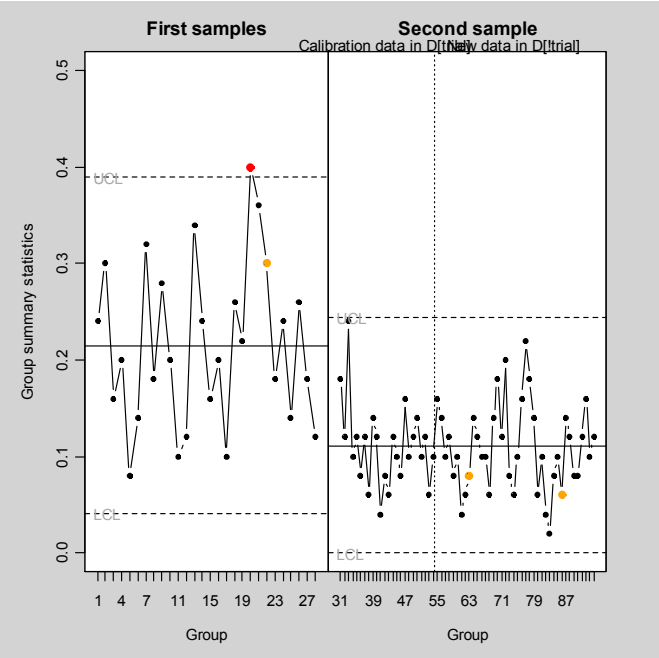
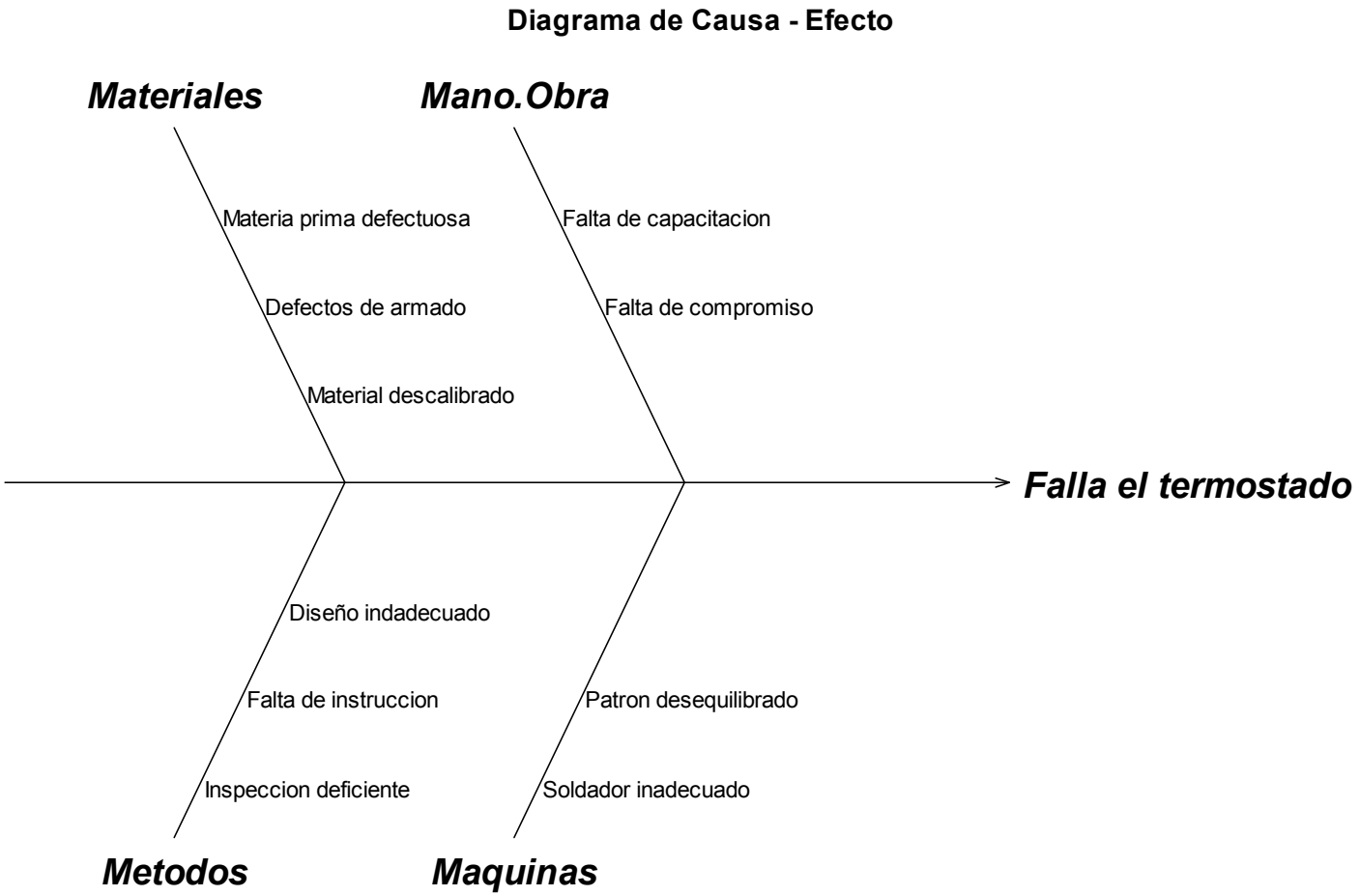
Control de calidad con …



Felipe de Mendiburu

cause.and.effect(cause=list(
Materiales=c("Materia prima defectuosa", "Defectos de armado", "Material escalibrado"),
Mano.Obra=c("Falta de capacitacion", "Falta de compromiso"),Metodos=c("Inspeccion deficiente", "Falta de instruccion", "Diseño indadecuado"),Maquinas=c("Soldador inadecuado", "Patron desequilibrado")) ,
effect="Falla el termostado", title= " Diagrama de Causa - Efecto", cex = c(1.5, 0.9, 1.5), font = c(4,1,4)**)**



qcc package:qcc R Documentation

Quality Control Charts

Description:

Create an object of class `qcc' to perform statistical quality control. This object may then be used to plot Shewhart charts, Cusum and EWMA plotting, drawing OC curves, computes capability indices, and more.

Usage:

```
qcc(data, type, sizes, center, std.dev, limits, target,
    data.name, labels, newdata, newsizes, newlabels,
    nsigmas = 3, confidence.level, rules = shewhart.rules,
    plot = TRUE, ...)

## S3 method for class 'qcc':
print(x, ...)

## S3 method for class 'qcc':
summary(object, ...)

## S3 method for class 'qcc':
plot(x, add.stats = TRUE, chart.all = TRUE,
     label.limits = c("LCL ", "UCL"), title, xlab, ylab, ylim,
     axes.las = 0, restore.par = TRUE, ...)
```

Argumentos de la funcion qqc()

Arguments:

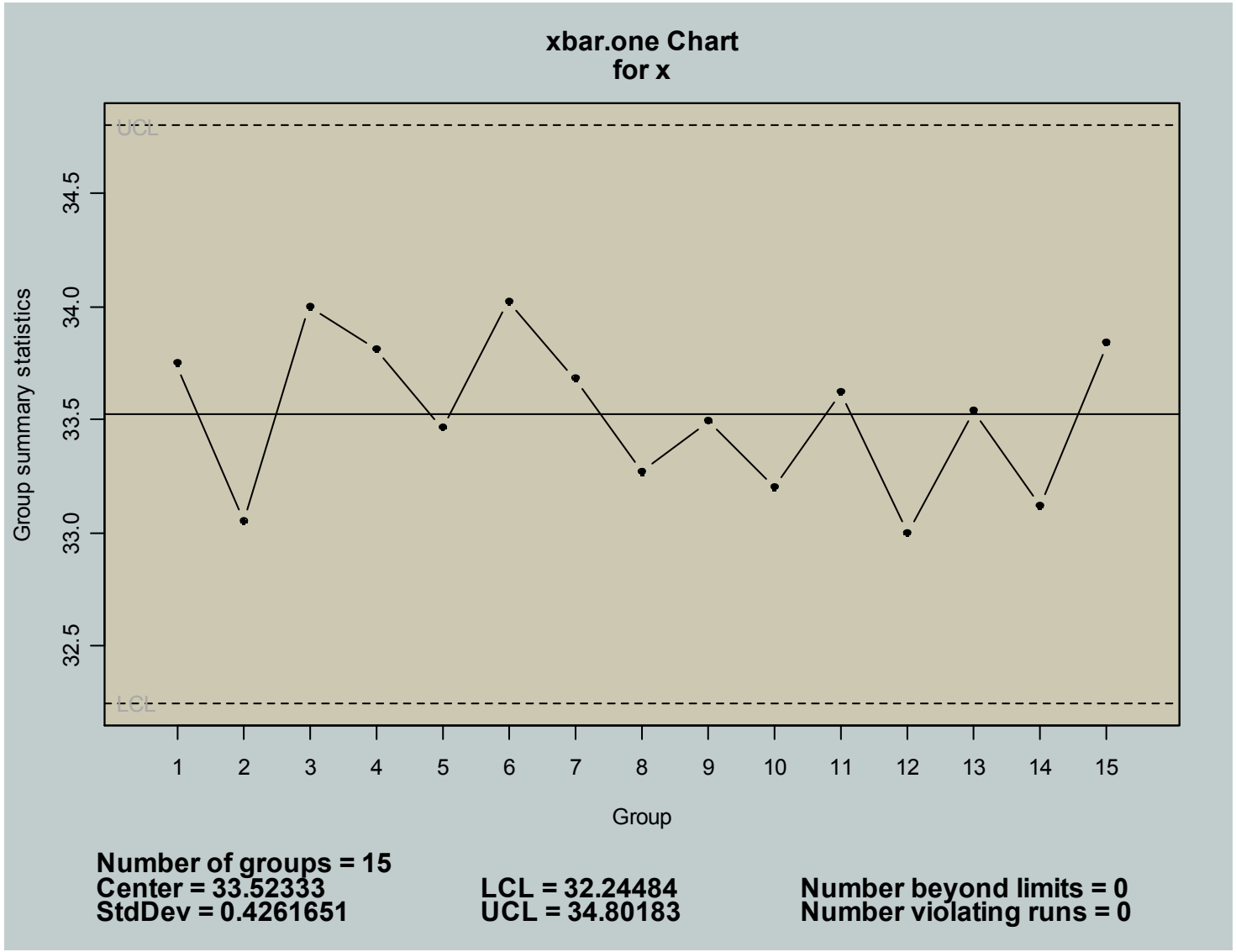
data: a data frame, a matrix or a vector containing observed data for the variable to chart. Each row of a data frame or a matrix, and each value of a vector, refers to a sample or ``rationale group''.

