

612303050 Deshmukh Mehmood Rehan's Assignment 6

Q1. The time (in minutes) that a patient has to wait in a consulting room before being seen by doctor is recorded for 12 patients as follows: 17,15,20,20,32,28,12,26,25,25,35,24 Use Wilcoxon's signed rank test to test whether the median waiting time is more than 20 minutes at 5% l.o.s

```
library(BSDA)

## Warning: package 'BSDA' was built under R version 4.3.3

## Loading required package: lattice

##
## Attaching package: 'BSDA'

## The following object is masked from 'package:datasets':
##
##      Orange

# Given data
data <- c(17,15,20,20,32,28,12,26,25,25,35,24)
# Null Hypothesis: Median <= 20 minutes
# Alternative Hypothesis: Median > 20 minutes
# Significance Level = 0.05
alpha <- 0.05
# Wilcoxon's signed rank test
p_value = wilcox.test(data, mu = 20, alternative = "greater", conf.level = 1 -
- alpha)$p.value

## Warning in wilcox.test.default(data, mu = 20, alternative = "greater",
## conf.level = 1 - : cannot compute exact p-value with ties

## Warning in wilcox.test.default(data, mu = 20, alternative = "greater",
## conf.level = 1 - : cannot compute exact p-value with zeroes

print(p_value)

## [1] 0.06906391

if(p_value < alpha){
  print("Reject Null Hypothesis")
}else{
  print("Fail to reject Null Hypothesis")
}

## [1] "Fail to reject Null Hypothesis"
```

Q2. Following are data on ten randomly selected specimen of certain material subjected to stress and the fatigue life's (in kilocycles) 612,619,631,628,643,640,655,649,670,663 Apply

a sign test to test the hypothesis that population median fatigue life is 625 against the alternative hypothesis that is greater than 625 at 5% l.o.s

```
# Given data
data <- c(612,619,631,628,643,640,655,649,670,663)
# Null Hypothesis: Median = 625 kilocycles
# Alternative Hypothesis: Median > 625 kilocycles
# Significance Level = 0.05
alpha <- 0.05
# Sign test
p_value = SIGN.test(data, md = 625, alternative = "greater", conf.level = 1 -
alpha)$p.value
print(p_value)

## [1] 0.0546875

if(p_value < alpha){
  print("Reject Null Hypothesis")
}else{
  print("Fail to reject Null Hypothesis")
}

## [1] "Fail to reject Null Hypothesis"
```

Q3. The following data represents the number of hours that a rechargeable hedge trimmer operates before a recharge is required. 1.5, 2.2, 0.9, 1.3, 2.0, 1.6, 1.8, 1.5, 2.0, 1.2, 1.7 Use Wilcoxon's signed rank test to test the hypothesis that this particular trimmer operates with median of 1.8 hours before requiring a recharge.

```
# Given data
data <- c(1.5, 2.2, 0.9, 1.3, 2.0, 1.6, 1.8, 1.5, 2.0, 1.2, 1.7)
# Null Hypothesis: Median = 1.8 hours
# Alternative Hypothesis: Median ≠ 1.8 hours
# Significance Level = 0.05
alpha <- 0.05
# Wilcoxon's signed rank test
p_value = wilcox.test(data, mu = 1.8, alternative = "two.sided", conf.level =
1 - alpha)$p.value

## Warning in wilcox.test.default(data, mu = 1.8, alternative = "two.sided",
:
## cannot compute exact p-value with ties

## Warning in wilcox.test.default(data, mu = 1.8, alternative = "two.sided",
:
## cannot compute exact p-value with zeroes

print(p_value)

## [1] 0.1522389
```

```

if(p_value < alpha){
  print("Reject Null Hypothesis")
}else{
  print("Fail to reject Null Hypothesis")
}

## [1] "Fail to reject Null Hypothesis"

```

Q4. The median age of tourist visiting to certain place is claimed to be 41 years. A random sample of 17 tourists have the ages. 25, 19, 38, 52, 57, 39, 46, 46, 30, 49, 27, 39, 44, 63, 31, 67, 42 Use the sign test to test the claim at 5% level of significance.

```

# Given data
data <- c(25, 19, 38, 52, 57, 39, 46, 46, 30, 49, 27, 39, 44, 63, 31, 67, 42)
# Null Hypothesis: Median = 41 years
# Alternative Hypothesis: Median ≠ 41 years
# Significance Level = 0.05
alpha <- 0.05
# Sign test
p_value = SIGN.test(data, md = 41, alternative = "two.sided", conf.level = 1 - alpha)$p.value
print(p_value)

## [1] 1

if(p_value < alpha){
  print("Reject Null Hypothesis")
}else{
  print("Fail to reject Null Hypothesis")
}

## [1] "Fail to reject Null Hypothesis"

```

Q5. A student tells her parents that the median rental rate for a studio apartment in Portland is \$700. Her parents are skeptical and believe the rent is different. A random sample of studio rentals is taken from the internet; prices are listed below. Test the claim that there is a difference using $\alpha = 0.10$. Should the parents believe their daughter? (Hint: Using Sign test) 700 650 800 975 855 785 759 640 950 715 825 980 895 1025 850 915 740 985 770 785 700 925

```

# Given data
data <- c(700, 650, 800, 975, 855, 785, 759, 640, 950, 715, 825, 980, 895, 1025, 850, 915, 740, 985, 770, 785, 700, 925)
# Null Hypothesis: Median = $700
# Alternative Hypothesis: Median ≠ $700
# Significance Level = 0.10
alpha <- 0.10
# Sign test
p_value = SIGN.test(data, md = 700, alternative = "two.sided", conf.level = 1 - alpha)$p.value

```

```
print(p_value)
## [1] 0.0004024506

if(p_value < alpha){
  print("Reject Null Hypothesis")
}else{
  print("Fail to reject Null Hypothesis")
}

## [1] "Reject Null Hypothesis"
```