test way

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Contents

```
servr::rmdv2("dir")
```

```r
library("tidyverse")
library("gt")
library("printr")
library("readxl")
```

E02_01:

```r
E02_01 <- read_xls("../    /02 /09 R  /E02_01.xls")
E02_01[[1]]
```

```
##   [1] 3.96 4.23 4.42 3.59 5.12 4.02 4.32 3.72 4.76 4.16 4.61 4.26 3.77 4.20 4.36
##  [16] 3.07 4.89 3.97 4.28 3.64 4.66 4.04 4.55 4.25 4.63 3.91 4.41 3.52 5.03 4.01
##  [31] 4.30 4.19 4.75 4.14 4.57 4.26 4.56 3.79 3.89 4.21 4.95 3.98 4.29 3.67 4.69
##  [46] 4.12 4.56 4.26 4.66 4.28 3.83 4.20 5.24 4.02 4.33 3.76 4.81 4.17 3.96 3.27
##  [61] 4.61 4.26 3.96 4.23 3.76 4.01 4.29 3.67 3.39 4.12 4.27 3.61 4.98 4.24 3.83
##  [76] 4.20 3.71 4.03 4.34 4.69 3.62 4.18 4.26 4.36 5.28 4.21 4.42 4.36 3.66 4.02
##  [91] 4.31 4.83 3.59 3.97 3.96 4.49 5.11 4.20 4.36 4.54 3.72 3.97 4.28 4.76 3.21
## [106] 4.04 4.56 4.25 4.92 4.23 4.47 3.60 5.23 4.02 4.32 4.68 4.76 3.69 4.61 4.26
## [121] 3.89 4.21 4.36 3.42 5.01 4.01 4.29 3.68 4.71 4.13 4.57 4.26 4.03 5.46 4.16
## [136] 3.64 4.16 3.76
```

```
length()
max()
min()
mean()
median()
sd()
var()
sd()/sqrt()
range()
quantile(,)
```

Codes:

```
length(E02_01$x)      #
max(E02_01$x)         #
min(E02_01$x)         #
mean(E02_01$x)        #
median(E02_01$x)      #
sd(E02_01$x)          #
var(E02_01$x)         #
sd(E02_01$x)/sqrt(length(E02_01$x))  #
range(E02_01$x)       #
quantile(E02_01$x,c(0.025, 0.25, 0.5, 0.75, 0.975)) #    2.5%, 25%, 50%, 75%, 97.5 %
```

```
qqnorm()                                    Q-Q
hist()
boxplot()
plot()
stem()
ggplot()+   geom_line(, stat = "density")
```

Codes:

```
shapiro.test(E02_01$x)                  #   -
qqnorm( E02_01$x )                      #   E02_01 Q-Q
hist(E02_01$x)      #
boxplot(E02_01$x)   #
plot(E02_01$x)      #
stem(E02_01$x)      #     x x

X <- pretty( c(2.5, 6), 300 ) # pretty()
# dnorm()          X
TranData <- dnorm( X, mean=mean(E02_01$x), sd = sd(E02_01$x) )
# X X
plot( X, TranData)
```

```
ggplot(E02_01)+        #ggplot2
  geom_line(aes(x), stat = "density")
```

summary()	
str()	
head()	n=
tail()	n=
dplyr::slice()	4:9
dplyr::select()	
dplyr::filter()	
dplyr::arrange()	
dplyr::group_by()	
dplyr::summarise()	

Code:

```
summary(E02_01)
str(E02_01)
head(E02_01[[1]])
tail(E02_01[[1]])
E02_01 %>% slice(2:5)
```

```
    mtcars
```

```
head(mtcars) #
mtcars %>% select(mpg,cyl) %>% head()
mtcars %>% filter(cyl == 4) %>% arrange(-mpg)#  cyl 4  mpg
mtcars %>% summarise(mean_mpg = mean(mpg)) #
mtcars %>% group_by(cyl) %>% summarise(mean_mpg = mean(mpg)) #
```

T

-
  - –
  - –
- T
  - –
  - – $\sigma_1^2 = \sigma_2^2$

  T

  3-5 $\mu_0 = 140$ codes:

```
df <- read_xls("../    /03 /09 R  /E03_05.xls")
df$hb
t.test(df$hb, mu = 140) #      mu = 140
```

3

T

3-6   codes:

```
df <- read_xls("../    /03 /09 R  /E03_06.xls")
df
```

no	x1	x2
1	0.840	0.580
2	0.591	0.509
3	0.674	0.500
4	0.632	0.316
5	0.687	0.337
6	0.978	0.517
7	0.750	0.454
8	0.730	0.512
9	1.200	0.997
10	0.870	0.506

```
t.test(df$x1, df$x2, paired = T) #        ~
```

```
##
##  Paired t-test
##
## data:  df$x1 and df$x2
## t = 7.926, df = 9, p-value = 2.384e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.1946542 0.3501458
## sample estimates:
## mean of the differences
##                  0.2724
```