type: a character string specifying the group statistics to compute:

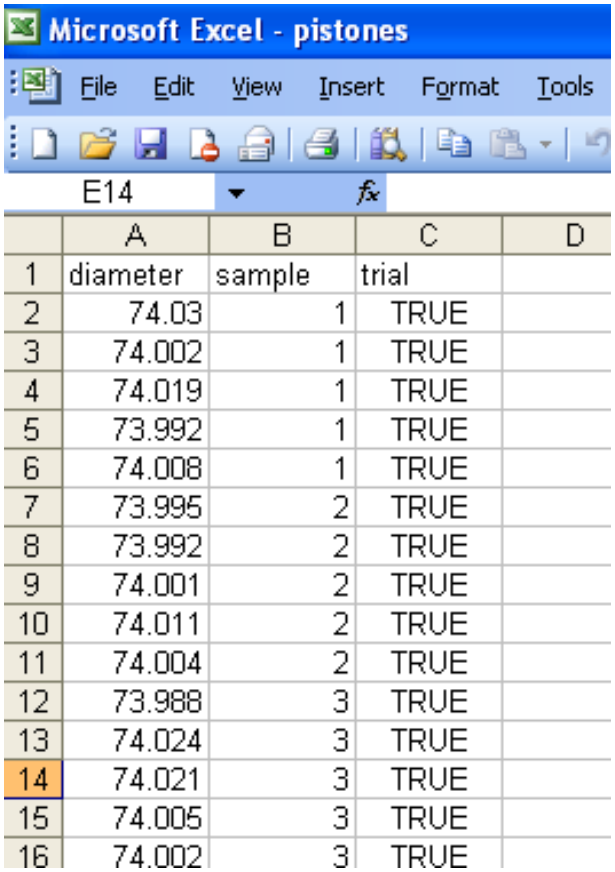
	Statistic charted	Chart description
'"xbar"'	mean	means of a continuous process variable
'"S"'	standard deviation	standard deviations of a continuous variable
'"R"'	range	ranges of a continuous process variable
'"xbar.one"'	mean	one-at-time data of a continuous process variable
'"p"'	proportion	proportion of nonconforming units
'"np"'	count	number of nonconforming units
'"c"'	count	nonconformities per unit
'"u"'	count	average nonconformities per unit

sizes: a value or a vector of values specifying the sample sizes associated with each group. For continuous data provided as data frame or matrix the sample sizes are obtained counting the non-'NA' elements of each row. For '"p"', '"np"' and '"u"' charts the argument 'sizes' is required.

```
x <- c(33.75, 33.05, 34, 33.8 , …….)
qcc(x, type="xbar.one")
```



Excel: pistones.xls

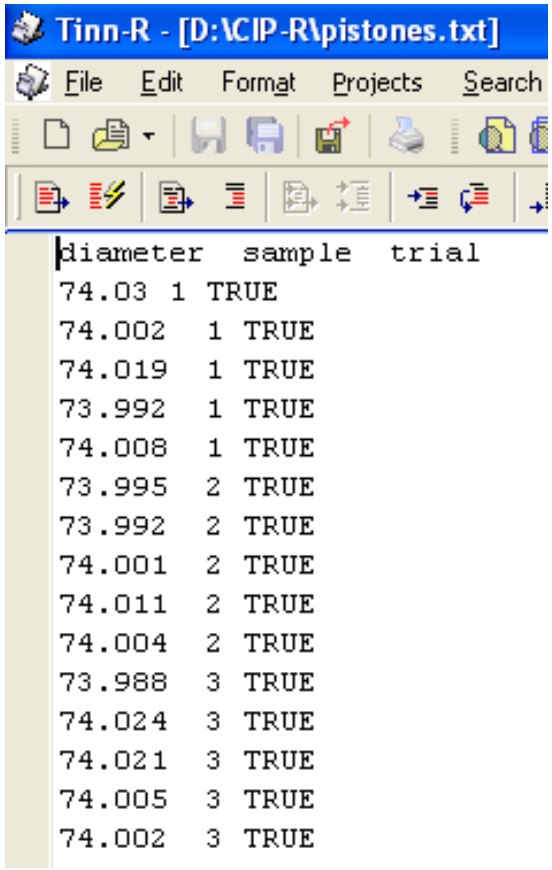


	A	B	C	D
1	diameter	sample	trial	
2	74.03	1	TRUE	
3	74.002	1	TRUE	
4	74.019	1	TRUE	
5	73.992	1	TRUE	
6	74.008	1	TRUE	
7	73.995	2	TRUE	
8	73.992	2	TRUE	
9	74.001	2	TRUE	
10	74.011	2	TRUE	
11	74.004	2	TRUE	
12	73.988	3	TRUE	
13	74.024	3	TRUE	
14	74.021	3	TRUE	
15	74.005	3	TRUE	
16	74.002	3	TRUE	

Copy

Paste

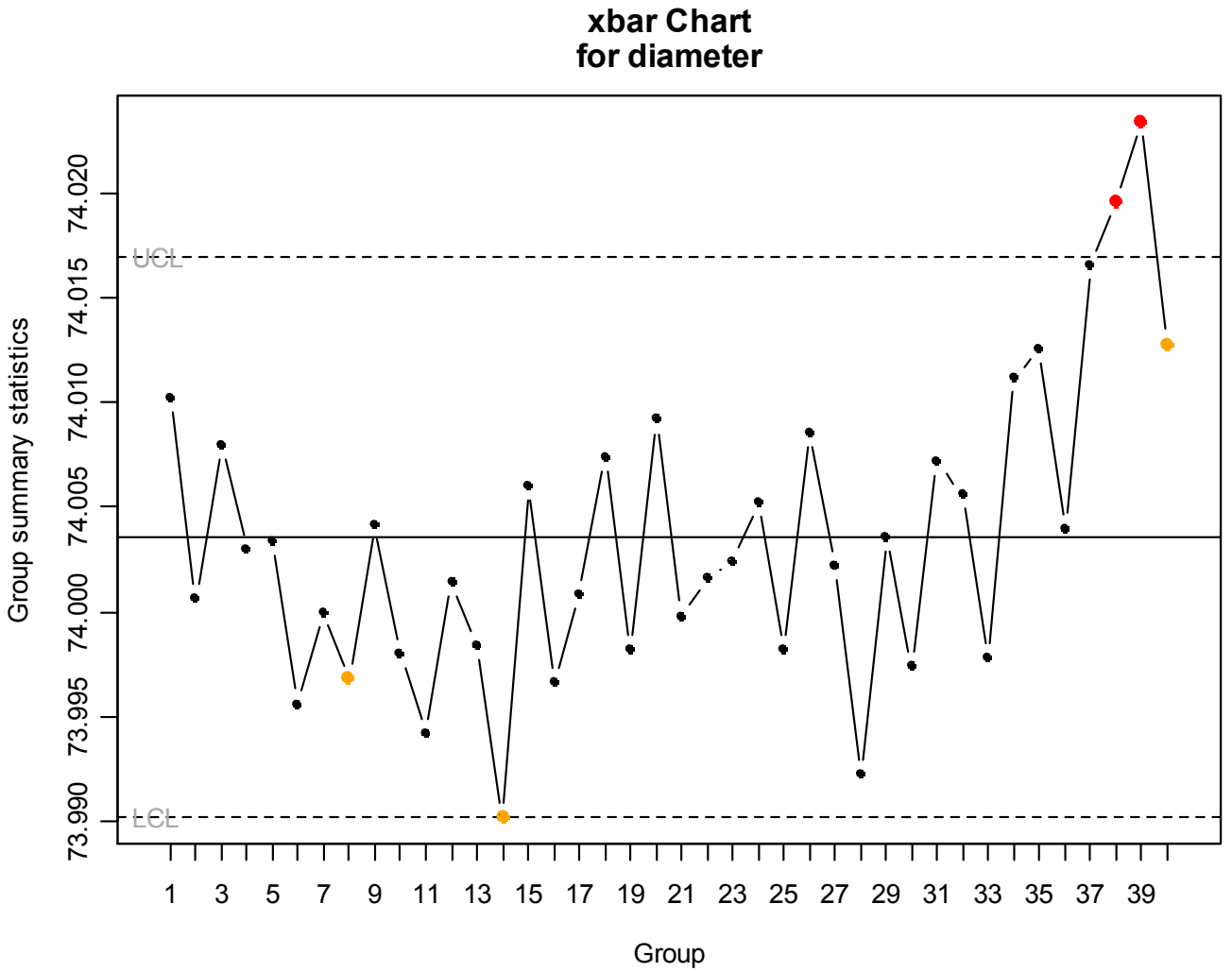
Text: pistones.txt



En R: `> pistones <- read.table("pistones.txt",header=T)`

```
> pistones <- read.table("pistones.txt",header=T)

> pistones
   diameter sample trial
1    74.030       1  TRUE
2    74.002       1  TRUE
3    74.019       1  TRUE
4    73.992       1  TRUE
5    74.008       1  TRUE
6    73.995       2  TRUE
7    73.992       2  TRUE
8    74.001       2  TRUE
9    74.011       2  TRUE
10   74.004       2  TRUE
..
200    74.02      40 FALSE
> attach(pistones)
> diameter <- qcc.groups(diameter, sample)
> diameter
     [,1]   [,2]   [,3]   [,4]   [,5]
1  74.030 74.012 73.998 73.990 74.009
2  73.985 74.020 73.996 73.995 73.995
3  74.000 74.020 73.990 74.000 73.995
4  74.007 73.988 73.987 74.002 74.010
5  73.990 74.015 73.996 74.000 74.002
6  74.008 73.967 74.013 73.993 74.005
7  74.025 73.997 73.992 74.003 74.014
8  74.005 73.995 74.007 74.016 74.003
9  74.009 73.994 73.984 74.019 74.030
10 73.995 74.010 73.996 73.995 74.008
..
40 74.013 73.989 73.986 74.007 74.020

40 muestras de tamaño igual a 5
```

```
> qcc(diameter, type="xbar")
```



