Statistical Inference Course Project - Part 2

In this project we will analyze the ToothGrowth data library(datasets) data(ToothGrowth)

This datasets consists of 60 observations and three variables. Variables are len (numeric: tooth length increase), supp (categorical: VC or OJ) and dose (numerical: dose level - 0.5mg, 1mg or 2mg) look at summary(ToothGrowth) summary(ToothGrowth) table(ToothGrowth$supp, as.factor(ToothGrowth$dose))

We will plot boxplots for each suppliment type (red are OJ, blue are VC) and dosage vs tooth length increase boxplot(len supp*dose, data = ToothGrowth, col = c("red", "blue"), main = "Tooth Growth", xlab ="Suppliment type and dose mg", ylab = "tooth length increase in mm")

95for(i in levels(ToothGrowth$supp))for(jinunique(ToothGrowth$dose)) x <- ToothGrowth$len[ToothGrowth$supp==i ToothGrowth$dose == j]print(paste0("Supplimenttype", i, "and", j, " −1∗qnorm(0.975)∗sd(x)/sqrt(length(x)), 2), "", round(mean(x)+1∗qnorm(0.975)∗ sd(x)/sqrt(length(x)), 2)))

We can see that as dosage increases, tooth length also increases We can also prove it performing t-tests

ToothGrowth.dose0.5 = subset(ToothGrowth, dose == 0.5) ToothGrowth.dose1.0= subset(ToothGrowth, dose == 1) ToothGrowth.dose2.0= subset(ToothGrowth, dose == 2) doseEffect0.5$_t o_1$.0 < −t.test(ToothGrowth.dose0.5len, ToothGrowth.dose1.0len)doseEffect0.5$_t o_1$.

doseEffect1.0$_t o_2$.0 < −t.test(ToothGrowth.dose1.0len,ToothGrowth.dose2.0len)doseEffect1.0$_t o_2$.095

Now lets compare the tooth length increase between different suppliment types. ToothGrowth.typeOJ = subset(ToothGrowth, supp == "OJ") ToothGrowth.typeVC = subset(ToothGrowth, supp == "VC") typeEffect <- t.test(ToothGrowth.typeOJlen, ToothG typeEffect The 95However p-value is only 6

ToothGrowth.typeOJ.dose0.5 = subset(ToothGrowth, supp == "OJ" dose==0.5) ToothGrowth.typeOJ.dose1.0 = subset(ToothGrowth, supp == "OJ" dose==1.0) ToothGrowth.typeOJ.dose2.0 = subset(ToothGrowth, supp == "OJ" dose==2.0) ToothGrowth.typeVC.dose0.5 = subset(ToothGrowth, supp == "VC" dose==0.5) ToothGrowth.typeVC.dose1.0 = subset(ToothGrowth, supp == "VC" dose==1.0) ToothGrowth.typeVC.dose2.0 = subset(ToothGrowth, supp == "VC" dose==2.0) typeEffect$_a t$0.5 < −t.test(ToothGrowth.typeOJ.dose0.5len, ToothGrowth.typeVC.dose0.5len)typeEffect$_a t$1.0 −t.test(ToothGrowth.typeOJ.dose1.0len, ToothGrowth.typeVC.dose1.0len)typeEffect$_a t$2.0 < −t.test(ToothGrowth.typeOJ.dose2.0len, ToothGrowth.typeVC.dose2.0len)

For the tests below: Null Hypothesis: True difference in means is equal to 0 Alternative hypothesis: True difference in means is not equal to 0 Significance level: 5

typeEffect$_a t$0.595

typeEffect$_a t$1.095

typeEffect$_a t$2.095$We conlcude that at 2.0mg dosage there is no difference between supp types in tooth length increase$