Randomization Test using R

Under the null hypothesis, there is no difference in the populations. Thus, the assignment of values to one population or the other is regarded as one arbitrary permutation. The question is how unusual is the test statistic under this permutation in relation to other permutations. ($\alpha = .01$)

Problem 9.2.20

$250,000 Mortgage Rates	
30-Year Fixed	ARM
3.525	2.923
3.625	3.385
3.383	3.154
3.625	3.363
3.661	3.226
3.791	3.283
3.941	3.427
3.781	3.437
3.660	3.746
3.733	3.438

See R code below:

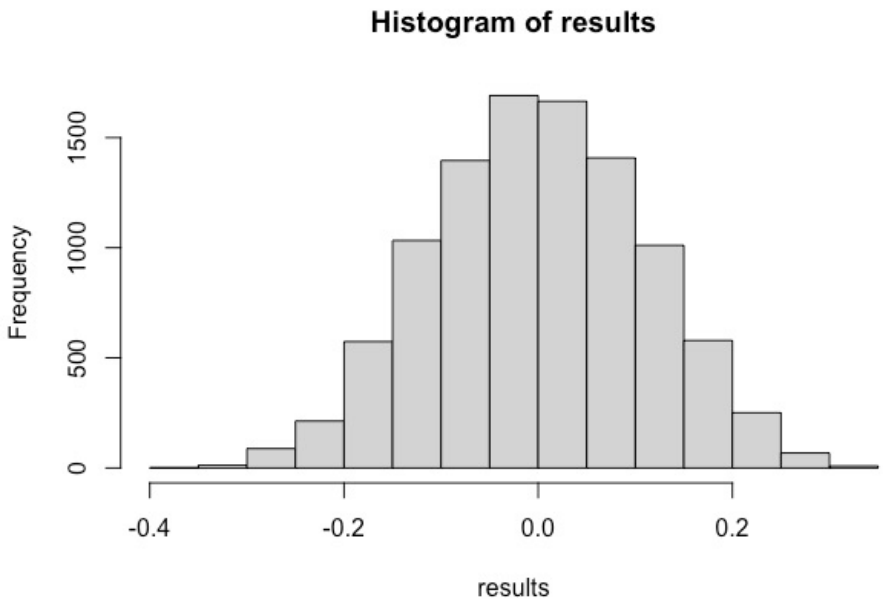
```
reps <- 10000
results <- numeric(reps)
X = c(3.525, 3.625, 3.383, 3.625, 3.661, 3.791, 3.941, 3.781, 3.660, 3.733)
muX = mean(X)
Y = c(2.923, 3.385, 3.154, 3.363, 3.226, 3.283, 3.427, 3.437, 3.746, 3.438)
muY = mean(Y)
diff = muX-muY
x <- c(X,Y)

for(i in 1:reps){
  temp <- sample(x)
  results[i]<- mean(temp[1:10])-mean(temp[11:20])
}

abs_results = abs(results)
hist(results)
p.value <- sum(abs_results >= diff) / reps
t.test(X,Y, alternate="greater")
```

Outputs:

This is the histogram of the difference of means of the random sample populations simulated 10000 times.



The p.value resulted in .0007.
And confirming the results with t.test() the p value is calculated at .001017

Since the p.value is < $\alpha = .01$. We reject the null hypothesis. Meaning the means are not equal.