Number of groups = 40
Center = 74.0036
StdDev = 0.009992449

LCL = 73.9902
UCL = 74.01701

Number beyond limits = 2
Number violating runs = 3

```
> qcc(diameter, type="xbar")

Call:
qcc(data = diameter, type = "xbar")
xbar chart for diameter

Summary of group statistics:
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  73.99   74.00   74.00   74.00   74.01   74.02

Group sample size:  5
Number of groups:  40

Center of group statistics:  74.0036
Standard deviation:  0.00999245

Control limits:
     LCL      UCL
 73.9902 74.01701
```

Eliminando algunas observaciones para tener muestras con diferentes tamaños:

```
> salen <- c(9, 10, 30, 35, 45, 64, 65, 74, 75, 85, 99, 100)
```

```
> diameter <- qcc.groups(pistones$diameter[-salen], sample[-salen])
> fix(diameter)
```

Data Editor

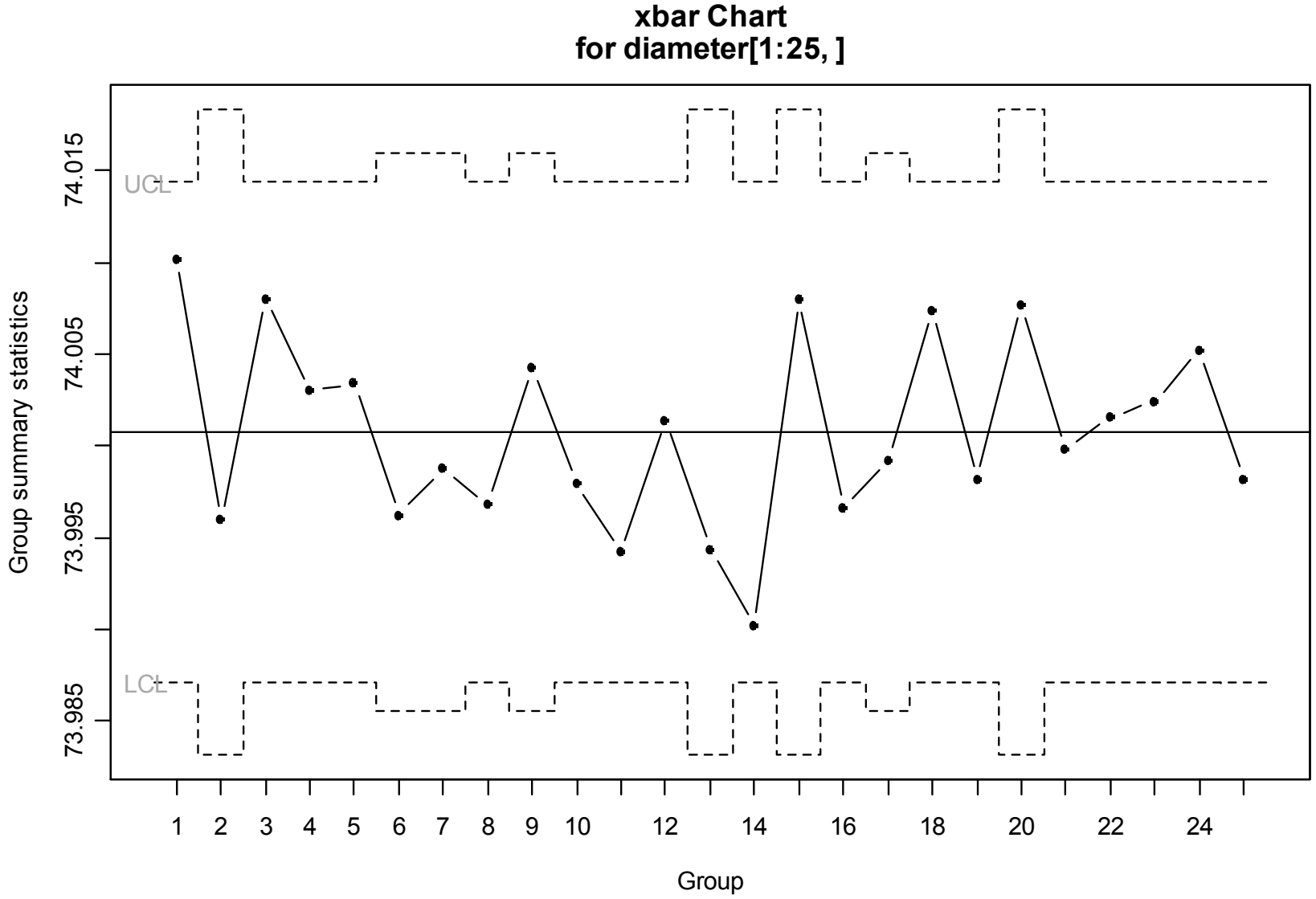
	row.names	col1	col2	col3	col4	col5	var7
1	1	74.03	74.002	74.019	73.992	74.008	
2	2	73.995	73.992	74.001	NA	NA	
3	3	73.988	74.024	74.021	74.005	74.002	
4	4	74.002	73.996	73.993	74.015	74.009	
5	5	73.992	74.007	74.015	73.989	74.014	
6	6	74.009	73.994	73.997	73.985	NA	
7	7	73.995	74.006	73.994	74	NA	
8	8	73.985	74.003	73.993	74.015	73.988	
9	9	74.008	73.995	74.009	74.005	NA	
10	10	73.998	74	73.99	74.007	73.995	
11	11	73.994	73.998	73.994	73.995	73.99	

Ordenes para hacer las cartas:

```
> salen <- c(9, 10, 30, 35, 45, 64, 65, 74, 75, 85, 99, 100)

> diameter <- qcc.groups(pistones$diameter[-salen], sample[-
salen])

> qcc(diameter[1:25,], type="xbar")

> qcc(diameter[1:25,], type="R")

> qcc(diameter[1:25,], type="S")

> qcc(diameter[1:25,], type="xbar", newdata=diameter[26:40,])

> qcc(diameter[1:25,], type="R", newdata=diameter[26:40,])

> qcc(diameter[1:25,], type="S", newdata=diameter[26:40,])
```

Otras ordenes:

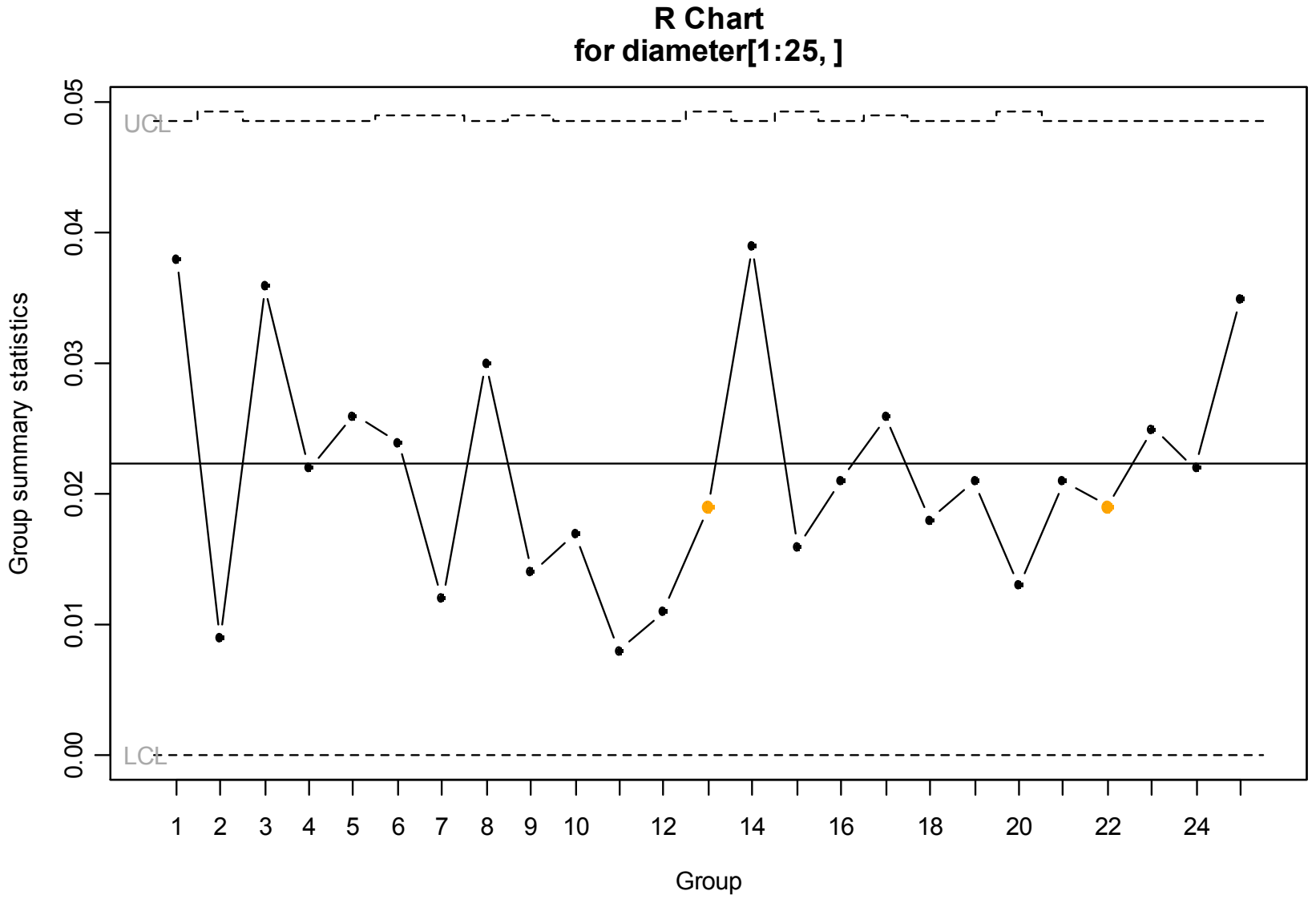
```
> qcc(diameter[1:25,], type="xbar", newdata=diameter[26:40,], nsigmas=2)

> qcc(diameter[1:25,], type="xbar", newdata=diameter[26:40,],
confidence.level=0.99)
```



