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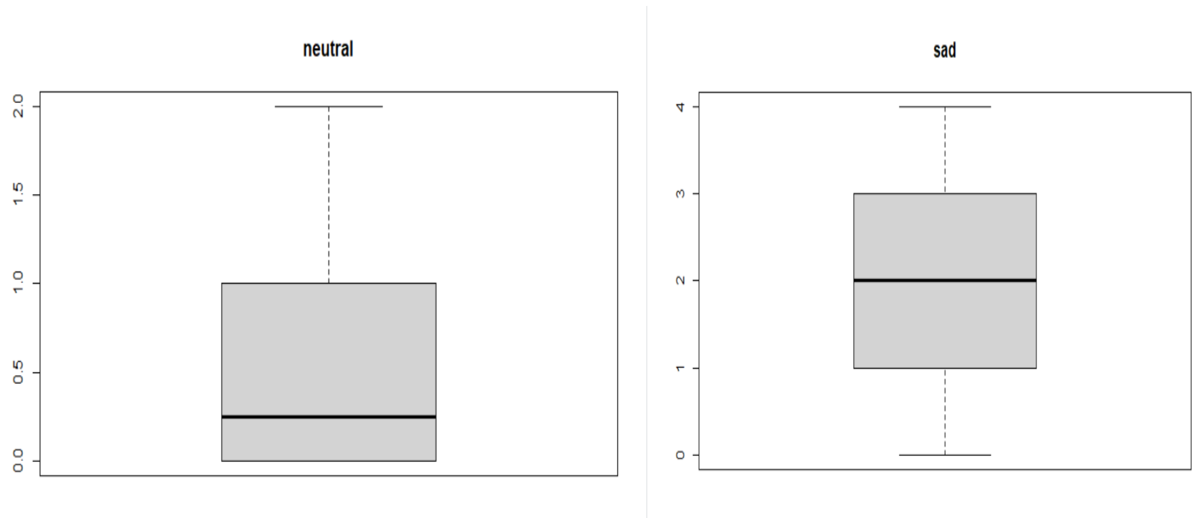
“I pledge my honor I have abided by the Stevens Honor System”

Problem 7.71

A




```
# The boxplots don't seem to be apx. normal but they don't seem
# to have any outliers --> we can use t procedures
```

#B

```
> ntl_ss
[1] 14
> sad_ss
[1] 17
>
> ntl_mean
[1] 0.5714286
> sad_mean
[1] 2.117647
>
> ntl_sd
[1] 0.7300459
> sad_sd
[1] 1.244104
>
```

#C

```
# H0 => mean(neural) = mean(sad)
# Ha => mean(neutral) != mean(sad)
```

#D

```
        Welch Two Sample t-test

data:  neutral and sad
t = -4.3031, df = 26.48, p-value = 0.0002046
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -2.2841749 -0.8082621
sample estimates:
mean of x mean of y
0.5714286 2.1176471
```

#E

```
> t <- (ntl_mean - sad_mean) / sqrt(ntl_sd^2 / (ntl_ss - 1) + sad_sd^2 / (sad_ss - 1))
> SE <- sqrt(ntl_sd ^ 2 / ntl_ss + sad_sd ^ 2 / sad_ss)
> temp_Sp <- SE * 2.052
> interval <- c(ntl_mean - sad_mean - temp_Sp, ntl_mean - sad_mean + temp_Sp)
> interval
[1] -2.2835572 -0.8088798
>
>
> df <- df_t(ntl_sd, sad_sd, ntl_ss, sad_ss)
> df
[1] 27
```

Problem 7.89 | #A

```
 # H0 => mean(bf) = mean(fmla)
 # Ha => mean(bf) > mean(fmla)

> bf_ss
[1] 23
> fmla_ss
[1] 19
>
> bf_mean
[1] 13.3
> fmla_mean
[1] 12.4
>
> bf_sd
[1] 1.7
> fmla_sd
[1] 1.8
>
> df <- df_t(bf_sd, fmla_sd, bf_ss, fmla_ss)
> df
[1] 38
>
> t <- (bf_mean - fmla_mean) / sqrt(bf_sd ^ 2 / bf_ss + fmla_sd ^ 2 / fmla_ss)
> t
[1] 1.653734
```

```
# Since t = 1.653734 < 2.042 = a of 0.05 with df 38 --> fail to reject H0
```

#B

```
SE <- sqrt(bf_sd ^ 2 / bf_ss + fmla_sd ^ 2 / fmla_ss)
SE
1] 0.5442228

CI <- c(bf_mean - fmla_mean - SE * 2.042, bf_mean - fmla_mean + SE * 2.042)
CI
1] -0.211303  2.011303
```

#C

```
We need both samples to be independent SRS from an Normal Distr.
```

Problem 7.102

#A

```
t <- (s1 - s2) / sqrt(s1 ^ 2 / n1 +  s2 ^ 2 / n2)
t
1] -1.216636

pt(t, df) * 2
1] 0.2351046

> df <- df_t(s1, s2, n1, n2)
> df
[1] 25
```

#B

```
# ==> Value from table = 2.060
```

#C

```
# Since |-1.216626|  < 2.060 --> Fail to reject H0
```

Problem 7.122 | #A

```
 g1_ss
1] 10
 g2_ss
1] 10

 g1_mean
1] 49.692
 g2_mean
1] 50.545

 g1_sd
1] 2.317896
 g2_sd
1] 1.92436

 df <- df_t(g1_sd, g2_sd, g1_ss, g2_ss)
 df
1] 18

 t <- (g1_mean - g2_mean) / sqrt(g1_sd ^ 2 / g1_ss + g2_sd ^ 2 / g2_ss)
 t
1] -0.8953783

 pt(t, df) * 2
1] 0.3824027
```

#B

```
> dif_var
[1] 1.610668
> dif_mean
[1] -0.853
>
> df <- length(dif)
> df
[1] 10
>
> t <- (sum(dif) / df) / sqrt((sum(dif_sq) - (sum(dif) ^ 2) / df) / ((df - 1) * df))
> t
[1] -2.125426
>
> df <- length(dif) - 1
> df
[1] 9
>
> pt(t, df)*2
[1] 0.06248424
```

#C

```
P-value significantly smaller : 0.0624 | paired t-test < 0.3824 | 2 sample t-test
Meaning very high chance to come to incorrect conclusion based on result
```

Problem 8.71 | #A

```
> f_prop
[1] 0.8
> m_prop
[1] 0.3939394
>
> f_SE
[1] 0.05163978
> m_SE
[1] 0.04252906
```

#B

```
std <- sqrt(f_prop*(1-f_prop) / fn + m_prop*(1-m_prop) / mn)

CI <- c(f_prop - m_prop - std * 1.645, f_prop - m_prop + std * 1.645)
CI
1] 0.2960128 0.5161084
```

#C

```
z <- (f_prop - m_prop) / SE
z
L] 5.220477

#z = 5.2204 >> 1.645 = alpha = 0.10 we reject the null hypothesis. Thus we
#have significant evidence to conclude the proportions are not equal.
```