Question 2, Homework 1

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# Part A

library(datasets)  
sleep <- datasets::sleep  
head(sleep)

## extra group ID  
## 1 0.7 1 1  
## 2 -1.6 1 2  
## 3 -0.2 1 3  
## 4 -1.2 1 4  
## 5 -0.1 1 5  
## 6 3.4 1 6

sleep1 <- subset(sleep, group == "1")  
sleep2 <- subset(sleep, group == "2")  
t.test(sleep1$extra, sleep2$extra)

##   
## Welch Two Sample t-test  
##   
## data: sleep1$extra and sleep2$extra  
## t = -1.8608, df = 17.776, p-value = 0.07939  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -3.3654832 0.2054832  
## sample estimates:  
## mean of x mean of y   
## 0.75 2.33

# Part B

t.test(sleep1$extra, sleep2$extra, paired = TRUE)

##   
## Paired t-test  
##   
## data: sleep1$extra and sleep2$extra  
## t = -4.0621, df = 9, p-value = 0.002833  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -2.4598858 -0.7001142  
## sample estimates:  
## mean of the differences   
## -1.58

# Part C

For the ‘unpaired’ t-test, we are assuming the two groups are independent of eachother, with equal variance. For a ‘paired’ t-test, memebers from the same group are typically tested. The results from the first, unpaired test were not significant at a alpha level of 0.05. However, when paired, there is in fact evidence of difference between the two sample groups at an alpha level of 0.05.