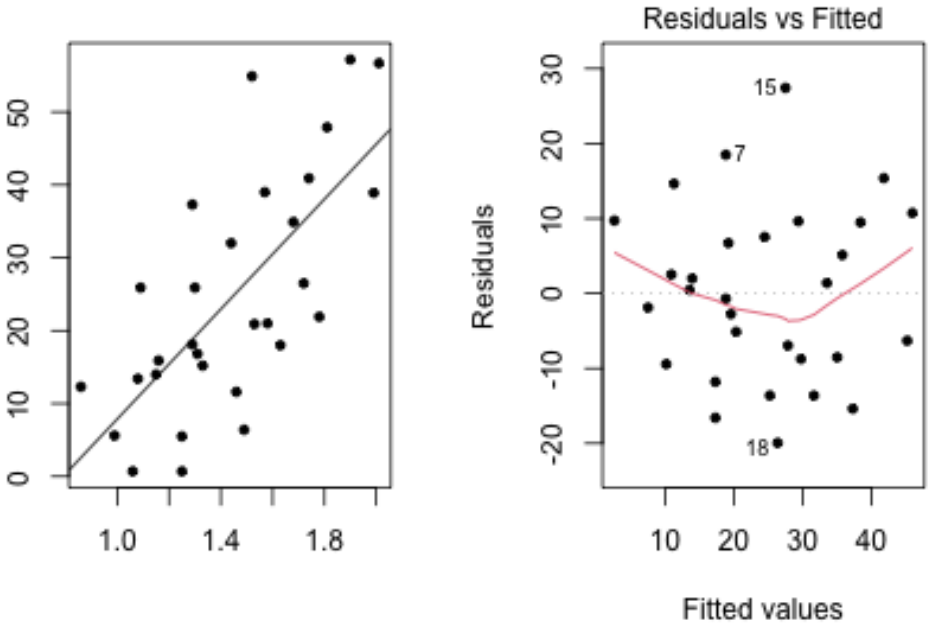
Lesson 23: Inference for Bivariate Data

Homework

Solutions

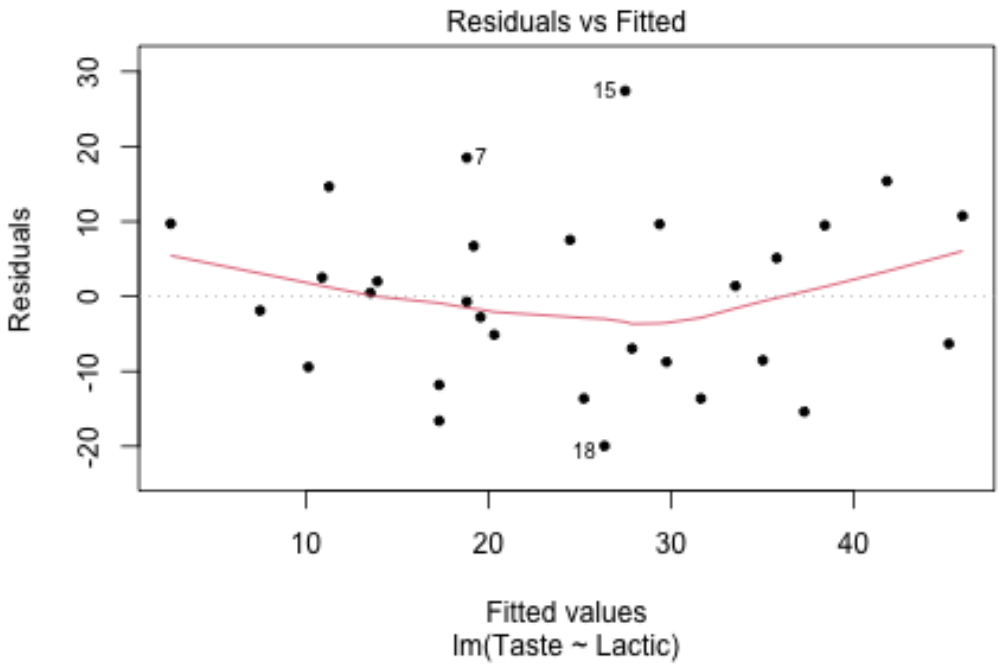
Please note that the steps show rounded numbers, but that the final answers to the problems are calculated without rounding.

Problem	Part	Solution
1	-	Estimated linear regression equation: $\hat{Y} = b_0 + b_1 X$ True linear regression equation: $Y = \beta_0 + \beta_1 X + \epsilon$
2	-	See the wiki for a review of this important concept.