Number of groups = 25
Center = 74.00075
StdDev = 0.01013948

LCL is variable
UCL is variable

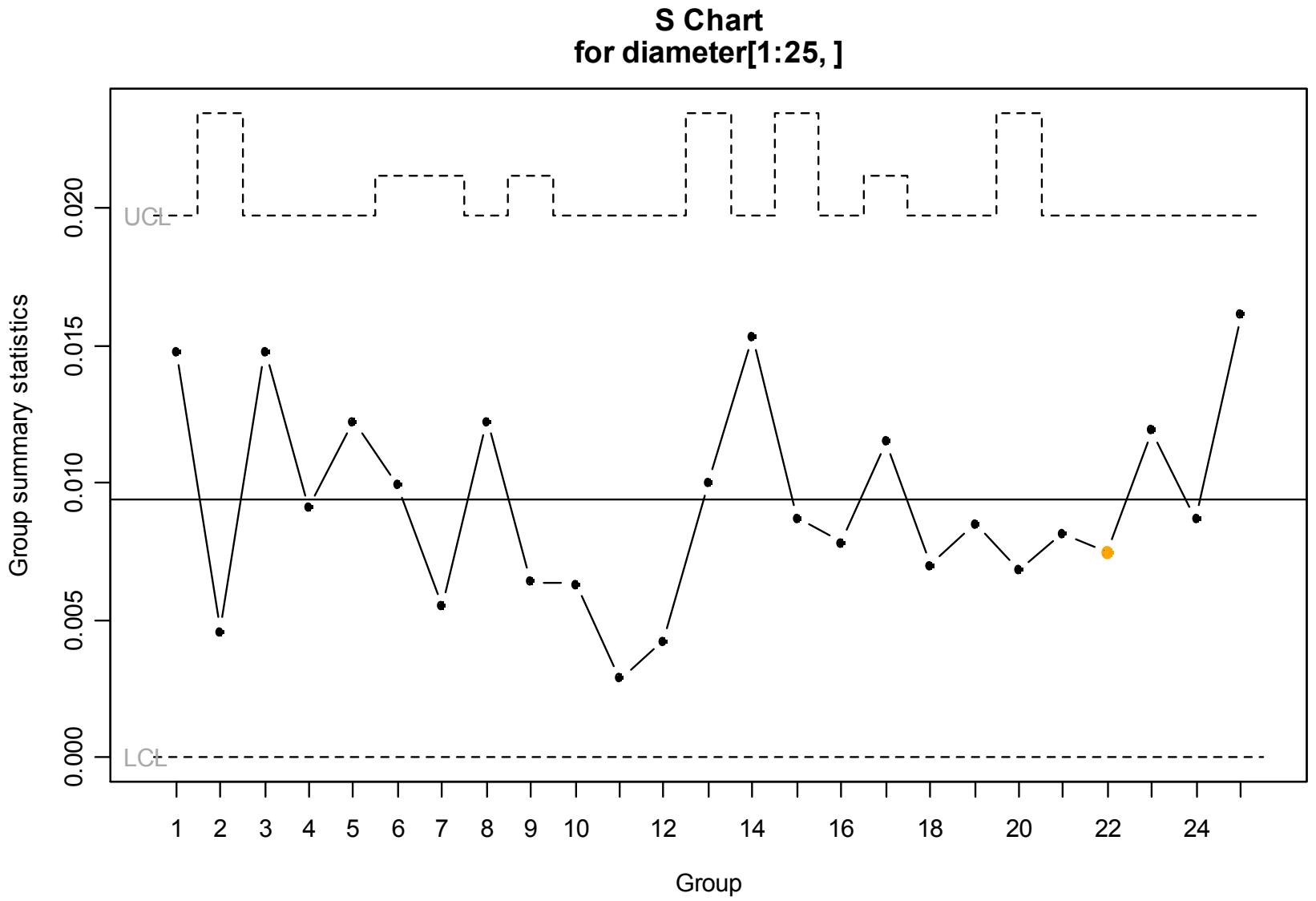
Number beyond limits = 0
Number violating runs = 0



Number of groups = 25
Center = 0.02230088
StdDev = 0.01013948

LCL = 0
UCL is variable

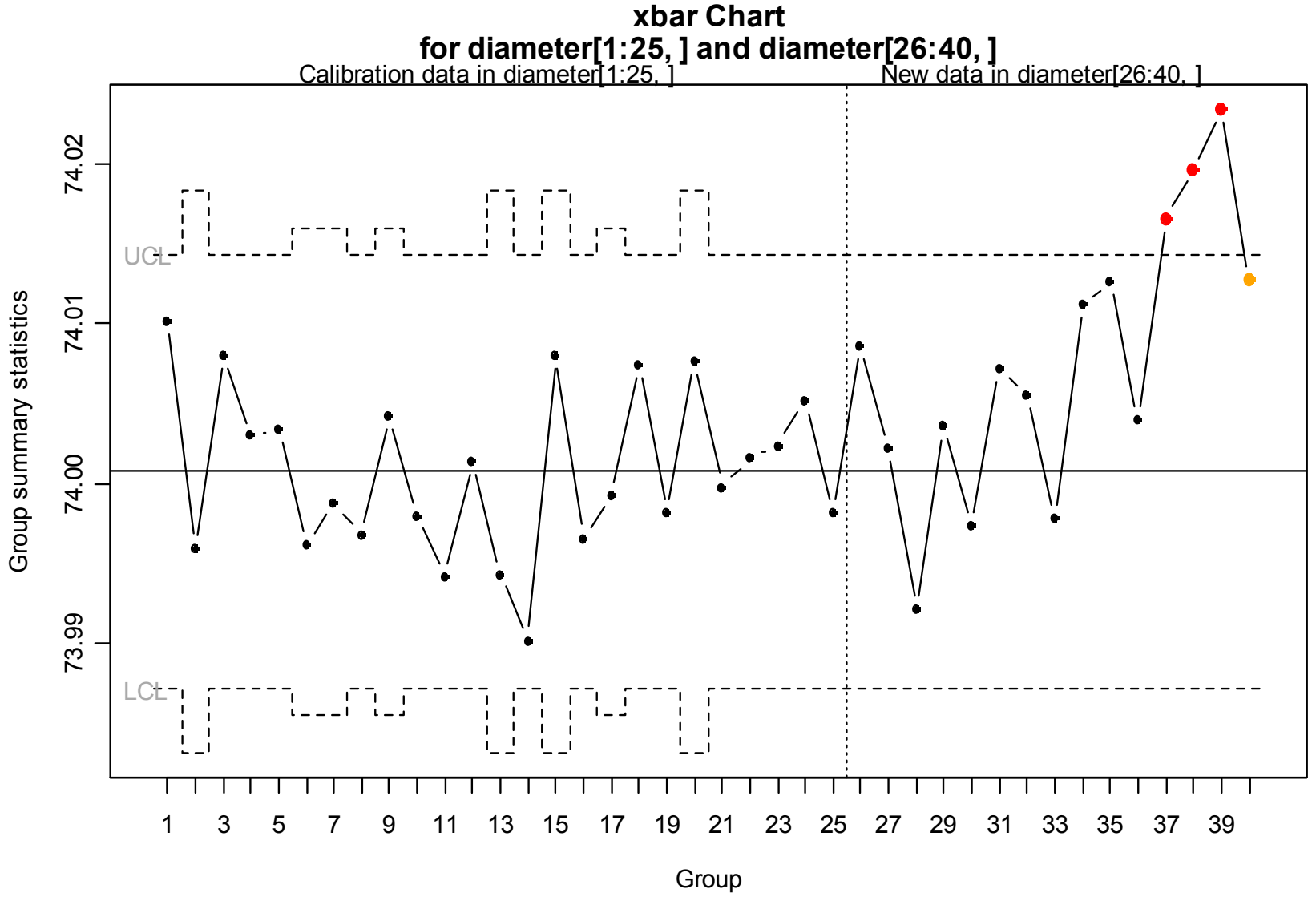
Number beyond limits = 0
Number violating runs = 2



