- | --- |
| a. | The percentage of variance in college GPA that is explained by HS GPA is 4%. |
| b. | 80% of the variance in college GPA has been left *un*explained after accounting for HS GPA. |
| c. | *R*2 = .20 represents a small to medium effect. |
| d. | This value (*R*2 = .20), while informative in some ways, does not tell us whether the predictor is significantly related to the outcome. |

**Indicate “True” or “False” for each statement. If False, explain why you think so and/or how to make the statement true.**

1. In regression, the “predictor” refers to b0 and the “outcome” refers to b1.
2. A simple regression model allows us to predict a person’s score on a variable from the typical score (i.e., the mean score) of that variable.
3. The line defined by the equation Ŷ = –3*X* + 6 slopes up to the right.
4. If *t*(35) = 1.98, *p* < .05, this suggests that our predictor is significantly related to our outcome variable.
5. The *t*-statistic is what we use to test the null hypothesis that *b*0 = 0.
6. If the p-value associated with the *t* statistic is a value < .05, it means that there is a significant relationship between the outcome and predictor variables.
7. The line produced by the equation Ŷ= -5 + 4*X* crosses the vertical axis at Y = 5.
8. A *simple linear regression* analysis could be used to examine whether students’ high school GPA can be used to predict what their final college GPA is, and to make a specific prediction about what final college GPA a student with a 2.70 high school GPA would eventually have.
9. It is possible for none of the actual (observed) data points to be located on the regression line described by the regression equation.
10. If a professor used students’ midterm exam scores to make predictions about their final exam scores, then midterm scores would be the *predictor* variable.
11. If your regression equation was, Ŷ = 3 + .0001X, then the best fit line would essentially be flat.
12. The *p*-value associated with the *t*-statistic tells us the likelihood that our regression coefficient differs from zero.
13. The alternative hypothesis tested in a simple regression analysis is that b1 > 0.
14. If your regression equation was Ŷ = 1.25 – 42X, then the slope of the regression line would be negative.
15. If the p-value associated with the hypothesis test for b1 is *p* = .15, it means that the intercept is not significant.
16. A positive slope in regression suggests that there is a positive correlation between the two variables.
17. If our regression equation is Ŷ= -2.54X - 2*,* then the Y intercept is +2.
18. The regression coefficient ranges from -1 to +1, but can never be greater than 1 or less than -1.

**KEY**

1. C
2. D
3. C
4. C
5. B
6. A
7. D
8. A
9. C
10. D
11. B
12. D
13. C
14. D
15. B
16. False. b0 refers to the intercept, and b1 refers to the coefficient forthe predictor (aka, the slope of the line, aka the relationship between the predictor and outcome).
17. False. With simple regression, we’re not predicting a person’s score from the *mean* score (that would be using the *mean as the model*). With simple regression, we’re using information about the relationship between two variables (a predictor and outcome), as well as a person’s score on the predictor variable, to estimate what that person’s outcome score would be.
18. False. The line slopes down to the right, because the regression coefficient is a negative number (-3).
19. True.
20. False. The *t*-statistic is what we use to test the null hypothesis that *b*1 = 0. *b*1 represents the regression coefficient, which tells us about the direction and strength of the relationship between the predictor and outcome. The t-statistic is associated with a p-value, and that p-value tells us whether the null is credible (p >= .05) or not credible (p < .05).
21. True.
22. False. The line crosses at Y = -5 (not positive 5). Plug in zero for X and solve for Y to get the Y intercept (b0).
23. True. Simple regression investigates whether two variables are related (similar to correlation), but it also allows us to estimate what the value of an outcome variable (college GPA) will be, if we know info about the predictor variable (HS GPA).
24. True.
25. True.
26. True.
27. True.
28. False. The alternative hypothesis tested in a simple regression analysis is that b1 ≠ 0. Since b1 can be either positive or negative, the null is b1 = 0, and the alternative is b1≠ 0.
29. True.
30. False. If the p-value associated with the hypothesis test for b1 is *p* = .15, it means only that the *regression coefficient* (slope) is not significant; it tells us nothing about the intercept (b0). Plus, we don’t usually discuss the “significance” of the intercept.
31. True. The value for the slope is not the same as the correlation, but larger positive slopes are associated with larger positive correlations, and more negative slopes are associated with more negative correlations. Slopes close to zero are associated with correlations close to zero.
32. False. If *Y* = -2.54X – 2, this means that b0 = -2, and b1 = -2.54. This implies that the y-intercept is -2 (i.e., the line crosses the y-axis at Y = -2).
33. False. Unlike the correlation value (*r*), which can never be greater than +1 or less than -1, regression coefficients (b1) can be *any* value – positive, negative, or zero.