Anthony Cunningham

STAT 3210

**Homework 2 R Code and Output**

1) > bearings <- read.table("http://www.stat.uiowa.edu/~ernli/DOEdata/problem0234.txt", header = TRUE)

> t.test(bearings$Caliper1, bearings$Caliper2, paired=TRUE)

Paired t-test

data: bearings$Caliper1 and bearings$Caliper2

t = 0.43179, df = 11, p-value = 0.6742

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-0.001024344 0.001524344

sample estimates:

mean of the differences

0.00025

> diff = bearings$Caliper1 - bearings$Caliper2

> qqnorm(diff)

> qqline(diff)



> t.test(bearings$Caliper1, bearings$Caliper2, var.equal=TRUE)

Two Sample t-test

data: bearings$Caliper1 and bearings$Caliper2

t = 0.40519, df = 22, p-value = 0.6893

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-0.001029568 0.001529568

sample estimates:

mean of x mean of y 0.26625 0.26600

2) > machines <- read.table("http://www.stat.uiowa.edu/~ernli/DOEdata/problem0226.txt", header = TRUE)

> mean1=mean(machines[,1])

> mean2=mean(machines[,2])

> diff=mean1-mean2

> diff

[1] 0.01

3) > wafers <- read.table("http://www.stat.uiowa.edu/~ernli/DOEdata/problem0231.txt", header = TRUE)

> t.test(wafers$Thick95, wafers$Thick100, var.equal=TRUE, alternative="greater")

Two Sample t-test

data: wafers$Thick95 and wafers$Thick100

t = 2.6751, df = 14, p-value = 0.009059

alternative hypothesis: true difference in means is greater than 0

95 percent confidence interval:

0.8608158 Inf

sample estimates:

mean of x mean of y

9.366625 6.846625

> boxplot(wafers)



> var.test(wafers$Thick95, wafers$Thick100, ratio=1)

F test to compare two variances

data: wafers$Thick95 and wafers$Thick100

F = 1.6381, num df = 7, denom df = 7, p-value = 0.5306

alternative hypothesis: true ratio of variances is not equal to 1

95 percent confidence interval:

0.3279572 8.1822436

sample estimates:

ratio of variances

1.638117

> par(mfrow=c(2,1))

> qqnorm(wafers$Thick95)

> qqline(wafers$Thick95)

> qqnorm(wafers$Thick100)

> qqline(wafers$Thick100)



> power.t.test(n=8, delta=1.5, sd=1.884, sig.level=0.05, power=NULL, type="two.sample", alternative="one.sided", strict=FALSE)

Two-sample t test power calculation

n = 8

delta = 1.5

sd = 1.884

sig.level = 0.05

power = 0.448331

alternative = one.sided

> delta=1.5

> sigma=1.884

> n=8

> alpha=0.05

> df=n+n-2

> tcritical=qt(1-alpha, df)

> ncp=abs(delta)/sqrt(2\*sigma^2/n)

> beta=pt(tcritical, df, ncp)

> power=1-beta

> power

[1] 0.448331

> power.t.test(n=8, delta=2.5, sd=1.884, sig.level=0.05, power=NULL, type="two.sample", alternative="one.sided", strict=FALSE)

Two-sample t test power calculation

n = 8

delta = 2.5

sd = 1.884

sig.level = 0.05

power = 0.8098993

alternative = one.sided

> power.t.test(n=15, delta=1.5, sd=1.884, sig.level=0.05, power=NULL, type="two.sample", alternative="one.sided", strict=FALSE)

Two-sample t test power calculation

n = 15

delta = 1.5

sd = 1.884

sig.level = 0.05

power = 0.6852415

alternative = one.sided

> delta=1.5

> sigma=1.884

> n1=6

> n2=10

> alpha=0.05

> df=n1+n2-2

> tcritical=qt(1-alpha, df)

> ncp=abs(delta)/sigma\*sqrt((1/n1) +(1/n2))

> beta=pt(tcritical, df, ncp)

> power=1-beta

> power

[1] 0.1050586

> power.t.test(n=NULL, delta=2.5, sd=1.884, sig.level=0.05, power=0.80, type="two.sample", alternative="one.sided", strict=FALSE)

Two-sample t test power calculation

n = 7.798021

delta = 2.5

sd = 1.884

sig.level = 0.05

power = 0.8

alternative = one.sided

> power.t.test(n=NULL, delta=1.5, sd=1.884, sig.level=0.05, power=0.80, type="two.sample", alternative="one.sided", strict=FALSE)

Two-sample t test power calculation

n = 20.21831

delta = 1.5

sd = 1.884

sig.level = 0.05

power = 0.8

alternative = one.sided

> power.t.test(n=NULL, delta=1.5, sd=1.884, sig.level=0.05, power=0.90, type="two.sample", alternative="one.sided", strict=FALSE)

Two-sample t test power calculation

n = 27.72311

delta = 1.5

sd = 1.884

sig.level = 0.05

power = 0.9

alternative = one.sided

> t.test(wafers$Thick95, wafers$Thick100, paired=TRUE, var.equal=TRUE, alternative="greater")

Paired t-test

data: wafers$Thick95 and wafers$Thick100

t = 3.1511, df = 7, p-value = 0.008064

alternative hypothesis: true difference in means is greater than 0

95 percent confidence interval:

1.004855 Inf

sample estimates:

mean of the differences

2.52