Lesson 23: Inference for Bivariate Data

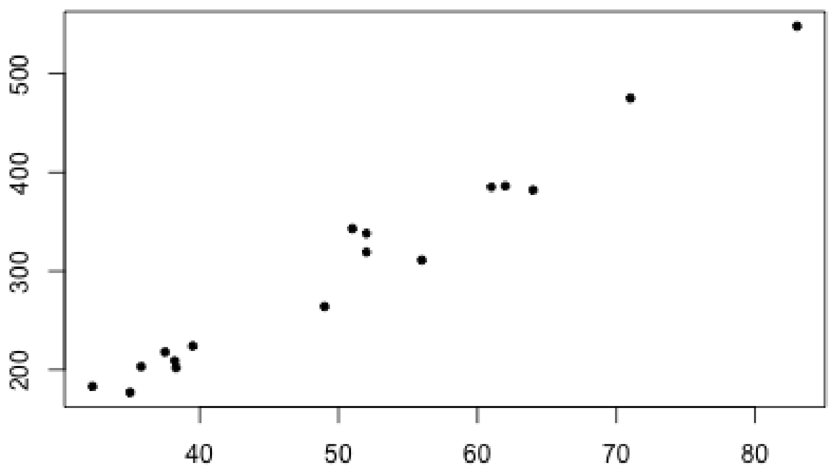
Preparation

Solutions

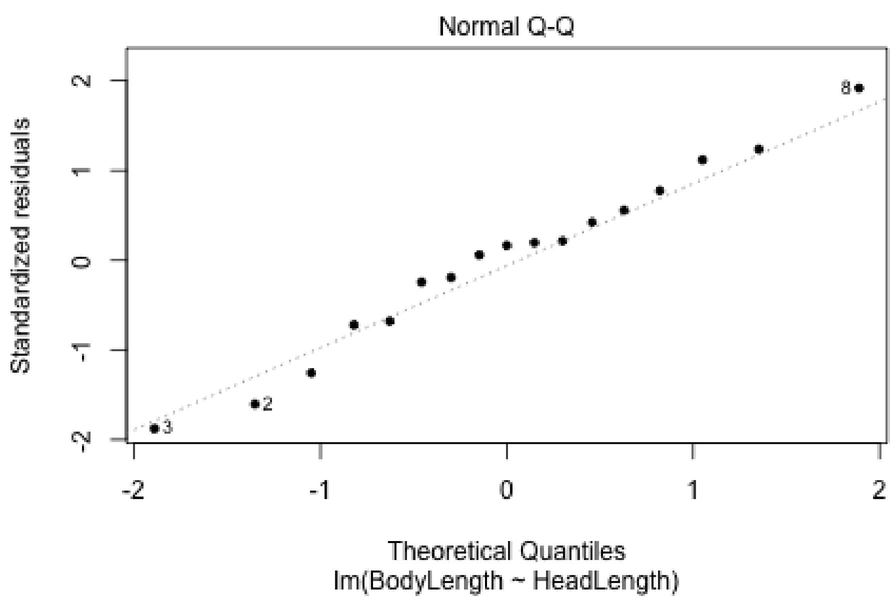
Please note that the steps show rounded numbers, but that the final answers to the problems are calculated without rounding.

Problem	Part	Solution
1	-	The variance of the error terms is constant for all values of X — Residual Plot The X's are fixed and measured without error. (In other words, the X's can be considered as known constants.) — Cannot be checked directly The observations are independent. — Cannot be checked directly --- Table: Table continues below --------------------------- What you hope to see --------------------------- A hot dog/cucumber shape in the data.There should be no pattern in the residuals. Points in the QQ plot are close to the line
2	-	β_0 is the parameter y-intercept for the population β_1 is the parameter slope for the population. ϵ is the error term–a normal random variable.

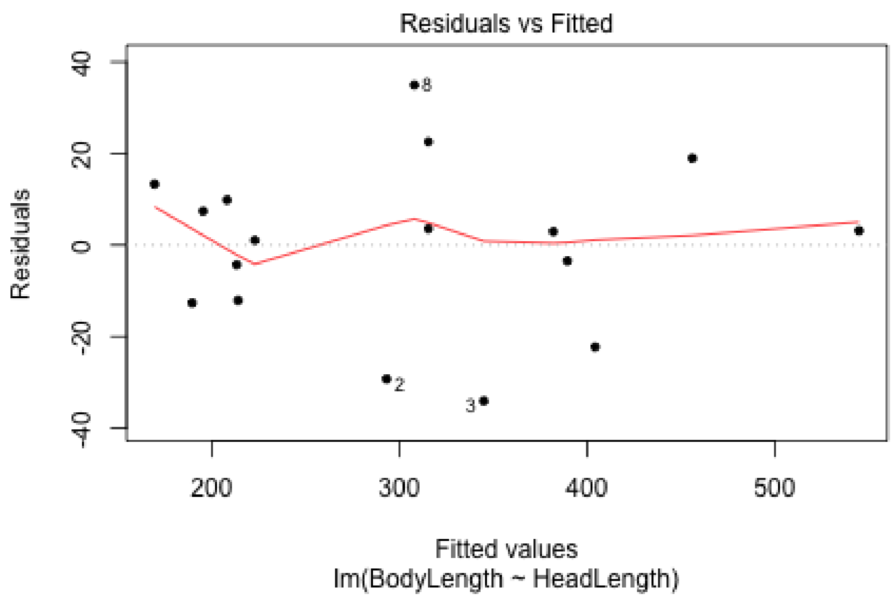
Problem	Part	Solution
3	A	There is a linear relationship between X and Y. - Yes points on the scatter plot are close together and in a ‘hotdog’ shape.



3	B	The error term ϵ is normally distributed - Yes. Made a QQ plot of the residuals and the points are close to linear.



Problem	Part	Solution
3	C	The variance of the error terms is constant for all values of X - Yes there is no megaphone shape in the residual scatter plot.



Problem	Part	Solution
3	D	X's are fixed and measured without error. (In other words, the X's can be considered as known constants.) We will assume that X's have been measured accurately and precisely.
3	E	The observations are independent. - We will assume that the Y's are independent.
4	A	$H_0 : \beta_1 = 0$ $H_a : \beta_2 \neq 0$
4	B	Let alpha = 0.05
4	C	It is a t-test statistic $t = 22.675$
4	D	P-value = 0.000000000000508 < 0.05 Therefore we reject the null hypothesis.
4	E	We have sufficient evidence to suggest that there is a linear relationship between the head length and the body length of the Gharial crocodiles.
5	-	The 95% confidence interval for the true slope of the regression line is (6.704, 8.096)