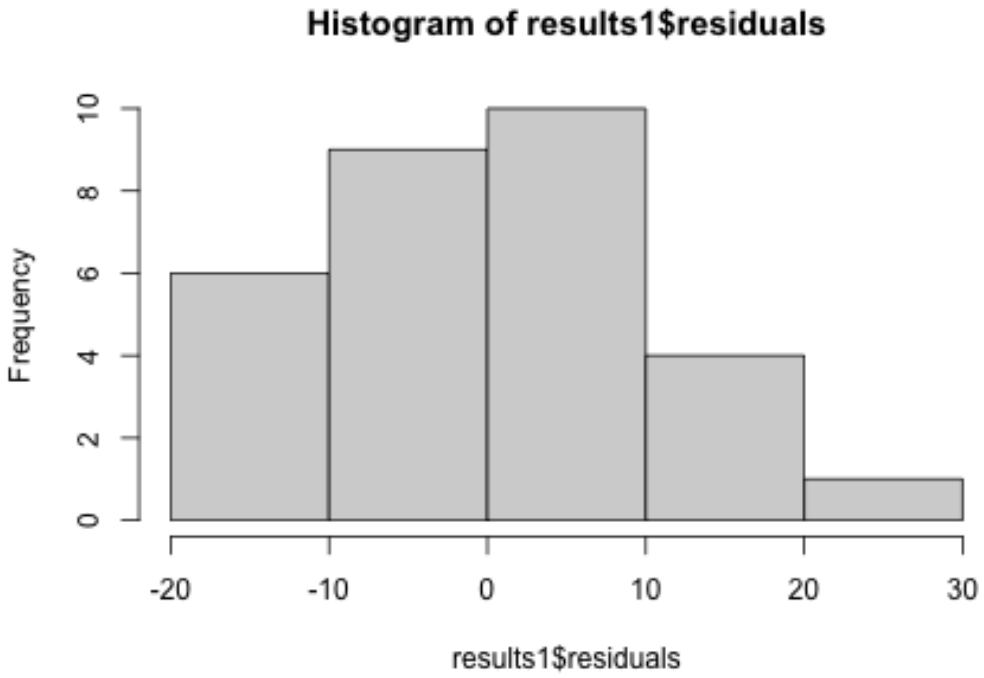
3	A	The appropriate graphs to check for a linear relationship are a scatterplot and a residual plot. The scatterpl

Problem Part	Solution



3 B

The appropriate graph to check for constant variance is a residual plot. There is no pattern in the residual p



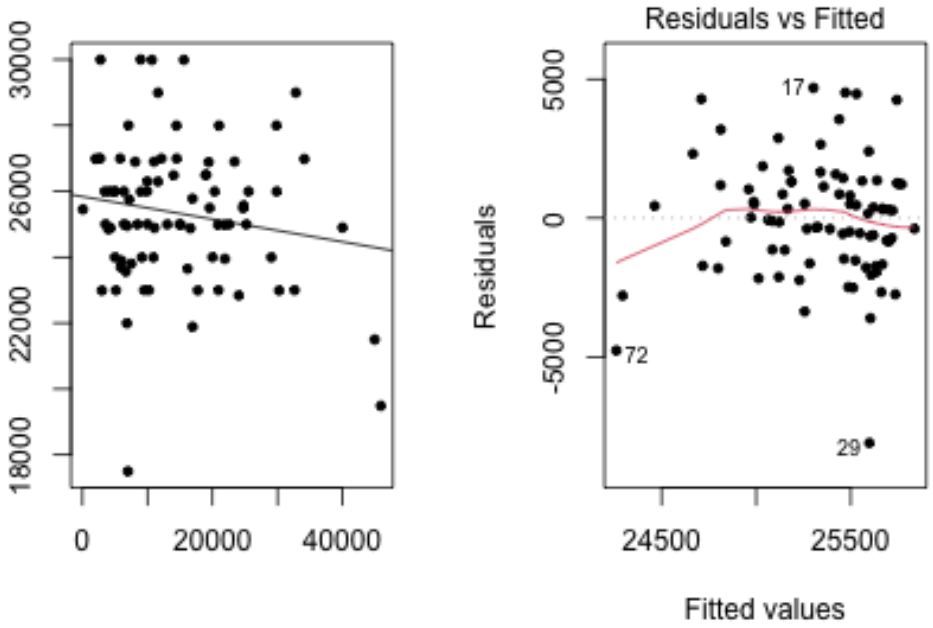
3 C

The appropriate graph to check for a normal error term is a histogram of the residuals. The shape of the his

