Statistics 140 Winter 17

Hand-In Assignment #6

Sarah Ruckman

Last 4 Digits of SID: 7194

1. The number of defective items produced by two production lines was recorded for 13 consecutive days. The following data was recorded:



Perform the appropriate nonparametric test to determine whether there is a significant difference in the number of defective items produced between the two production lines. (The data has been saved in defect1 w17.dat and defect1m.mtw. Use α = 0.05. (NOTE: Do not use the sign.test!) (9 pts)

**H0: Cannot conclude a significant difference in the number of defective items produced between two production lines.**

**Ha: Can conclude a significant difference in the number of defective items produced between two production lines.**

R Code:

> defect<-read.table("C:\\Users\\Sarah\\Downloads\\defect1\_w17.dat", header = TRUE)

> defect #Print as check

> attach(defect)

> names(defect)

[1] "Day" "Line1" "Line2"

> wilcox.test(Line1, Line2, paired = TRUE)

Wilcoxon signed rank test with continuity correction

data: Line1 and Line2

V = 44.5, p-value = 0.6946

alternative hypothesis: true location shift is not equal to 0

Warning messages:

1: In wilcox.test.default(Line1, Line2, paired = TRUE) :

cannot compute exact p-value with ties

2: In wilcox.test.default(Line1, Line2, paired = TRUE) :

cannot compute exact p-value with zeroes

**TS: p-value = 0.6946**

**Since the p-value = 0.6946 is greater than α = 0.05, we do not reject H0**

**There is insufficient evidence to conclude a significant difference in the number of defective items produced between two production lines.**

1. A statistician (Linda1), with Icelandic heritage, was interested in determining whether the median height of eruptions of the famous Strokkur Geyser in Iceland is 86 feet. Linda obtained a random sample of 14 eruptions and recorded the following data: (The data has been saved in geyser1m.mtw and geyser1d.dat.)



Use the Wilcoxon Signed-Ranks Test to test whether the median height is 86 feet. (9 pts)

**H0: The median height = 86 feet**

**Ha: The median height ≠ 86 feet**

R Code:

> g<-read.table("C:\\Users\\Sarah\\Downloads\\geyser1d.dat", header = TRUE)

> g #Print as check

> attach(g)

> names(g)

[1] "height"

> wilcox.test(height,mu=86)

Wilcoxon signed rank test with continuity correction

data: height

V = 26, p-value = 0.3261

alternative hypothesis: true location is not equal to 86

Warning messages:

1: In wilcox.test.default(height, mu = 86) :

cannot compute exact p-value with ties

2: In wilcox.test.default(height, mu = 86) :

cannot compute exact p-value with zeroes

**TS: p-value = 0.3261**

**Since the p-value = 0.3261 is greater than α = 0.05, we do not reject H0**

**There is insufficient evidence to indicate that the median height of eruptions is not 86 feet.**

1. Two wine experts were asked to rate 10 different wines, on a 100 point scale. (Note: The higher the score, the more the expert liked the wine.) The question is whether there is a correlation between the scores of the two experts. The following data has been recorded:



(The data has been saved in wine1m.mtw and wine1d.dat.)

1. Calculate Spearman’s ρ. (2 pts)

R Code:

> wine<-read.table("C:\\Users\\Sarah\\Downloads\\WINE1D.DAT", header= TRUE)

> wine #Print as check

> attach(wine)

> names(wine)

[1] "Wine" "Judge1" "Judge2"

> library(stats)

> cor.test(Judge1,Judge2,method="spearman")

Spearman's rank correlation rho

data: Judge1 and Judge2

S = 24, p-value = 0.003505

alternative hypothesis: true rho is not equal to 0

sample estimates:

rho

0.8545455

**Answer: Spearman’s rho = 0.8545455**

1. Calculate Kendall’s τ. (2 pts)

R Code:

> cor.test(Judge1,Judge2,method="kendall")

Kendall's rank correlation tau

data: Judge1 and Judge2

T = 37, p-value = 0.009148

alternative hypothesis: true tau is not equal to 0

sample estimates:

tau

0.6444444

**Answer: Kendall’s tau = 0.6444444**

1. Perform the appropriate test using Spearman’s rank correlation. (4 pts)

**H0: Judge1 and Judge2 scores are independent.**

**Ha: Judge1 and Judge2 scores are not independent. (There is a correlation)**

R Code (See part i above)

**TS: Spearman’s rho = 0.8545455 with p-value = 0.003505**

**Since the p-value = 0.003505 is less than α = 0.05, we reject H0**

**There is sufficient evidence to indicate that the judges scores are not independent and have a correlation.**

1. Perform the appropriate test using Kendall’s τ. (4 pts)

**H0: Judge1 and Judge2 scores are independent.**

**Ha: Judge1 and Judge2 scores are not independent. (There is a correlation)**

R Code (See part ii above)

**TS: Kendall’s tau = 0.6444444 with p-value = 0.009148**

**Since the p-value = 0.009148 is less than α = 0.05, we reject H0**

**There is sufficient evidence to indicate that the judges scores are not independent and have a correlation.**