Lesson 23: Inference for Bivariate Data

Homework

## Solutions

**Please note that the steps show rounded numbers, but that the final answers to the problems are calculated without rounding.**

|  |  |  |
| --- | --- | --- |
| Problem | Part | Solution |
| 1 | - | Estimated linear regression equation:  True linear regression equation: |
| 2 | - | See the [wiki](http://statistics.byuimath.com/index.php?title=Lesson_23:_Inference_for_Bivariate_Data#Checking_Requirements_of_Simple_Linear_Regression) for a review of this important concept. |
| 3 | A | A The appropriate graphs to check for a linear relationship are a scatterplot and a residual plot. The scatterplot seems to show a linear relationship and there is no pattern in the residual plot, so we can conclude that there is a linear relationship in the data. |
| 3 | B | b The appropriate graph to check for constant variance is a residual plot. There is no pattern in the residual plot, so we can conclude that there is a constant variance in the data. |
| 3 | C | c The appropriate graph to check for a normal error term is a histogram of the residuals. The shape of the histogram looks fairly bell-shaped and symmetric, so we can conclude that the error terms are normal. |
| 4 | - |  |
| 5 | - |  |
| 6 | - |  |
| 7 | - | (22.999, 52.441) We are 95% confident that the slope of the true true linear regression line of Lactic with Taste is between 22.999 and 52.441. |
| 8 | - |  |
| 9 | - |  |
| 10 | - |  |
| 11 | - | reject the null hypothesis |
| 12 | - | There is sufficient evidence to suggest that the slope of the true linear regression line does not equal zero. We conclude that there is a linear relationship between the concentration of lactic acid in cheese and the quality of its taste. |
| 13 | A | a The appropriate graphs to check for a linear relationship are a scatterplot and a residual plot. The scatterplot does not seem to show a significant linear relationship, so we cannot conclude that there is a linear relationship in the data. |
| 13 | B | b The appropriate graph to check for constant variance is a residual plot. There is no pattern in the residual plot, so we can conclude that there is a constant variance in the data. |
| 13 | C | c The appropriate graph to check for normal error terms is a histogram of the residuals. The distribution appears symmetric and bell-shaped, so we can conclude that the error terms are normal for the data. |
| 14 | - |  |
| 15 | - |  |
| 16 | - | (-0.073, 0.004) We are 90% confident that the slope of the true true linear regression line of Lactic with Taste is between -0.073 and 0.004. |
| 17 | - |  |
| 18 | - |  |
| 19 | - |  |
| 20 | - | fail to reject the null hypothesis |
| 21 | - | There is insufficient evidence to suggest that the slope of the true linear regression line does not equal zero. We conclude that there is not a linear relationship between the mileage of a Prius listed for sale and its price. |
| 22 | - |  |
| 23 | - |  |
| 24 | - |  |
| 25 | - | (-41.855, 5.383) We are 95% confident that the slope of the true true linear regression line of Lead with BRS is between -41.855 and 5.383. |
| 26 | - |  |
| 27 | - |  |
| 28 | - |  |
| 29 | - | fail to reject the null hypothesis |
| 30 | - | There is insufficient evidence to suggest that the slope of the true linear regression line does not equal zero. We conclude that there is not a linear relationship between a child’s level of lead exposure and his or her behavioral rating. |
| 31 | - | d. The actual Y value was 4.5 units higher than the predicted Y value |