Number of groups = 25
Center = 0.00938731
StdDev = 0.01013948

LCL = 0
UCL is variable

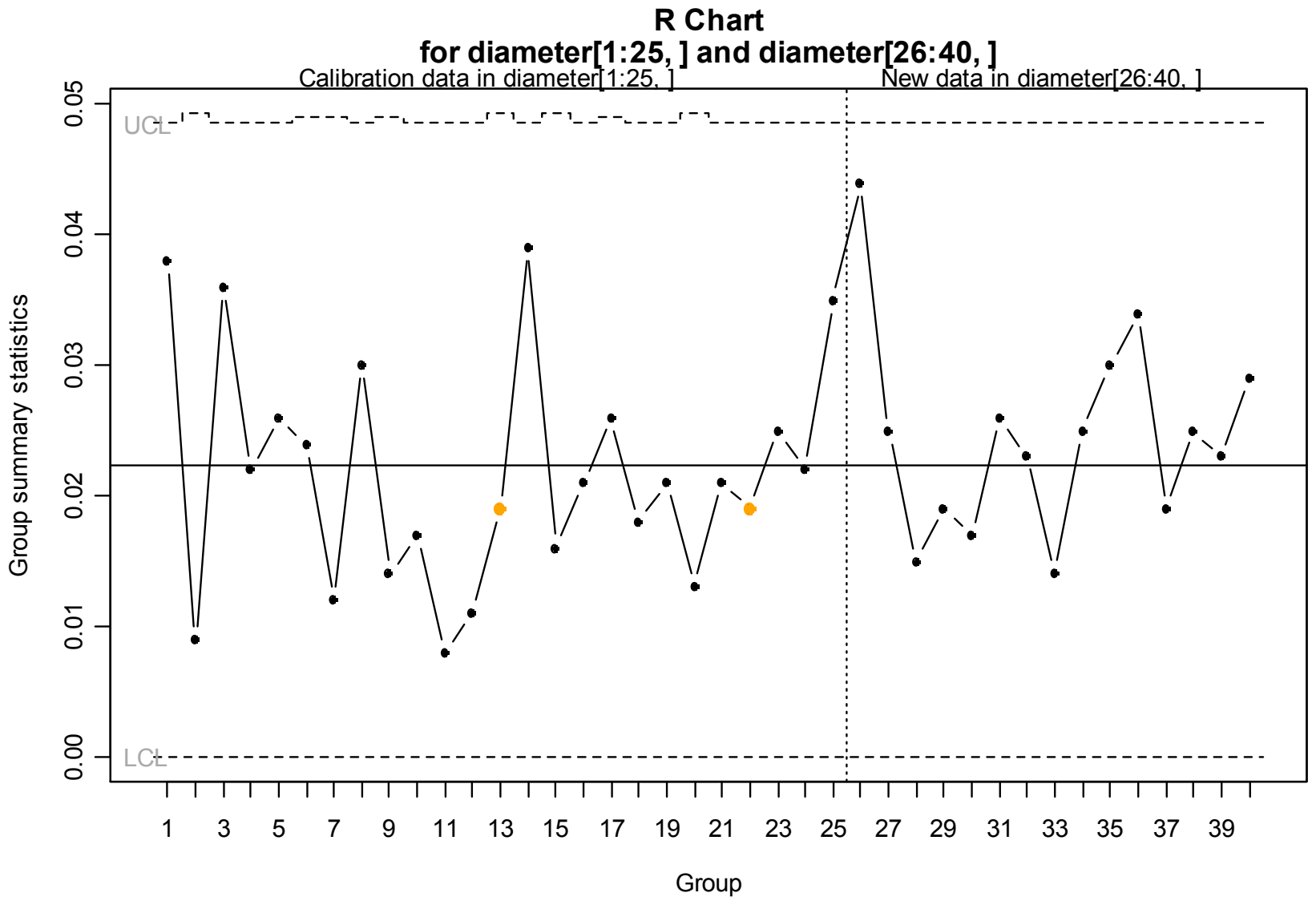
Number beyond limits = 0
Number violating runs = 1



Number of groups = 40
Center = 74.00075
StdDev = 0.01013948

LCL is variable
UCL is variable

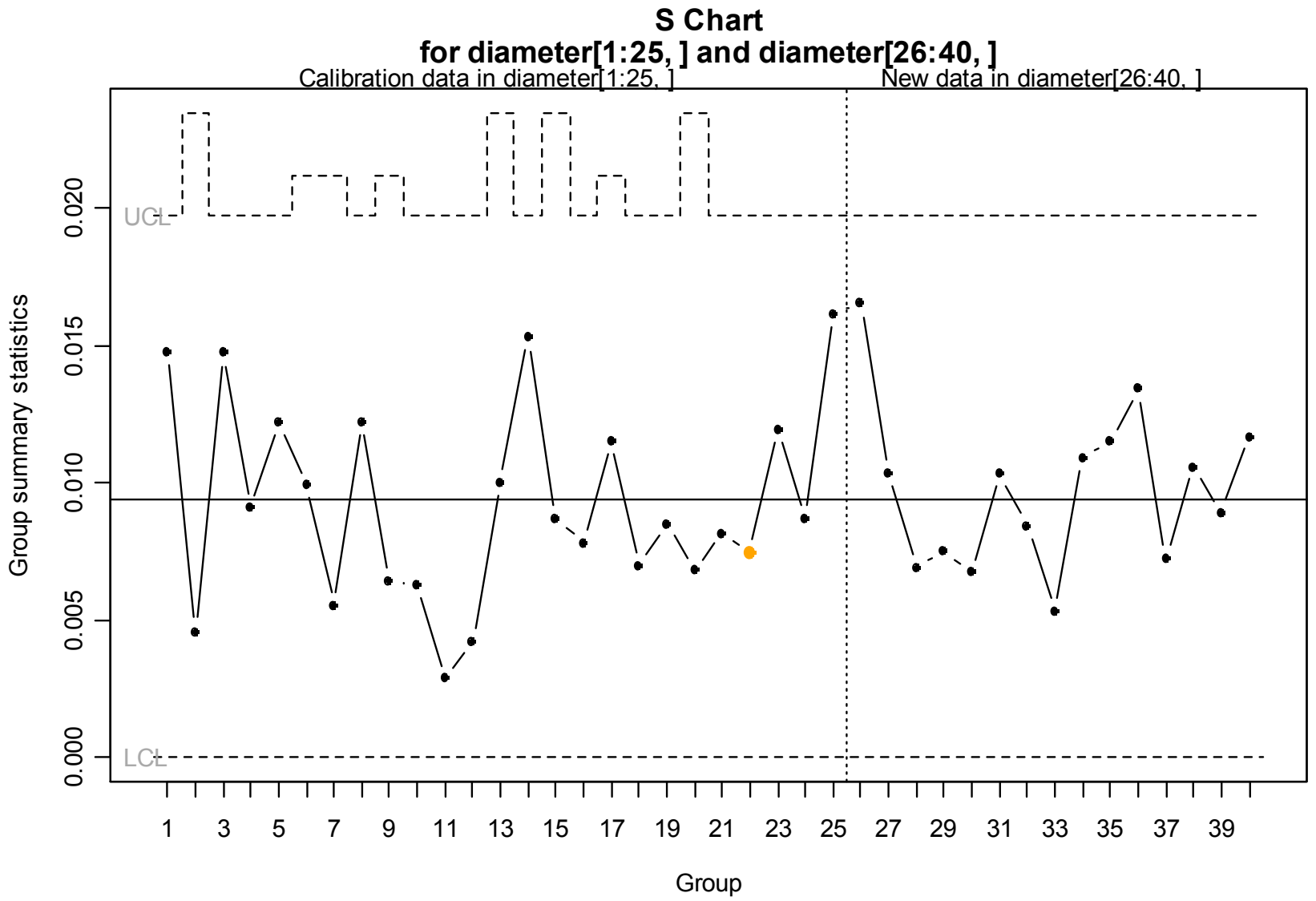
Number beyond limits = 3
Number violating runs = 1



Number of groups = 40
Center = 0.02230088
StdDev = 0.01013948

LCL = 0
UCL is variable

Number beyond limits = 0
Number violating runs = 2



Number of groups = 40
Center = 0.00938731
StdDev = 0.01013948

LCL = 0
UCL is variable

Number beyond limits = 0
Number violating runs = 1

R Console

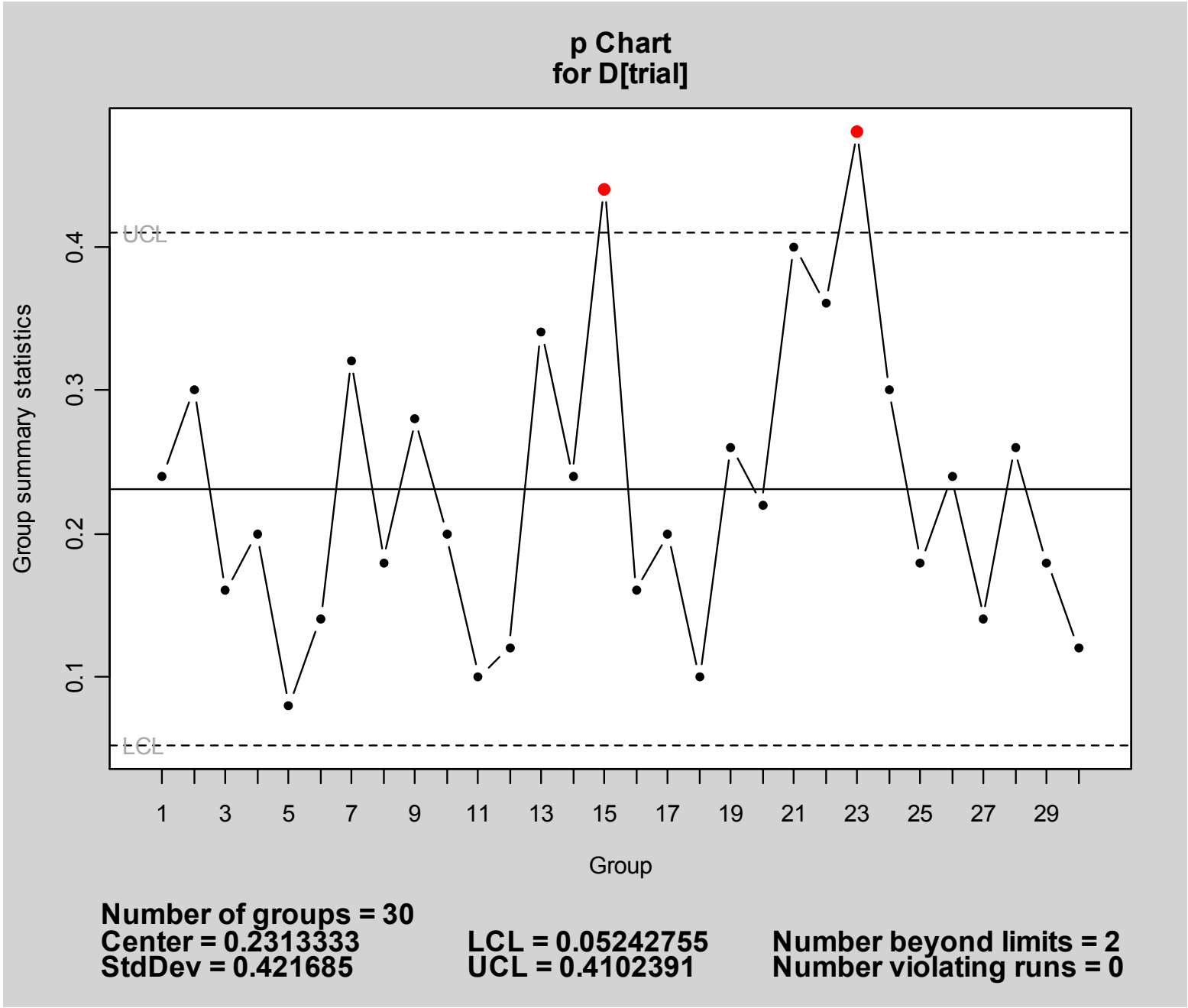
```
> naranjajugo<-read.table("naranjajugo.txt",header=T)
> fix(naranjajugo)
```

