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Slot details:L33+L34
Course Code:PMDS503P
Course title:Statistical Inference Lab

```r
#Q1
#The diameter of a ball bearing was measured by 12 inspectors, each using two different kin
#calipers. The results were as follows:
#Is there a significant difference between the medians of the population of measurements rep
#the two samples? Use   = 0.05.
caliper1 <- c(0.265, 0.265, 0.266, 0.267, 0.267, 0.265, 0.267,
              0.267, 0.265, 0.268, 0.268, 0.265)
caliper2 <- c(0.264, 0.265, 0.264, 0.266, 0.267, 0.268, 0.264,
              0.265, 0.265, 0.267, 0.268, 0.269)
result1 <- wilcox.test(caliper1, caliper2, alternative="two.sided",
                       conf.level = 0.95,exact=TRUE)

## Warning in wilcox.test.default(caliper1, caliper2, alternative =
"two.sided", : cannot compute exact p-value with ties

result12 <- wilcox.test(caliper1, caliper2, paired = TRUE,
                        conf.level = 0.95)

## Warning in wilcox.test.default(caliper1, caliper2, paired = TRUE,
conf.level = 0.95): cannot compute exact p-value with ties
## Warning in wilcox.test.default(caliper1, caliper2, paired = TRUE,
conf.level = 0.95): cannot compute exact p-value with zeroes

print(result1)

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  caliper1 and caliper2
## W = 81, p-value = 0.6131
## alternative hypothesis: true location shift is not equal to 0

print(result12)

##
##  Wilcoxon signed rank test with continuity correction
##
## data:  caliper1 and caliper2
## V = 21.5, p-value = 0.6721
## alternative hypothesis: true location shift is not equal to 0
```

```r
#The titanium content in an aircraft-grade alloy is an important determinant of strength. A
#test coupons reveals the following titanium content (in percent):
#8.32, 8.05, 8.93, 8.65, 8.25, 8.46, 8.52, 8.35, 8.36, 8.41, 8.42, 8.30, 8.71, 8.75, 8.60, 8
#8.29, 8.46.
#Suppose that the distribution of titanium content is symmetric and continuous.
#Wilcoxon signed-rank test  = 0.05 to test the hypothesis 0:  = 8.5 versus 1:    8.5.
titanium <- c(8.32, 8.05, 8.93, 8.65, 8.25, 8.46, 8.52, 8.35, 8.36, 8.41,
              8.42, 8.30, 8.71, 8.75, 8.60, 8.83, 8.50, 8.38, 8.29, 8.46)
mu <- 8.5
result2 <- wilcox.test(titanium, mu = mu, alternative = "two.sided", conf.level = 0.95)
```

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

```r
print(result2)
```

```
##
##  Wilcoxon signed rank test with continuity correction
##
## data:  titanium
## V = 80.5, p-value = 0.573
## alternative hypothesis: true location is not equal to 8.5
```

```r
#Q3
#An electrical engineer must design a circuit to deliver the maximum amount of current to a
#tube to achieve sufficient image brightness. Within her allowable design constraints, she h
#two candidate circuits and tests prototypes of each. The resulting data (in microamperes) a
#follows:
Circuit1<-c( 251, 255, 258, 257, 250, 251, 254, 250, 248)
Circuit2<- c(250, 253, 249, 256, 259, 252, 260, 251)
#Use the Wilcoxon rank-sum test to test  0:  1 =  2 versus  0:  1 >  2. Use   = 0.10.

result3<-wilcox.test(Circuit1, Circuit2, alternative = "greater", exact = FALSE,
                     paired = FALSE,conf.level = 0.90)
print(result3)
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  Circuit1 and Circuit2
## W = 30, p-value = 0.7352
## alternative hypothesis: true location shift is greater than 0
```

```r
#Q4
#A machine working correctly cuts pieces of wire to a mean length of 10.5 cm
#with a standard deviation of 0.15 cm. Sixteen samples of wire were drawn at random from a p
#10.4 10.6 10.1 10.3 10.2 10.9 10.5 10.8 10.6 10.5 10.7 10.2 10.7 10.3 10.4 10.5
#Test the hypothesis that the machine is working correctly,
#i.e. the data fits to the normal distribution
# ( = 10.5, 2=0.152) at   = 0:05 by using Kolmogorov-Smirnov goodness-of-fit test.
wire_lengths <- c(10.4, 10.6, 10.1, 10.3, 10.2, 10.9, 10.5, 10.8,
                  10.6, 10.5, 10.7, 10.2, 10.7, 10.3, 10.4, 10.5)
mu <- 10.5
sigma <- 0.15
result4 <- ks.test(wire_lengths, "pnorm", mean = mu, sd = sigma)
```

```
## Warning in ks.test.default(wire_lengths, "pnorm", mean = mu, sd
= sigma): ties should not be present for the one-sample Kolmogorov-Smirnov
test
```

```r
print(result4)
```

```
##
##  Asymptotic one-sample Kolmogorov-Smirnov test
##
## data:  wire_lengths
## D = 0.22129, p-value = 0.4136
## alternative hypothesis: two-sided
```