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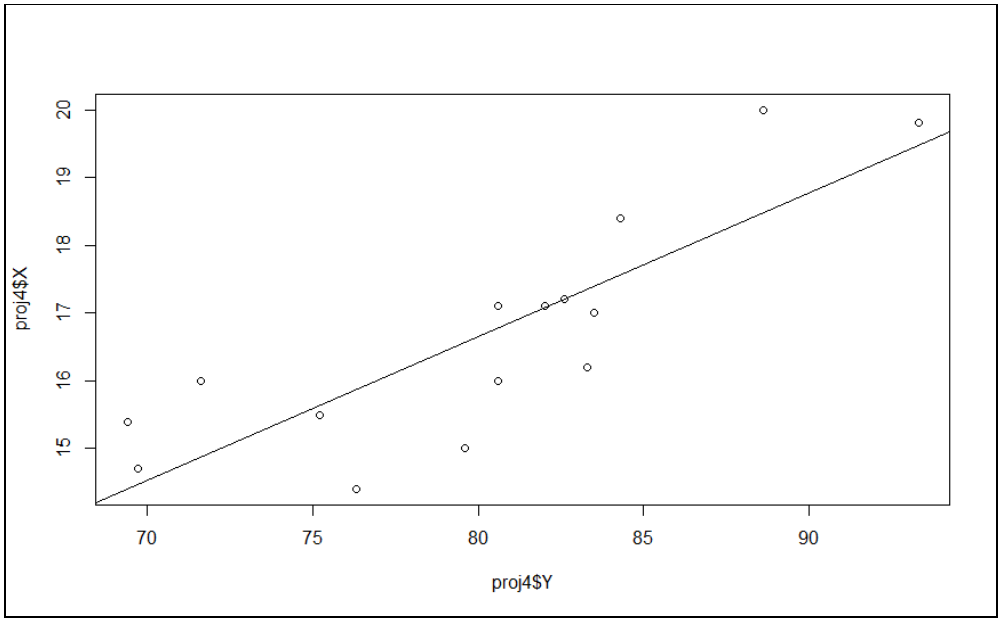
Project 4

This project looks at the correlation between cricket chirps per second and temperature in degrees Fahrenheit. The correlation between cricket chirps per second and temperature is interesting because it will help us learn more about how crickets respond to changes in temperature. This information can be useful for those studying insects and their relationship to the environment. In this experiment, the temperature is the explanatory variable (x) and the cricket chirps per second is the response variable (y).

For simple linear regression, three conditions have to be met: the relationship between x and y is linear, the y's are Normally distributed with the same standard deviation for each x, and the samples are random and independent. Based on a scatterplot of the data and an r value of 0.8351438, the relationship between temperature and cricket chirps per second is linear. The scatterplot of the data is shown below:



Based on a p-value of 0.2031 for the Shapiro test for cricket chirps per second, the y's are Normally distributed. The largest standard deviation is not less than twice the smallest so the standard deviations for the y's are not the same. The sample is random and independent.

The null hypothesis is that there is no statistically significant linear correlation between cricket chirps per second and temperature. The alternative hypothesis is that there is a statistically significant linear correlation between cricket chirps per second and temperature. Based on a p-value of 0.0001067, the null hypothesis is rejected in favor of the alternative hypothesis. The equation for the regression line is: cricket chirps per second = -0.30914 + 0.21192(temperature). For example, at a temperature of 72.6 degrees Fahrenheit, we would predict a rate of 15.1 cricket chirps per second. Based on the scatterplot and the trendline shown above, this answer seems reasonable. The confidence interval for 72.6 degrees Fahrenheit is (69.00122, 76.24691) and the prediction interval is (63.59443, 81.65370). The confidence interval tells us about the expected mean value of y at a given x while the prediction interval tells us about the predicted y of a single point with that value of x. The prediction interval is larger

than the confidence interval because the prediction interval calculates for a single value so there is more uncertainty compared to the confidence interval.

In conclusion, there is a statistically significant correlation between cricket chirps per second and temperature. The results show that the number of cricket chirps per second increases as temperature increases. There isn't a perfect correlation between cricket chirps and temperature which results in some error in the regression line. Also, there is variability in the data collected from crickets or temperature which causes error. Overall, the evidence supports a strong correlation between cricket chirps per second and temperature. This information can be useful for researchers who are studying ecology, herpetology, etc.