ROutput\_2018-01-24

One-sample $t$-test

# Get data
library(Sleuth3)
poetry.dat = case0101
summary(poetry.dat)

## Score Treatment
## Min. : 5.00 Extrinsic:23
## 1st Qu.:14.90 Intrinsic:24
## Median :18.70
## Mean :17.86
## 3rd Qu.:21.25
## Max. :29.70

# Do 1-sample t-test
intrinsic = poetry.dat$Score[poetry.dat$Treatment=="Intrinsic"]
intrinsic

## [1] 12.0 12.0 12.9 13.6 16.6 17.2 17.5 18.2 19.1 19.3 19.8 20.3 20.5 20.6
## [15] 21.3 21.6 22.1 22.2 22.6 23.1 24.0 24.3 26.7 29.7

t.test(intrinsic,mu=20,alternative="greater")

##
## One Sample t-test
##
## data: intrinsic
## t = -0.12874, df = 23, p-value = 0.5507
## alternative hypothesis: true mean is greater than 20
## 95 percent confidence interval:
## 18.3302 Inf
## sample estimates:
## mean of x
## 19.88333

# Do t-test test-stat by hand
mean(intrinsic)

## [1] 19.88333

sd(intrinsic)

## [1] 4.439513

(mean(intrinsic) - 20)/(sd(intrinsic)/sqrt(24))

## [1] -0.1287411

# p-value by hand
1-pt(-0.1287411,23)

## [1] 0.5506592

$z$ confidence intervals

# 90% CI
mean(intrinsic) + c(-1,1)\*qnorm(.95)\*sd(intrinsic)/sqrt(24)

## [1] 18.39275 21.37392

# 95% CI
mean(intrinsic) + c(-1,1)\*qnorm(.975)\*sd(intrinsic)/sqrt(24)

## [1] 18.10719 21.65948

# 99% CI
mean(intrinsic) + c(-1,1)\*qnorm(.995)\*sd(intrinsic)/sqrt(24)

## [1] 17.54909 22.21758

# Multiplier for 90% CI
qnorm(.95)

## [1] 1.644854

# Multiplier for 95% CI
qnorm(.975)

## [1] 1.959964

# Multiplier for 99% CI
qnorm(.995)

## [1] 2.575829

# Example #1 in Chapter 2 notes, 90% CI
0.5 + c(-1,1)\*qnorm(.95)\*.4/sqrt(77)

## [1] 0.4250206 0.5749794