4 - $r = 0.704$

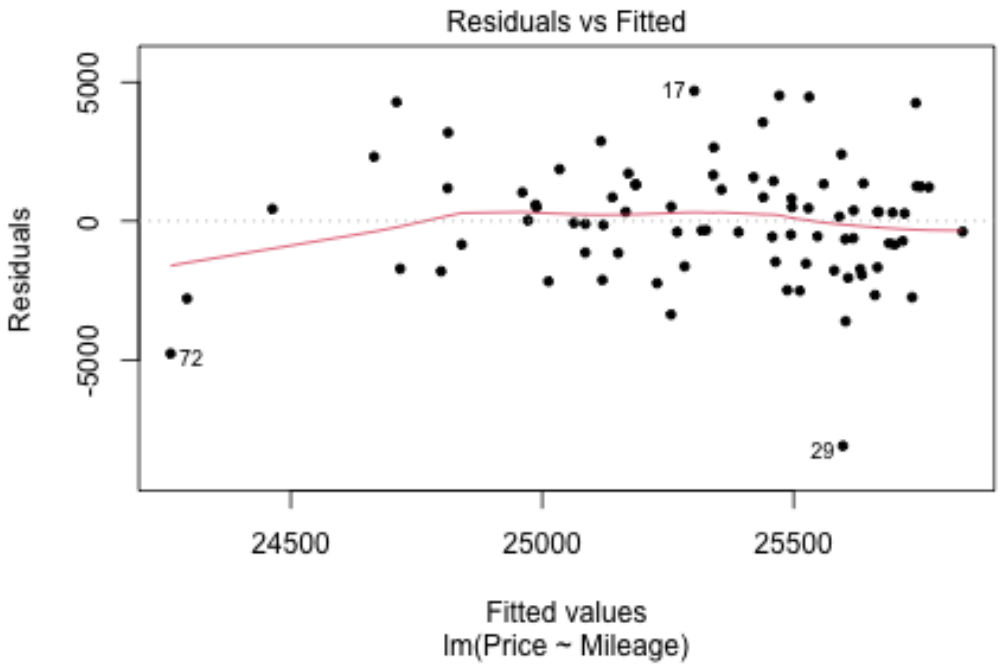
5 - $\hat{Y} = -29.859 + 37.72X$

Problem	Part	Solution
6	-	$Y = 49.73$
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	-	$H_0 : \beta_1 = 0$ $H_a : \beta_1 \neq 0$
9	-	$t = 5.249$
10	-	P-value = 0.00001405
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.



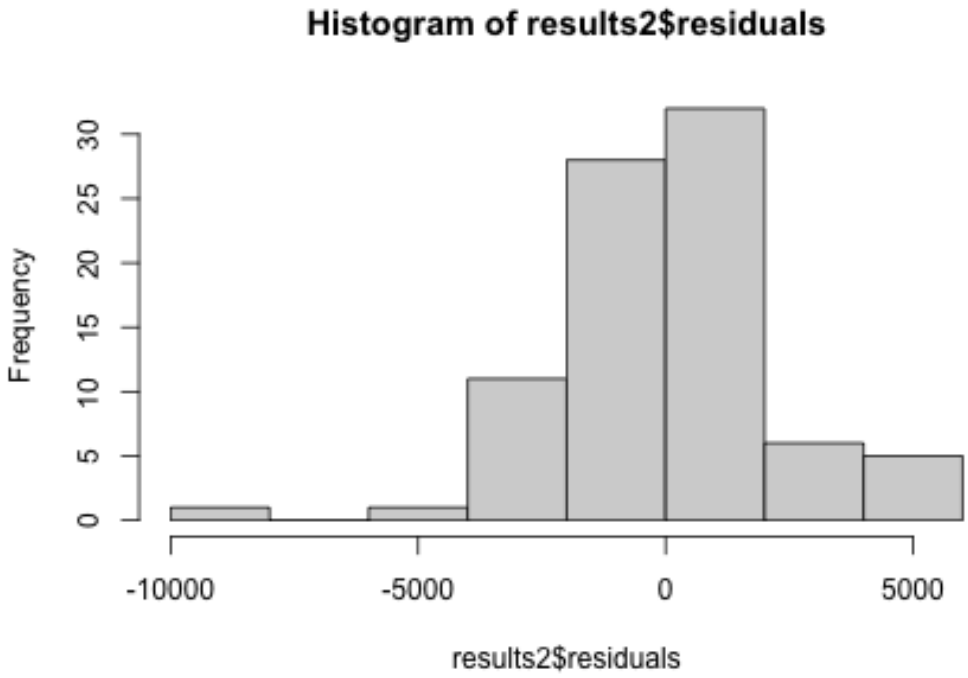
13	A	The appropriate graphs to check for a linear relationship are a scatterplot and a residual plot. The scatterpl

Problem Part	Solution



13 B

The appropriate graph to check for constant variance is a residual plot. There is no pattern in the residual p



13 C

The appropriate graph to check for normal error terms is a histogram of the residuals. The distribution app

14 - $\hat{Y} = 25,838.626 + -0.034X$

15 - $Y = 22,401.192$

Problem	Part	Solution
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	-	$H_0 : \beta_1 = 0$ $H_a : \beta_1 \neq 0$
18	-	$t = -1.476$
19	-	P-value = 0.144
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	-	$r = -0.181$
23	-	$\hat{Y} = 62.825 + -18.236X$
24	-	$Y = 49.148$
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	-	$H_0 : \beta_1 = 0$ $H_a : \beta_1 \neq 0$
27	-	$t = -1.54$
28	-	P-value = 0.128
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