ATRIBUTOS

Data Editor

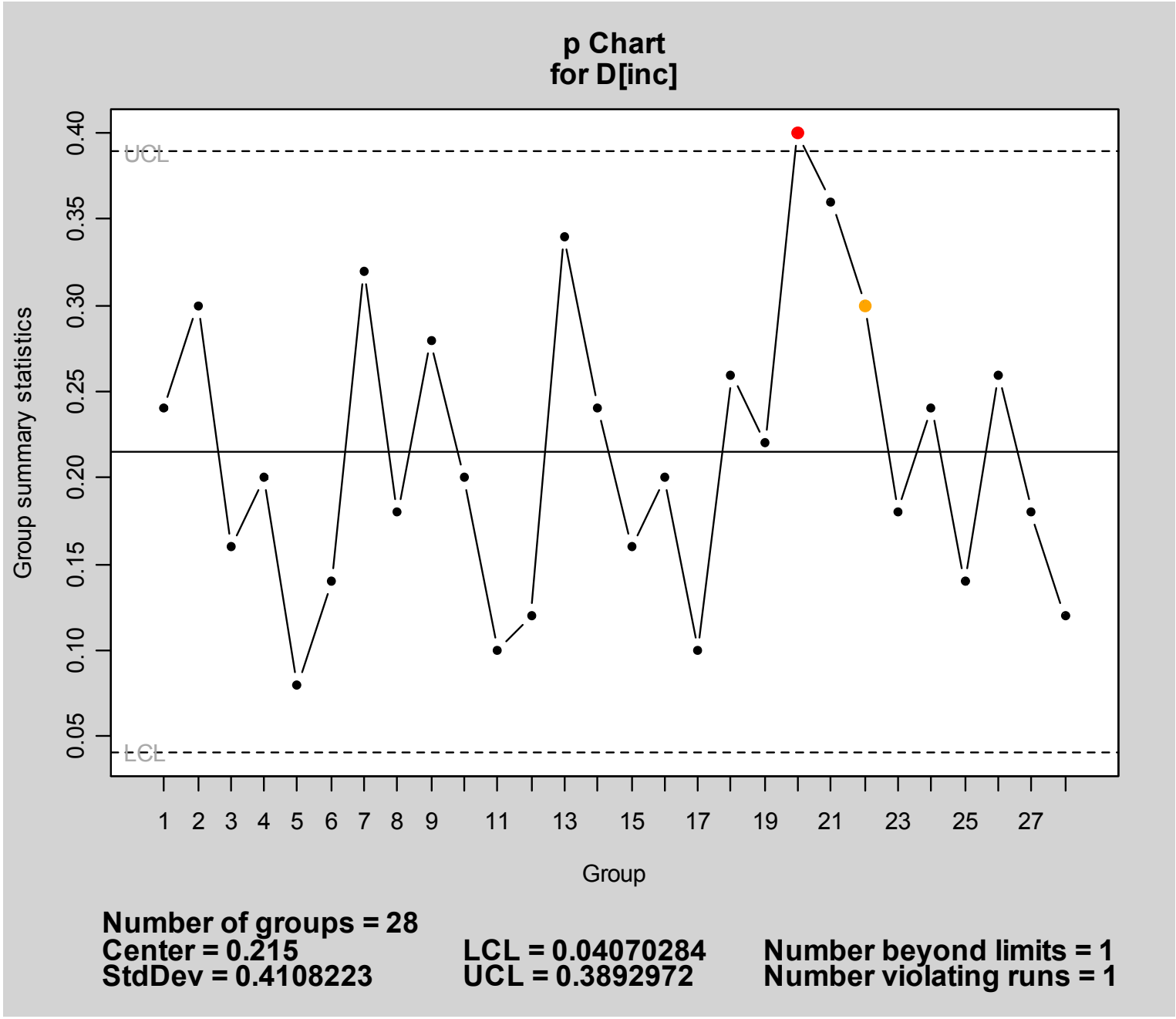
	sample	D	size	trial	var
1	1	12	50	TRUE	
2	2	15	50	TRUE	
3	3	8	50	TRUE	
4	4	10	50	TRUE	
5	5	4	50	TRUE	
6	6	7	50	TRUE	
7	7	16	50	TRUE	
8	8	9	50	TRUE	
9	9	14	50	TRUE	
10	10	10	50	TRUE	
11	11	5	50	TRUE	
12	12	6	50	TRUE	
13	13	17	50	TRUE	
14	14	12	50	TRUE	

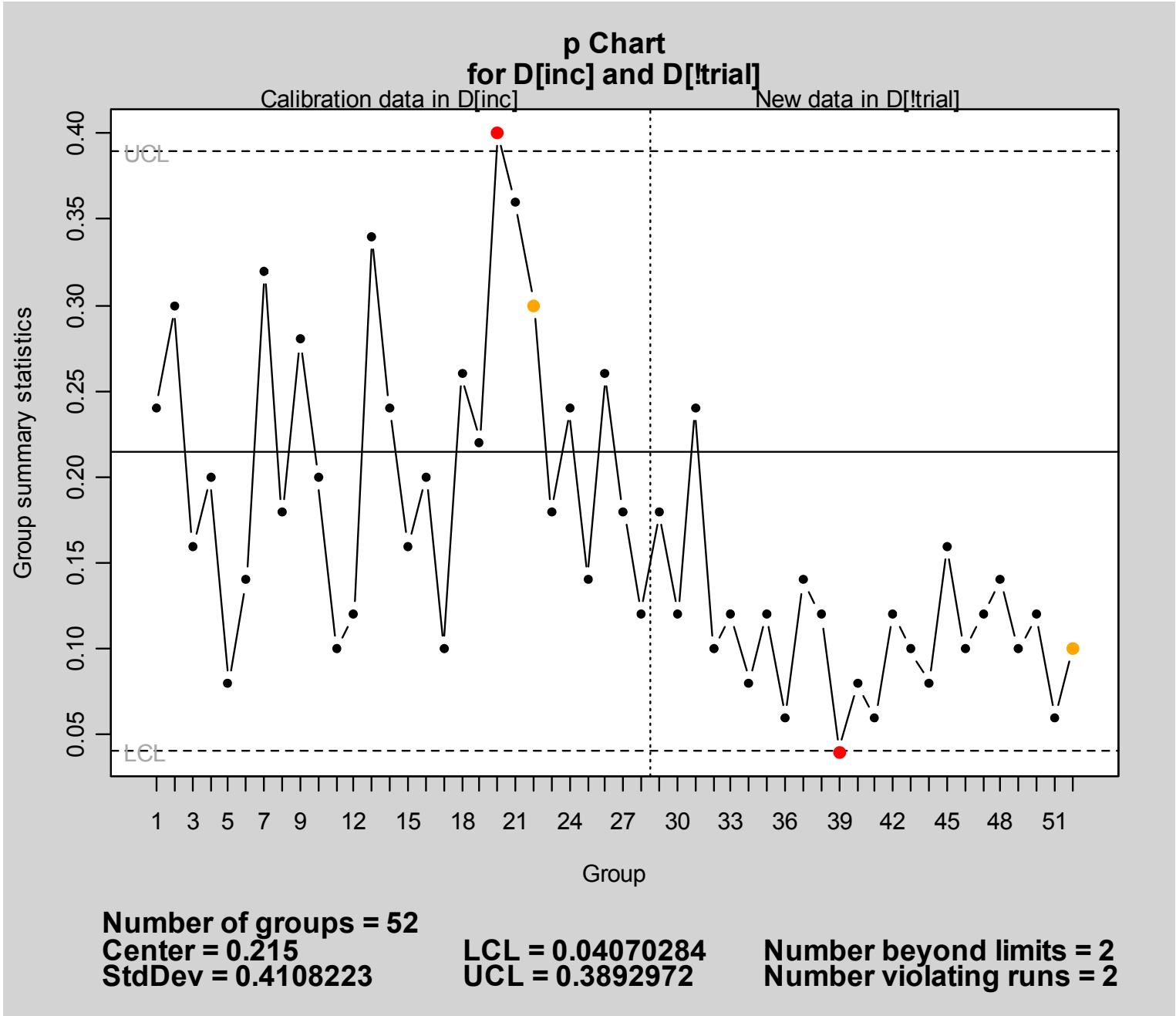
```
> # Solo grupo TRUE
> qcc(D[trial], sizes=size[trial], type="p")

Call:
qcc(data = D[trial], type = "p", sizes = size[trial])

p chart for D[trial]

Summary of group statistics:
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 0.0800  0.1600  0.2100  0.2313  0.2950  0.4800

Group sample size:  50
Number of groups:  30
Center of group statistics:  0.2313333
Standard deviation:  0.421685

Control limits:
        LCL       UCL
 0.05242755 0.4102391
```


p Chart
for D[trial]
Group summary statistics
0.1
0.2
0.3
0.4
UCL
LCL
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
Group
Number of groups = 30
Center = 0.2313333
StdDev = 0.421685
LCL = 0.05242755
UCL = 0.4102391
Number beyond limits = 2
Number violating runs = 0

