Problem-1

Samar Moussa/NIU:1661270 _ Jamia Begum/NIU: 1676891

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```
#exercise:1. Remember one of the examples presented in class:

#The first row is chest circumference (in inches) of five subjects.
#Let us call this X.
#The second row is the respective total volumes of air that can be breathed in
#and out in one minute (in liters) for the same five subjects. Let us call this Y.
#X: 39, 29, 60, 40, 32
#Y: 11, 5, 20, 8, 6

#Download the package combinat in order to use the function permn().
#Perform an exact test for H0 :   = 0 against H1 :   > 0.
#Use Pearson and Spearman correlation coefficient as well
```

#Answer: suppose, ##The null hypothesis is, H0: rho = 0 (i.e X and Y are not correlated) ##The Alternative hypothesis is,H1: rho>0 (i.e X and Y are positively correlated)

```
x= c(39,29,60,40,32)
y= c(11,5,20,8,6)
sttrue1= cor(x,y,method= "pearson") #taking statistic as the Pearson correlation coefficient
sttrue1
```

```
## [1] 0.9777792
```

```
sttrue2= cor(x,y,method= "spearman") #taking statistic as the spearman correlation coefficient
sttrue2
```

```
## [1] 0.9
```

```
n=length(y)
nr=fact(n) #number of rearrangements to be examined
st1=numeric(nr)
st2=numeric(nr)
cnt1=0 #for initiating counting
cnt2=0
d=permn(y) #Permuting randomly the Y column leaving the X fixed
for (i in 1:nr)
  { st1[i]<-cor(d[[i]],x,method= "pearson")
  if (st1[i] >=sttrue1)cnt1=cnt1+1 #comparing the true statistic and the evaluated statistic

  st2[i]<-cor(d[[i]],x,method= "spearman")
```

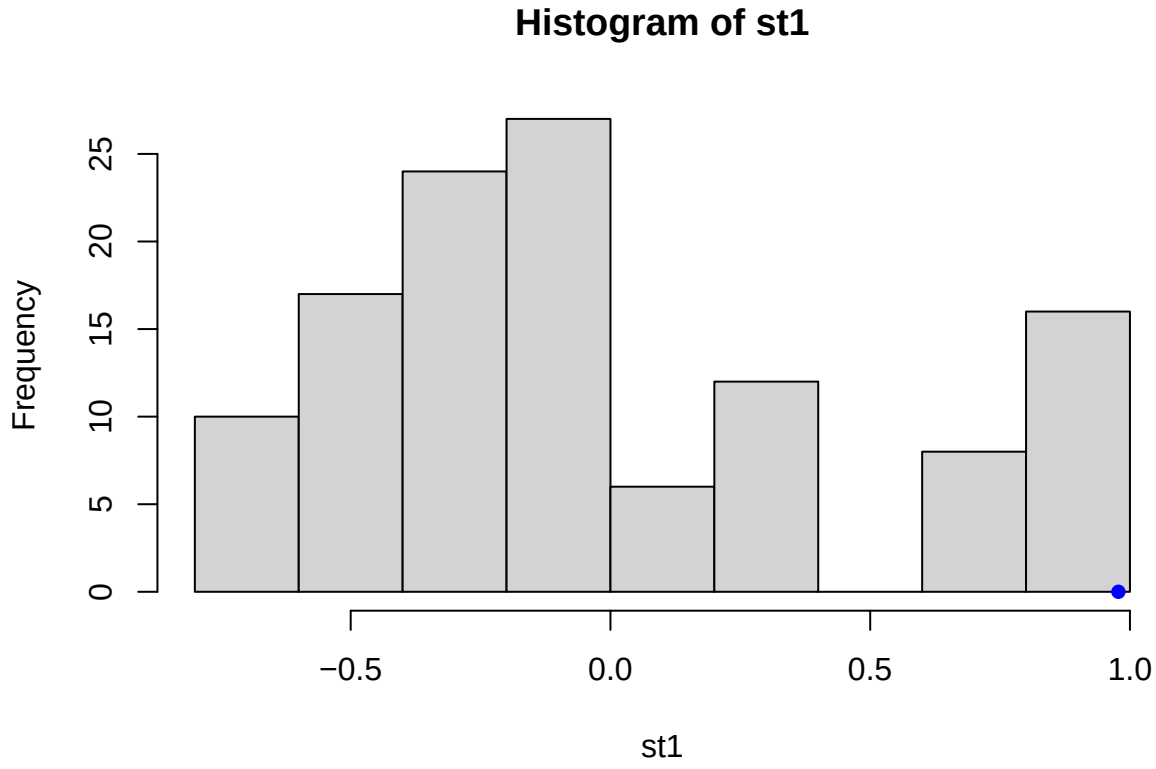
```
  if (st2[i] >=sttrue2)cnt2=cnt2+1 #comparing the true statistic and the evaluated statistic

