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Analysis of Environmental Data
Lab 10 Report
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Worked with Juliana Berube

Question 1

```
rm(list = ls())
require(here)
read.csv(here("data", "rope.csv"))

rope = read.csv(here("data", "rope.csv"))
rope$rope.type = factor(x = rope$rope.type)
levels(rope$rope.type)

n_obs = length(rope$rope.type)
n_groups = length(levels(rope$rope.type))

mean_cut= mean(rope$p.cut)
resids_cut = rope$p.cut - mean_cut
ss_tot = sum(resids_cut^2)
df_tot = n_obs - 1

agg_resids = aggregate(
  x = rope$p.cut,
  by = list(rope$rope.type),
  FUN = function(x){x-mean(x)})
str(agg_resids)

agg_sq_resids =  aggregate(
  x = rope$p.cut,
  by = list(rope$rope.type),
  FUN = function(x){sum((x-mean(x))^2)})
str(agg_sq_resids)

ss_within = sum(agg_sq_resids$x)
df_within = 115

ss_among = ss_tot - ss_within
df_among = 5

ms_within = ss_within / (n_obs - n_groups)
ms_among  = ss_among / (n_groups - 1)
```

```
f_ratio = ms_among / ms_within
f_pval = pf(f_ratio, df_among, df_within, lower.tail = FALSE)
```

Question 2

No, the boxes for each rope type are not the same shape.

Question 3

0.00143

Question 4

Both the box plots and the Bartlett test confirm that there is a difference in variance (because p-value is less than 0.5, we can reject the Bartlett null that all the variances are the same). The ANOVA test is **not** appropriate because it assumes equal variance. "In ANOVA, when homogeneity of variance is violated, there is a greater probability of falsely rejecting the null hypothesis" (Google).

Question 5

BLAZE

Question 6

0.36714. For the base case, the intercept estimate is the mean percent cut.

Question 7

0.2655 = 0.36714 + (1 * -0.10164)