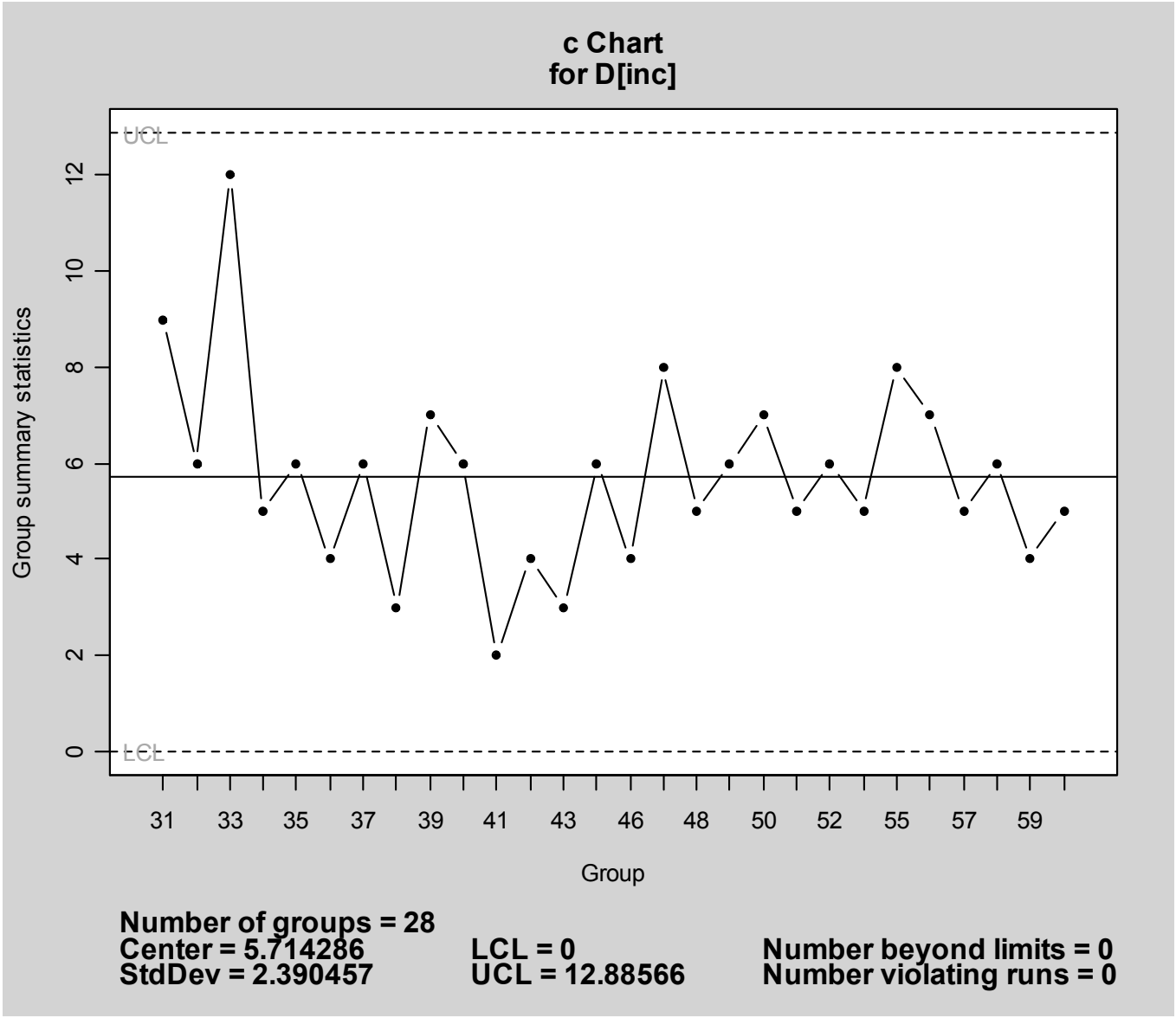
R Console

```
> # Remover puintos fuera de control
> inc <- setdiff(which(trial), c(15,23))
> q1 <- qcc(D[inc], sizes=size[inc], type="p")
> qcc(D[inc], sizes=size[inc], type="p", newdata=D[!trial], newsizes=size[!trial])

Call:
qcc(data = D[inc], type = "p", sizes = size[inc], newdata = D[!trial],     newsizes = size[!trial])

p chart for D[inc]

Summary of group statistics:
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  0.080   0.155   0.200   0.215   0.265   0.400

Group sample size:  50
Number of groups:  28
Center of group statistics:  0.215
Standard deviation:  0.4108223

Summary of group statistics in D[!trial]:
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 0.0400  0.0800  0.1100  0.1108  0.1200  0.2400

Group sample size:  50
Number of groups:  24

Control limits:
        LCL       UCL
 0.04070284 0.3892972
```


p Chart
for D[inc]
Group summary statistics
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
UCL
LCL
1
2
3
4
5
6
7
8
9
11
13
15
17
19
21
23
25
27
Group
Number of groups = 28
Center = 0.215
StdDev = 0.4108223
LCL = 0.04070284
UCL = 0.3892972
Number beyond limits = 1
Number violating runs = 1


p Chart
for D[inc] and D[!trial]
Calibration data in D[inc]
New data in D[!trial]
UCL
LCL
Group summary statistics
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
1
3
5
7
9
12
15
18
21
24
27
30
33
36
39
42
45
48
51
Group
Number of groups = 52
Center = 0.215
StdDev = 0.4108223
LCL = 0.04070284
UCL = 0.3892972
Number beyond limits = 2
Number violating runs = 2

```
> q1 <- qcc(D[inc], sizes=size[inc], type="c")
>
```