  }
p_value1<-cnt1/nr #pvalue(using pearson)
p_value1
```

```
## [1] 0.025
```

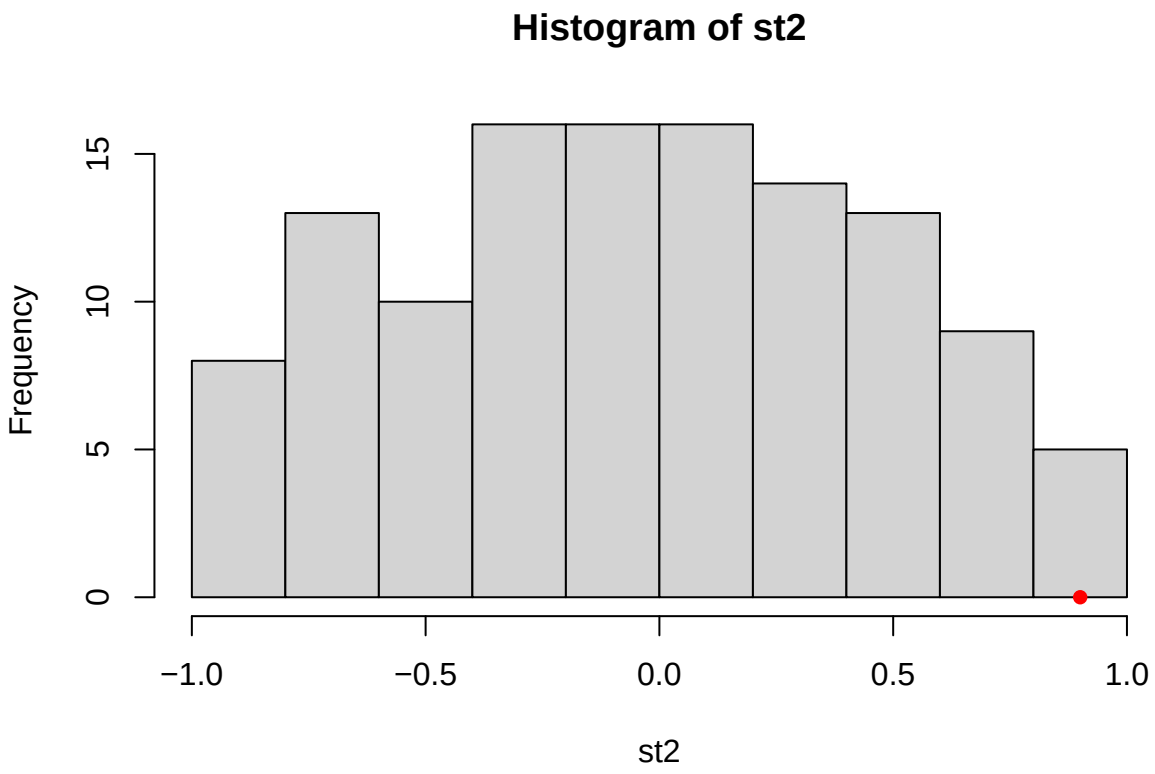
```
p_value2<-cnt2/nr #pvalue(using spearman)
p_value2
```

```
## [1] 0.04166667
```

```
hist(st1)
points(sttrue1,0,pch = 16,
       col = "blue")
```




```
hist(st2)
points(sttrue2,0,pch = 16,
       col = "red")
```




```
#in both cases,since the p-value is lower than 0.05,we have lower evidence to support the null hypothes
#therefore,the null hypothesis is rejected,so we can conclude that
#Chest circumference and volume of air are positively correlated
```