**2 WAY ANOVA FOR INC1** testing if soil type and treatment have a significant effect on end **mean C resp.** (variance from the replicates)

<http://www.sthda.com/english/wiki/two-way-anova-test-in-r#what-is-two-way-anova-test>

# 2 WAY ANOVA

# recode Num to factors

twowayanova\_data$Num <- factor(twowayanova\_data$Num,

levels = c(1, 2, 3, 4, 5),

labels = c('Soil Control', 'Corn Stover', 'AD HLFB', 'C-CBP HLFB', 'DASE HLFB'))

table(twowayanova\_data$Typ, twowayanova\_data$Num) # check for balanced design, UNBALANCED SINCE UNQUELA NUM. OF OBSERVATIONS

ggboxplot(twowayanova\_data, x = 'Num', y = 'mean\_C\_resp\_cum', color = 'Typ') # boxplot shows various treatments and how they compare to each other + soil type

res.aov3 <- aov(mean\_C\_resp\_cum ~ Typ \* Num, data = twowayanova\_data) # test interaction btwn Num and Typ

Anova(res.aov3, type = 'III') # have to use this bc unbalanced design

summary(res.aov3) # results in INC1\_stats.doc

Text

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Since Pr<.05 ANOVA for Num and Typ:Num, ANOVA has has detected a significant effect of the interaction between soil type and treatment on mean C resp + a significant effect of the treatment itself on mean C resp. Which means relationships between treatment and mean C resp depends on the soil type and that treatment has sig. effect on mean C resp. But interestingly soil type does NOT have a significant effect on mean C resp. since Pr>.05.

Tukey-Kramer for unbalanced design

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### Edit data so it works on fraction data

twowayanova\_data2 <- subset(twowayanova\_data, Num != 'Soil Control')

### FRACTION OF CARBON REMAINING FROM RESIDUE ###

ggboxplot(twowayanova\_data2, x = 'Num', y = 'fr', color = 'Typ') # boxplot shows various treatments and how they compare to each other + soil type

res.aov\_fr <- aov(fr ~ Typ \* Num, data = twowayanova\_data2) # test interaction btwn Num and Typ

Anova(res.aov\_fr, type = 'III') # have to use this bc unbalanced design

# Tukey-Kramer maybe

TukeyHSD(res.aov\_fr) # unclear if this is taking into account unbalanced design, I think it's using Tukey Kramer

### FRACTION OF CARBON REMAINING FROM SOIL ###

ggboxplot(twowayanova\_data2, x = 'Num', y = 'fs', color = 'Typ') # boxplot shows various treatments and how they compare to each other + soil type

res.aov\_fs <- aov(fs ~ Typ \* Num, data = twowayanova\_data2) # test interaction btwn Num and Typ

Anova(res.aov\_fs, type = 'III') # have to use this bc unbalanced design

# Tukey-Kramer maybe

TukeyHSD(res.aov\_fs) # unclear if this is taking into account unbalanced design, I think it's using Tukey Kramer

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Both soil type and treatment have a significant effect on fraction of substrate C retained.

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fs

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Both soil type and treatment have a significant effect on fraction of soil C retained. This checks out since soil carbon is literally the thing that is being retained.

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A picture containing text, plaque

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