problem\_set\_10

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tired <- data.frame(time1 = c(1, 2, 4, 3, 2),  
 time2 = c(4, 5, 6, 4, 3),  
 time3 = c(9, 6, 8, 7, 10))  
tired

## time1 time2 time3  
## 1 1 4 9  
## 2 2 5 6  
## 3 4 6 8  
## 4 3 4 7  
## 5 2 3 10

1. Get the sum for each participant (adding up all of their time points)

# participants  
1+4+9

## [1] 14

2+5+6

## [1] 13

4+6+8

## [1] 18

3+4+7

## [1] 14

2+3+10

## [1] 15

1. Get the sum of each level of our IV/factor

time1\_sum = sum(tired$time1)  
time1\_sum

## [1] 12

time2\_sum = sum(tired$time2)  
time2\_sum

## [1] 22

time3\_sum = sum(tired$time3)  
time3\_sum

## [1] 40

1. Get the total sum of values

total\_sum = time1\_sum + time2\_sum + time3\_sum  
total\_sum

## [1] 74

1. Get the squared sum of each level of our IV/factor

t1\_square = 1^2 + 2^2 + 4^2 + 3^2 + 2^2  
t1\_square

## [1] 34

t2\_square = 4^2 + 5^2 + 6^2 + 4^2 + 3^2  
t2\_square

## [1] 102

t3\_square = 9^2 + 6^2 + 8^2 + 7^2 + 10^2  
t3\_square

## [1] 330

1. Get the total sum of squared values

total\_square = t1\_square + t2\_square + t3\_square  
total\_square

## [1] 466

1. Get the means of each condition/level

t1\_m = mean(tired$time1)  
t2\_m = mean(tired$time2)  
t3\_m = mean(tired$time3)  
  
t1\_m

## [1] 2.4

t2\_m

## [1] 4.4

t3\_m

## [1] 8

1. Get the n, the N, and the k

total\_n = 15  
k = 3  
  
total\_n

## [1] 15

k

## [1] 3

1. Get the sum of squares total

74^2

## [1] 5476

5476/15

## [1] 365.0667

466-365.07

## [1] 100.93

1. Get Sum of Squares Between Groups

12^2

## [1] 144

22^2

## [1] 484

40^2

## [1] 1600

144/5

## [1] 28.8

484/5

## [1] 96.8

1600/5

## [1] 320

28.8+96.8+320

## [1] 445.6

445.6 - 365.07

## [1] 80.53

1. Get the Sum of Squares for the participants

14\*14

## [1] 196

13\*13

## [1] 169

18\*18

## [1] 324

14\*14

## [1] 196

15\*15

## [1] 225

196 + 169 + 324 + 196 + 225

## [1] 1110

1110/3

## [1] 370

370-365.07

## [1] 4.93

1. Get the error of our factor by participants

100.93 - 80.53 - 4.93

## [1] 15.47

1. Get the Degrees of Freedom Between Groups

3 - 1

## [1] 2

1. Get the Degrees of Freedom For the Error (this is a combination of the df for between groups and for subjects/participants)

3-1

## [1] 2

5-1

## [1] 4

2\*4

## [1] 8

1. Get the Mean Square for The Factor/IV

80.53/2

## [1] 40.265

1. Get the Mean Square of the Error of the Factor by the Participants

15.47/8

## [1] 1.93375

1. Within-Subjects F-statistic

40.27/1.93

## [1] 20.86528

Is your finding statistically significant?