QSCI 482 Lab 4

Simon Hans Edasi

2023-10-26

Question 1

```
rm(list = ls())
GoogleTimes <- read.csv('GoogleMapTimes.csv')
diff <- GoogleTimes$Actual - GoogleTimes$GMapPredicted
```

```
samp_mean <- mean(diff)
samp_var <- var(diff)
print(samp_var)
```

```
## [1] 6.907792
```

```
alpha <- 0.05
power <- 0.90
beta <- 0.1
n <- 20

delta <- 1
for (i in 1:10){
  t_alpha <- qt(1-alpha/2, df = n-1)
  t_beta <- qt(1-beta, df = n-1)
  n <- ceiling(  (samp_var / delta^2) * (t_alpha + t_beta)^2  )
  print(n)
}
```

```
## [1] 81
## [1] 75
## [1] 75
## [1] 75
## [1] 75
## [1] 75
## [1] 75
## [1] 75
## [1] 75
## [1] 75
```

```
library(glue)
glue('choose n = 9')
```

```
## choose n = 9
```

Question 3

```
df <- read.csv('lab4/chromis_data.csv')
head(df)
```

```
##     genus  species    name_combined feet meters  X
## 1 Chromis insolata Chromis insolata  248     76 NA
## 2 Chromis insolata Chromis insolata  210     64 NA
## 3 Chromis   scotti   Chromis scotti  275     84 NA
## 4 Chromis insolata Chromis insolata  262     80 NA
## 5 Chromis insolata Chromis insolata  250     76 NA
## 6 Chromis insolata Chromis insolata  293     89 NA
##                                                          X.1
## 1 Arbitrary comment on the right that will mess up data reading
## 2
## 3
## 4
## 5
## 6
```

```
scottiD <- df[df$name_combined == 'Chromis scotti', 'meters']
insolataD <- df[df$name_combined == 'Chromis insolata', 'meters']
```

```
scotti_var <- var(scottiD)
insolata_var <- var(insolataD)

library(glue)
glue('scotti variance: {round(scotti_var, 3)}')
```

```
## scotti variance: 109.516
```

```
glue('insolata variance: {round(insolata_var,3)}')
```

```
## insolata variance: 159.475
```

```
t.test(scottiD, insolataD,'two.sided',var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  scottiD and insolataD
## t = 3.6464, df = 88, p-value = 0.0004497
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   4.590923 15.588972
## sample estimates:
## mean of x mean of y
##  80.85185  70.76190
```

```
n1 <- length(scottiD)
n2 <- length(insolataD)

X1 <- mean(scottiD)
X2 <- mean(insolataD)

dof <- n1 + n2 - 2
```

```r
pooled_var <- ( (n1-1)*scotti_var + (n2-1)*insolata_var ) / dof

s <- sqrt( (pooled_var / n1) + (pooled_var) / n2 )

t_obs <- (X1 - X2) / s
glue('t_obs = {signif(t_obs,3)}')
```

```
## t_obs = 3.65
```

```r
t_crit <- qt(0.05/2, df = dof, lower.tail = FALSE)
glue('t_crit = {signif(t_crit,3)}')
```

```
## t_crit = 1.99
```

```r
p <- 2 * pt(t_obs,df = dof,lower.tail = FALSE)
glue('p-value = {signif(p,3)}')
```

```
## p-value = 0.00045
```

```r
north <- c(145,265,19,93)
south <- c(142,253,5,85)

diffs <- north-south
t <- (mean(diffs)) / sqrt(var(diffs) / length(diffs))
print(t)
```

```
## [1] 3.80951
```