

Homework 1

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This homework is due on Jan. 24, 2017 at 7:00pm. Please submit as a pdf file on Canvas.

This homework uses the `chickwts` data set available in R. This data set contains the weight of chicks (`weight`) after being fed different feed supplements (`feed`). There are six different types of feed supplements observed in the data set (labeled `casein`, `horsebean`, `linseed`, `meatmeal`, `soybean`, `sunflower`), each with 10–14 observations.

```
head(chickwts)
```

```
##    weight      feed
## 1    179 horsebean
## 2    160 horsebean
## 3    136 horsebean
## 4    227 horsebean
## 5    217 horsebean
## 6    168 horsebean
```

Problem 1: (4 pts) We are interested in testing the effectiveness of various feed supplements on the growth rate of chickens. Since there are six different types of supplements in the data set, and therefore six groups of weight measurements, we will use an analysis of variance (ANOVA) test. Conduct an ANOVA test and interpret your results in 1-2 sentences. HINT: You will first need to create a linear model object using the `lm()` function before you can use the `anova()` function.

```
fit <- lm (weight ~ feed, data = chickwts)

anova(fit)
```

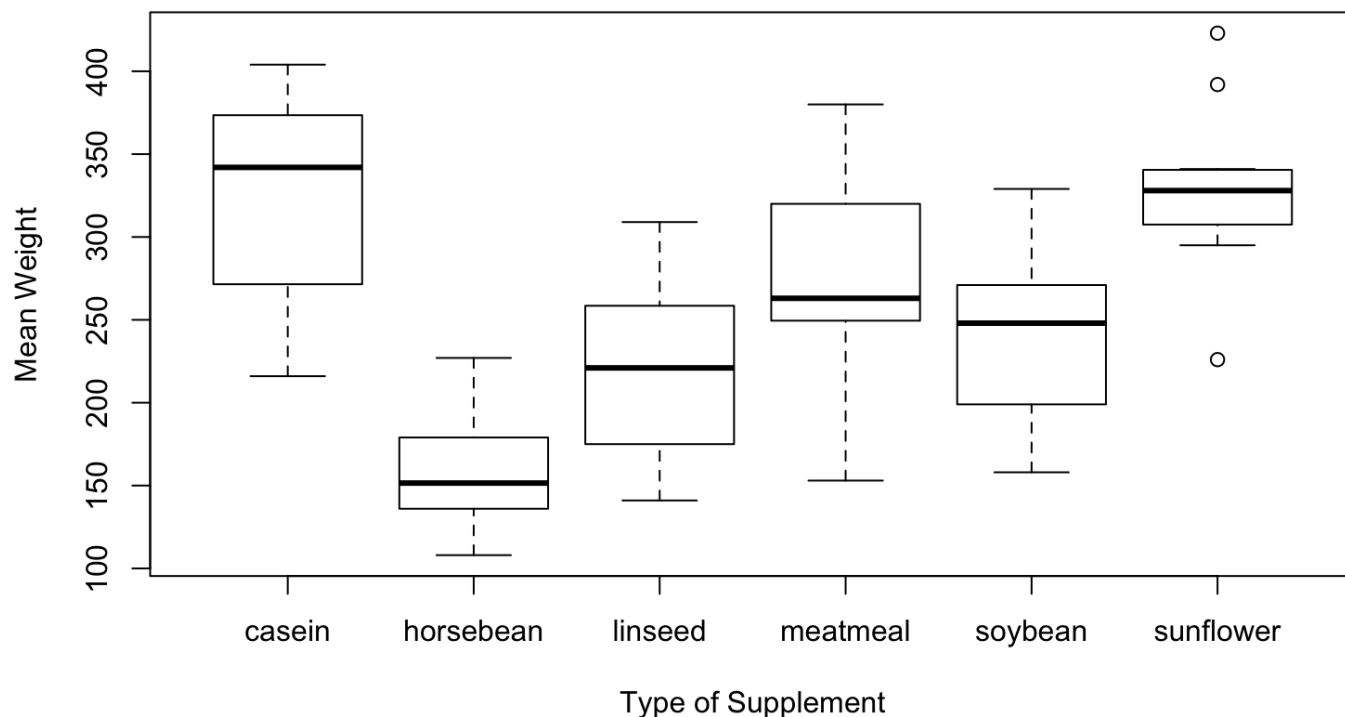
```
## Analysis of Variance Table
##
## Response: weight
##           Df Sum Sq Mean Sq F value    Pr(>F)
## feed         5  231129    46226  15.365 5.936e-10 ***
## Residuals   65  195556     3009
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

With a p-value less than .05, we reject the null hypothesis. There is statistical evidence that the various feed supplement do have an effect on the growth rate of chickens.

Problem 2: (3 pts) Create a boxplot of the chick weights, separated by feed supplement type. Based on this plot, is the mean weight of horsebean the same or different from that of sunflower? Explain your answer.

```
boxplot(chickwts$weight ~ chickwts$feed, ylab = "Mean Weight", xlab = "Type of Supplement", main = "Supplement vs Weight")
```

Supplement vs Weight



The median weight of the horsebean is different than the sunflower. The dark black line for the median weight of horsebean is around 150 while the median weight of sunflower is around 325.

Problem 3: (3 pts) Use a t test to determine if the mean weight of horsebean is the same or different from that of sunflower. Interpret and explain your results in 1-2 sentences.

```
t.test(chickwts$weight[chickwts$feed == 'horsebean'], chickwts$weight[chickwts$feed == 'sunflower'])
```

```
##
## Welch Two Sample t-test
##
## data: chickwts$weight[chickwts$feed == "horsebean"] and chickwts$weight[chickwts$feed == "sunflower"]
## t = -9.0449, df = 19.964, p-value = 1.69e-08
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -207.6313 -129.8021
## sample estimates:
## mean of x mean of y
## 160.2000 328.9167
```

Based on the t-test with a p-value less than 0.05, I reject the null hypothesis. The mean difference of weight between horsebean and sunflower does not equal to zero.