**Argrett Lab 3**

1. Chart, scatter chart

   Description automatically generatedFinish the Dragons data example from class (dragon in-class example.R) by implementing the suggestions we came up with in class to make the results figure “publication quality”. Turn in the figure, as well as the legend that would go with that figure. (4pts)
2. Use the skills and code we developed in the Dragons example and extend to the in class one-way ANOVA example with honeybee data (honeybee caffeine example.R)
   1. Turn in code/figures for preliminary visualizations, and one sentence accompanying each figure for what you learned from that visualization (4pts)
      1. Chart, histogram

         Description automatically generatedHere we can visualize the spread of the data representing the differences from the control caffeine concentration hist(bees$consumptionDifferenceFromControl)
      2. Chart, box and whisker chart

         Description automatically generatedHere we are looking at for the 4 different caffeine values what was the spread of the data and its mean value. boxplot(bees$consumptionDifferenceFromControl~bees$ppmCaffeine)
      3. Chart, line chart

         Description automatically generatedThe residuals are mostly on the line suggesting that an assumption of normality works. qqPlot(bm1)
      4. Chart, scatter chart

         Description automatically generatedData seems evenly distributed above and below the line. Can continue with assumed linearity. plot(bm1)
3. State the null and alternate hypotheses for this analysis (2pts)
   * 1. There is no difference between the mean value of the caffeine treatments.
     2. There is a difference among the treatments.
4. When using summary() on this dataset, what is the “baseline” treatment represented by the (Intercept) coefficient? What is the *estimated* mean consumption rate difference for the 200ppm caffeine treatment? (2pts)
   1. The baseline treatment is the 50ppm Caffeine treatment. The estimated mean consumption rate difference is 0.3700.
5. What is the conclusion for your stated null vs. alternate hypotheses in 2b, according to the results? (2pts)
   1. The conclusion is that there is a significant difference between caffeine treatments as our P value is less than .05 and thus, we reject the idea that this result could come from chance alone.
6. Using the Tukey method to adjust for post-hoc multiple comparisons, how do the mean caffeine consumption difference differ among caffeine treatment levels? (2pts)
   1. The only treatments that differed significantly from one another were the comparison between the 150 and 100 Caffeine concentration and between 200-100 ppm.
7. Turn in code/figure for your final presentation of the results of this analysis, including figure legend. (4pts)
   1. Beeplot <- ggerrorplot(bees, x = "ppmCaffeine" , y = "consumptionDifferenceFromControl", desc\_stat = "mean\_se", add.params = list(color = "darkgray"), ylab = "Consumption different from Control", xlab = "Caffine concentration (ppm)" )
8. Chart, box and whisker chart

   Description automatically generatedWrite the formal “results section” for this analysis. Make sure to focus on the biology! (4pts)
   1. There is significant difference among all treatment types from the control (F =4 .178, p = 0.0231). Caffeine concentration altered the feeding responses of free-flying honeybees. Between treatments, both the 150ppm and 200ppm treatments differed significantly from the 100ppm treatment. However, there was no significant difference between the other treatments. This suggests that different caffeine concentrations might be correlated with a shift in bee nectar consumption, however, further study is required.