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#
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# Purpose: Homework 4
# Class: IST 772
# Date: 05/06/2022
#
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# Question 7

PlantGrowth
View(PlantGrowth)

summary(PlantGrowth)
# The output of 'summary(PlantGrowth)' shows that there are two columns of
# data; 'weight' and 'group'. The 'group' column, per the summary function,
# shows three categories control ('ctrl'), treatment 1('trt1'), and
# treatment 2('trt2'), all having 10 items each. The 'weight' column, per the
# summary function, shows the minimum value, 1st quartile, 2nd quartile
# (median), 3rd quartile, and maximum value.


hist((PlantGrowth$weight[PlantGrowth$group=="ctrl"])
     , main = "Control Group Histogram")
hist((PlantGrowth$weight[PlantGrowth$group=="trt1"])
     , main = "Treatment Group 1 Histogram")
hist((PlantGrowth$weight[PlantGrowth$group=="trt2"])
     , main = "Treatment Group 2 Histogram")

# The control group shows more of a normal distribution of values. Treatment
# group 1 demonstrates right skewed distribution. Treatment group 2
# demonstrates normal distribution of values, as well. We can also see that
# the minimum, maximum, mode, and median values of these subsets are
different.

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# Question 8

boxplot(PlantGrowth$weight[PlantGrowth$group=="ctrl"]
        , main = "Control Group Boxplot")
boxplot(PlantGrowth$weight[PlantGrowth$group=="trt1"]
        , main = "Treatment Group 1 Boxplot")
boxplot(PlantGrowth$weight[PlantGrowth$group=="trt2"]
        , main = "Treatment Group 2 Boxplot")

# The mean value of the test group 2 is the highest at 5.4, with the
# treatment group 1 at ~4.5-4.6, and the control group at ~5.1. Test group 1
# also has an outlier that is displayed on the boxplot.

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# Question 9
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t.test(PlantGrowth$weight[PlantGrowth$group=="ctrl"]
       , (PlantGrowth$weight[PlantGrowth$group=="trt1"]))

# The 95% confidence interval is [5.032, 4.661]. This means that there is a
# 95% chance that the population mean of the control and treatment 1 group
# will fall within the values of this confidence interval.

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# Question 10

t.test(PlantGrowth$weight[PlantGrowth$group=="ctrl"]
       , (PlantGrowth$weight[PlantGrowth$group=="trt2"]))

# The 95% confidence interval is [5.032, 5.526]. This means that there is a
# 95% chance that the population mean of the control and treatment 2 group
# will fall within the values of this confidence interval.
```