Lesson 23: Inference for Bivariate Data

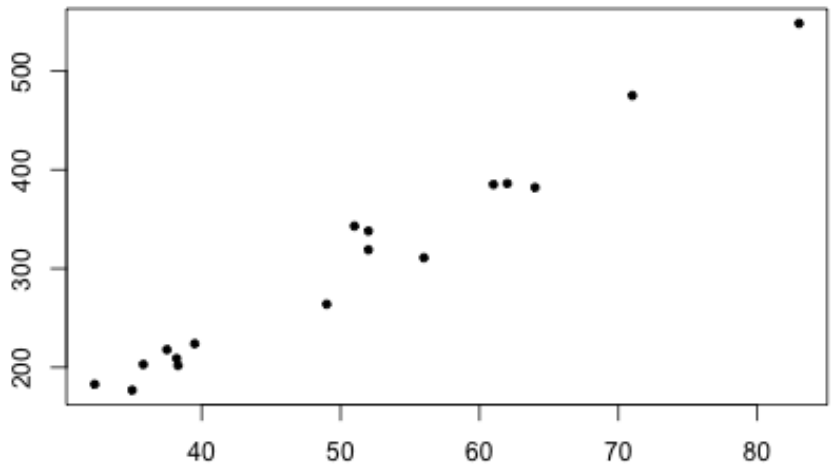
Preparation

Solutions

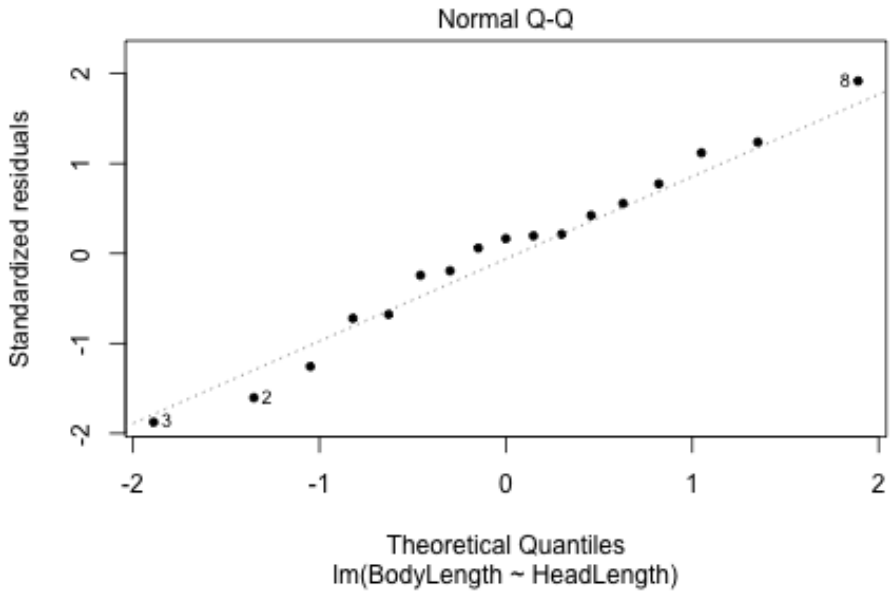
Please note that the steps show rounded numbers, but that the final answers to the problems are calculated without rounding.

Problem	Part	Solution
		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
1	-	
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.

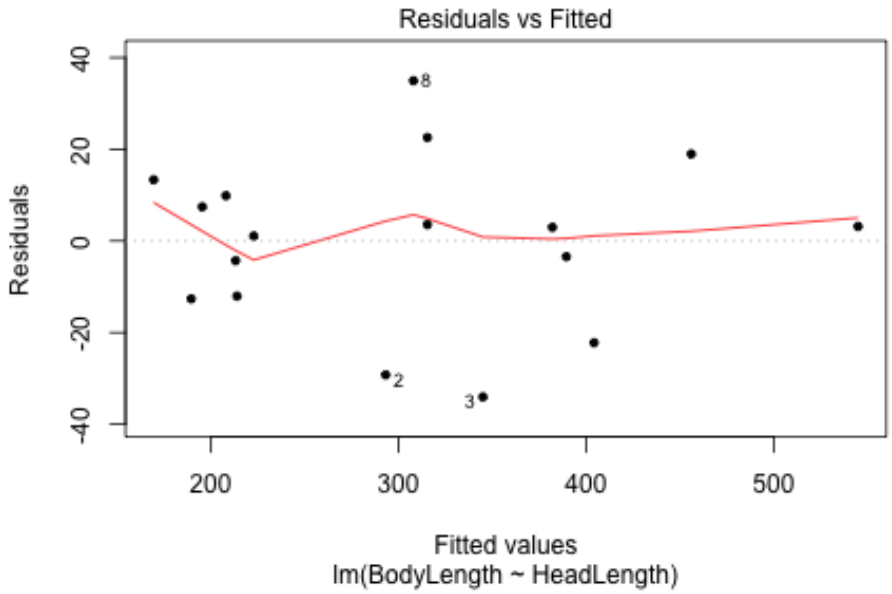
Problem	Part	Solution
3	A	There is a linear relationship between X and Y. - Yes points on the scatter plot are close together and in a 'hotdog' shape.



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.



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)