1940223\_paired\_ttest–2-.R

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QUESTION 2

# Sample 1  
mean1 = 64.3  
sd1 = 7.1  
n1 = 21  
# Sample 2  
mean2 = 68.8  
sd2 = 7.4  
n2 = 23

Here, we have two samples taken from normal distributions. Data is not given, only sample statistics. Hence, these samples cannot be considered as paired since their sizes differ. Additionally, we may assume that classes are not divided based on ability or inclination. Then, since the subjects are the same, we can expect the overall test results to have a similar variance in each class. Hence, we use pooled t-test.

#

AIM

#

We need to find out if the performance of the two classes in the same subject is equal or not, not just for these samples but in general. In other words, we need to check if the populations of the respective class’ results are significantly different or not.

CHECKING ASSUMPTIONS

#

Assumption 1…

#

Since there is not data, we must assume the samples follow normal distribution.

#

Assumption 2…

#

Since the results of students are not affected the results of other students (we assume there is no malpractice), the samples are drawn independently.

#

Assumption 3…

#

Cannot do boxplot without data.

#

POOLED VARIANCE

#  
sd\_pooled = sqrt(((n1 - 1)\*sd1\*sd1 + (n2 - 1)\*sd2\*sd2)/(n1 + n2 - 2))  
sd\_pooled

## [1] 7.258689

STANDARD ERROR (of differences of sample means)

se = sd\_pooled\*sqrt(1/n1 + 1/n2)  
se

## [1] 2.190842

POOLED T-TEST

#

Confidence interval of the difference of population means

# t value is for 21 + 23 - 2 = 42 degrees of freedom, and 0.05 significance level.  
# Also, this is a two-tailed distribution, since we are not specifying whether the mean of sample 1 is greater or lesser than that of sample 2.  
# Hence, t = 2.018  
ci\_upper = (mean1 - mean2) + 2.018\*se  
ci\_lower = (mean1 - mean2) - 2.018\*se  
ci\_upper

## [1] -0.07888159

ci\_lower

## [1] -8.921118

Hence we can say with 95% confidence that the difference between class 1’s mean and class 2’s mean is between -8.921118 and -0.07888159. In other words, the mean of class 1’s test results are between 0.5 and 9 points less than that of class 2. We may say that the classes have, in general, different performances in the subject, with class 2 generally better than class 1.