Homework11

Sucheta Jhunjhunwala, MDS202151

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```
set.seed(51)

#Solution 3
z = rnorm(1000,mean=0,sd=1) #Taking 1000 samples of Normal(0,1)

#Solution 3.a
zcinf = function(v){   #function to calculate Confidence interval for known sd
  n = length(v)
  Z= qnorm(0.95/2,lower.tail=FALSE)
  c(mean(v)-Z*1.5/sqrt(n),mean(v)+Z*1.5/sqrt(n))
}
zcinf(z)
```

```
## [1] 0.01481114 0.02076003
```

```
#Solution 3.b
#1-alpha = 0.95
tcinf = function(v){  #function to calculate Confidence interval for unknown sd
  n = length(v)
  Z = qnorm(0.95/2,lower.tail=FALSE)
  c(mean(v)-Z*sd(v)/sqrt(n),mean(v)+Z*sd(v)/sqrt(n))
}
tcinf(z)
```

```
## [1] 0.01580658 0.01976459
```

```
#Solution 5

data = c(94.0, 98.6, 96.8, 95.5, 93.8, 95.6, 99.3, 95.8, 93.9, 90.2, 91.0, 93.9)
ci = tcinf(data)   #Calculates the Confidence interval for the given Noise data
ci_round =c()
for (i in ci){
  ci_round=c(ci_round,round(i,1))
}
ci_round
```

```
## [1] 94.8 94.9
```

```
#The expected noise level will lie in the range (94.8, 94.9) with 95% Confidence.


#Solution 6

attach(iris)
head(iris)
```

```
##   Sepal.Length Sepal.Width Petal.Length Petal.Width Species
## 1          5.1         3.5          1.4         0.2  setosa
## 2          4.9         3.0          1.4         0.2  setosa
## 3          4.7         3.2          1.3         0.2  setosa
## 4          4.6         3.1          1.5         0.2  setosa
## 5          5.0         3.6          1.4         0.2  setosa
## 6          5.4         3.9          1.7         0.4  setosa
```

```
#Confidence interval for sepal length of each species

#We extract the sepal length data corresponding to each species and then
#apply the function tcinf constructed in Solution 3 to find the 95%
#confidence interval for each of them.
set_sep_l = iris[iris$Species=='setosa',]$Sepal.Length
print(paste('The confidence Interval for Sepal.Length of Setosa is: (',tcinf(set_sep_l)[1],tc
inf(set_sep_l)[2],')'))
```

```
## [1] "The confidence Interval for Sepal.Length of Setosa is: ( 5.00287409410694 5.009125905
89306 )"
```

```
vers_sep_l = iris[iris$Species=='versicolor',]$Sepal.Length
print(paste('The confidence Interval for Sepal.Length of versicolor is: (',tcinf(vers_sep_l)[
1],tcinf(vers_sep_l)[2],')'))
```

```
## [1] "The confidence Interval for Sepal.Length of versicolor is: ( 5.93142255422225 5.94057
744577775 )"
```

```
virg_sep_l = iris[iris$Species=='virginica',]$Sepal.Length
print(paste('The confidence Interval for Sepal.Length of virginica is: (',tcinf(virg_sep_l)[1
],tcinf(virg_sep_l)[2],')'))
```

```
## [1] "The confidence Interval for Sepal.Length of virginica is: ( 6.58236097043403 6.593639
02956597 )"
```

```
#Confidence interval for sepal width of each species

#We extract the sepal width data corresponding to each species and then
#apply the function tcinf constructed in Solution 3 to find the 95%
#confidence interval for each of them.
set_sep_w = iris[iris$Species=='setosa',]$Sepal.Width
print(paste('The confidence Interval for Sepal.Width of Setosa is: (',tcinf(set_sep_w)[1],tci
nf(set_sep_w)[2],')'))
```

```
## [1] "The confidence Interval for Sepal.Width of Setosa is: ( 3.42463842776628 3.4313615722
3372 )"
```

```
vers_sep_w = iris[iris$Species=='versicolor',]$Sepal.Width
print(paste('The confidence Interval for Sepal.Width of versicolor is: (',tcinf(vers_sep_w)[1
],tcinf(vers_sep_w)[2],')'))
```

```
## [1] "The confidence Interval for Sepal.Width of versicolor is: ( 2.76721721212318 2.772782
78787682 )"
```

```
virg_sep_w = iris[iris$Species=='virginica',]$Sepal.Width
print(paste('The confidence Interval for Sepal.Width of virginica is: (',tcinf(virg_sep_w)[1
],tcinf(virg_sep_w)[2],')'))
```

```
## [1] "The confidence Interval for Sepal.Width of virginica is: ( 2.97114007479275 2.9768599
2520725 )"
```

```
#Confidence interval for petal width of each species

#We extract the petal length data corresponding to each species and then
#apply the function tcinf constructed in Solution 3 to find the 95%
#confidence interval for each of them.
set_pet_l = iris[iris$Species=='setosa',]$Petal.Length
print(paste('The confidence Interval for Petal.Length of Setosa is: (',tcinf(set_pet_l)[1],tc
inf(set_pet_l)[2],')'))
```

```
## [1] "The confidence Interval for Petal.Length of Setosa is: ( 1.46045993420601 1.463540065
79399 )"
```

```
vers_pet_l = iris[iris$Species=='versicolor',]$Petal.Length
print(paste('The confidence Interval for Petal.Length of versicolor is: (',tcinf(vers_pet_l)[
1],tcinf(vers_pet_l)[2],')'))
```

```
## [1] "The confidence Interval for Petal.Length of versicolor is: ( 4.2558327929972 4.264167
2070028 )"
```

```
virg_pet_l = iris[iris$Species=='virginica',]$Petal.Length
print(paste('The confidence Interval for Petal.Length of virginica is: (',tcinf(virg_pet_l)[1
],tcinf(virg_pet_l)[2],')'))
```

```
## [1] "The confidence Interval for Petal.Length of virginica is: ( 5.54710575502176 5.556894
24497824 )"
```

```
#Confidence interval for petal width of each species

#We extract the petal width data corresponding to each species and then
#apply the function tcinf constructed in Solution 3 to find the 95%
#confidence interval for each of them.
set_pet_w = iris[iris$Species=='setosa',]$Petal.Width
print(paste('The confidence Interval for Petal.Width of Setosa is: (',tcinf(set_pet_w)[1],tci
nf(set_pet_w)[2],')'))
```

```
## [1] "The confidence Interval for Petal.Width of Setosa is: ( 0.245065432417353 0.246934567
582647 )"
```

```
vers_pet_w = iris[iris$Species=='versicolor',]$Petal.Width
print(paste('The confidence Interval for Petal.Width of versicolor is: (',tcinf(vers_pet_w)[1
],tcinf(vers_pet_w)[2],')'))
```

```
## [1] "The confidence Interval for Petal.Width of versicolor is: ( 1.32424631389167 1.327753
68610833 )"
```

```
virg_pet_w = iris[iris$Species=='virginica',]$Petall.Width
print(paste('The confidence Interval for Petal.Width of virginica is: (',tcinf(virg_pet_w)[1
],tcinf(virg_pet_w)[2],')'))
```

```
## Warning in mean.default(v): argument is not numeric or logical: returning NA

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```

```
## [1] "The confidence Interval for Petal.Width of virginica is: ( NA NA )"
```