Carta U

Datos de clase

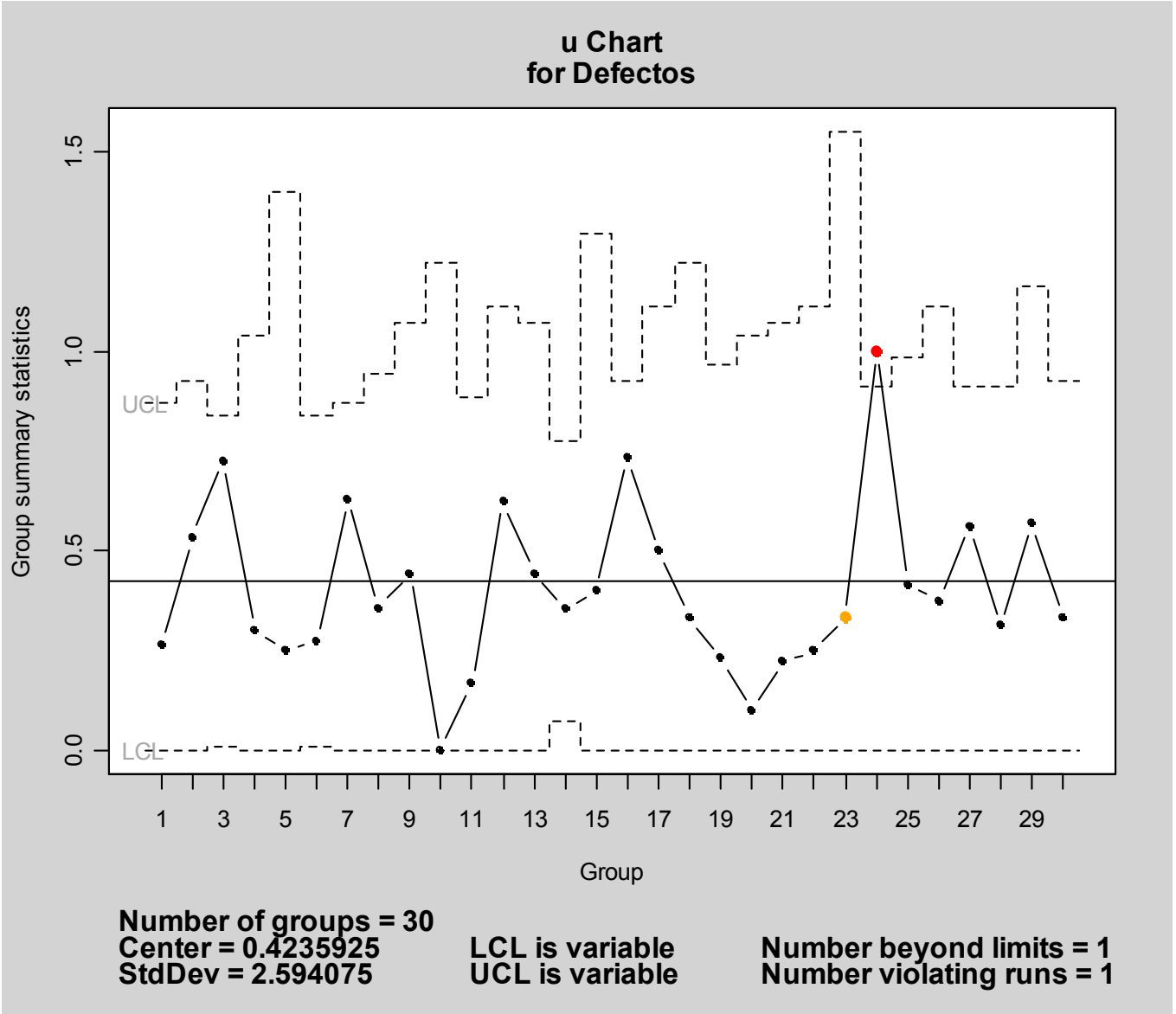
R Console

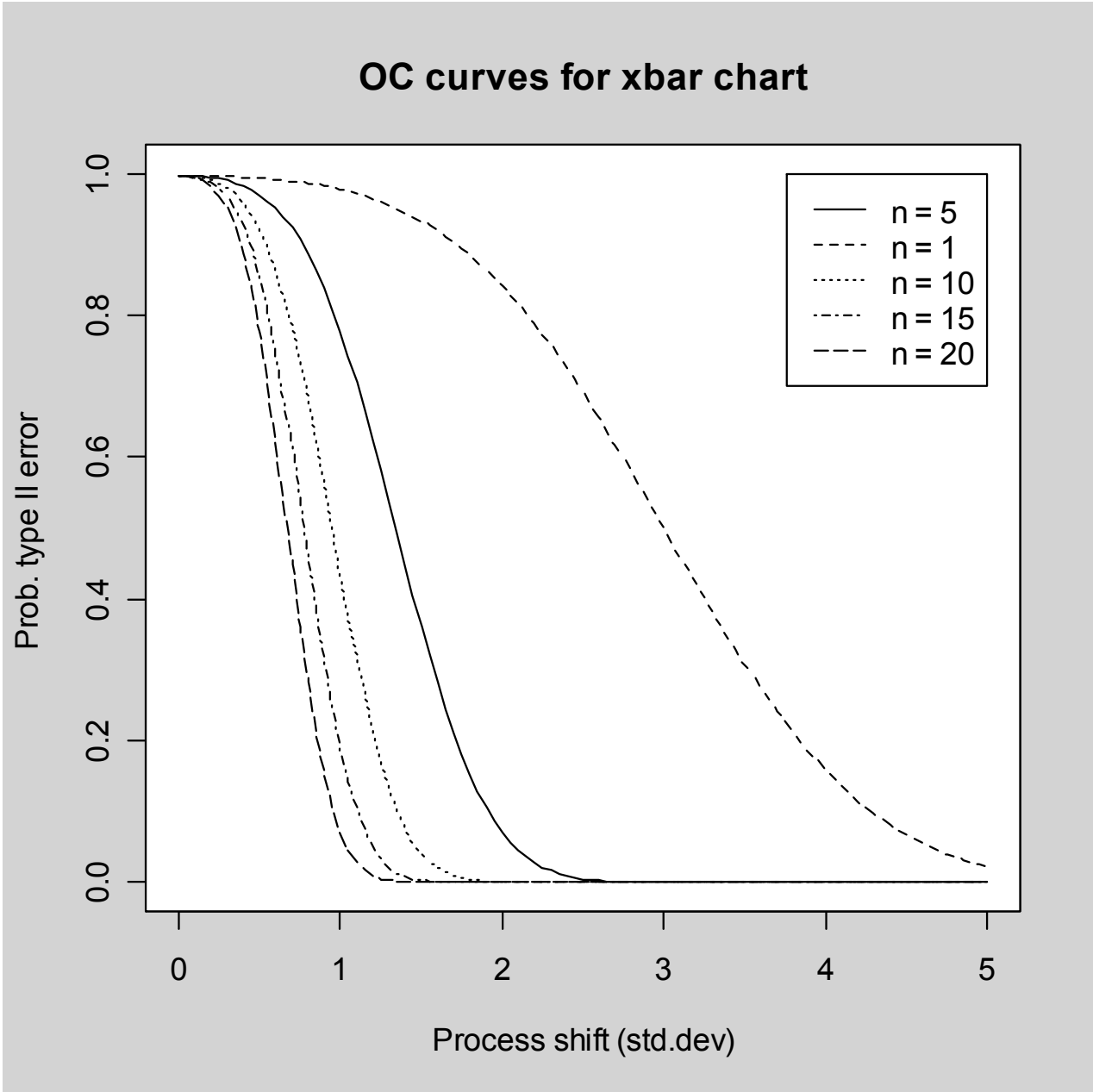
```
> datos<-read.table("carta U.txt",header=T)
> fix(datos)
```

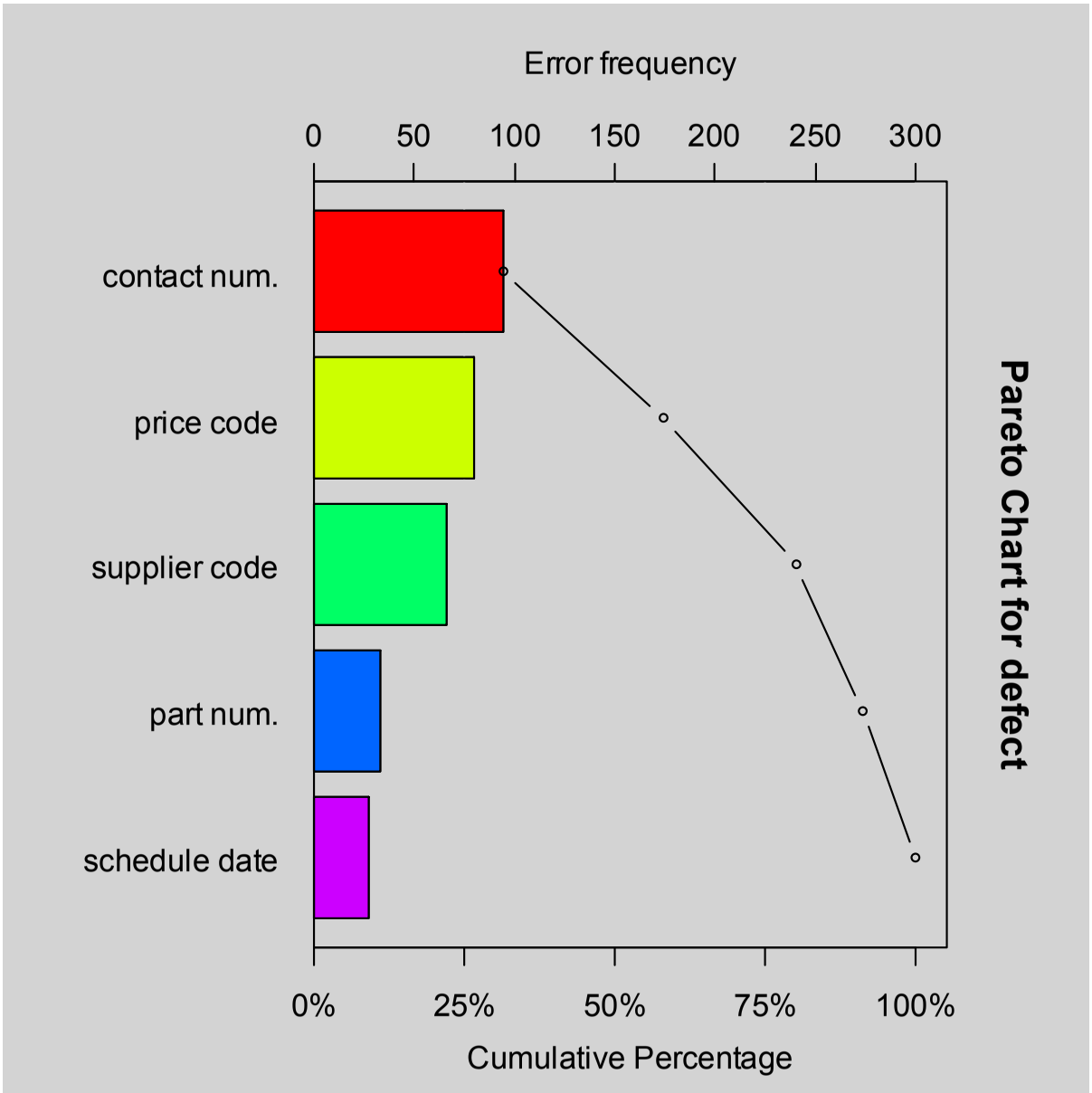
Data Editor

	Defectos	Unidades	var3
1	5	19	
2	8	15	
3	16	22	
4	3	10	
5	1	4	
6	6	22	
7	12	19	
8	5	14	
9	4	9	
10	0	6	
11	3	18	
12	5	8	
13	4	9	
14	11	31	
15	2	5	
16	11	15	
17	4	8	
18	2	6	

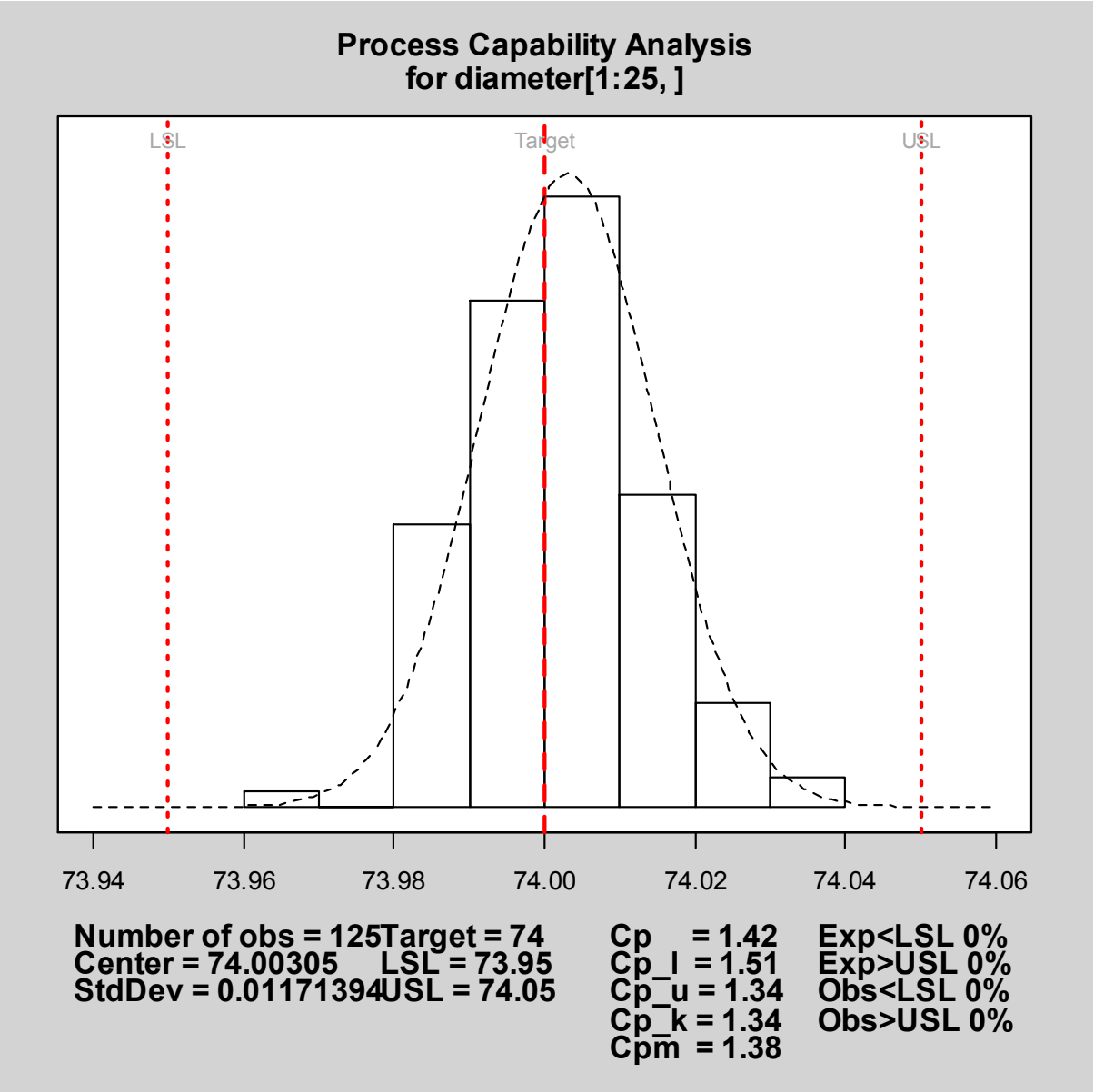
```
> attach(datos)
> qcc(Defectos,Unidades, type="u")
```



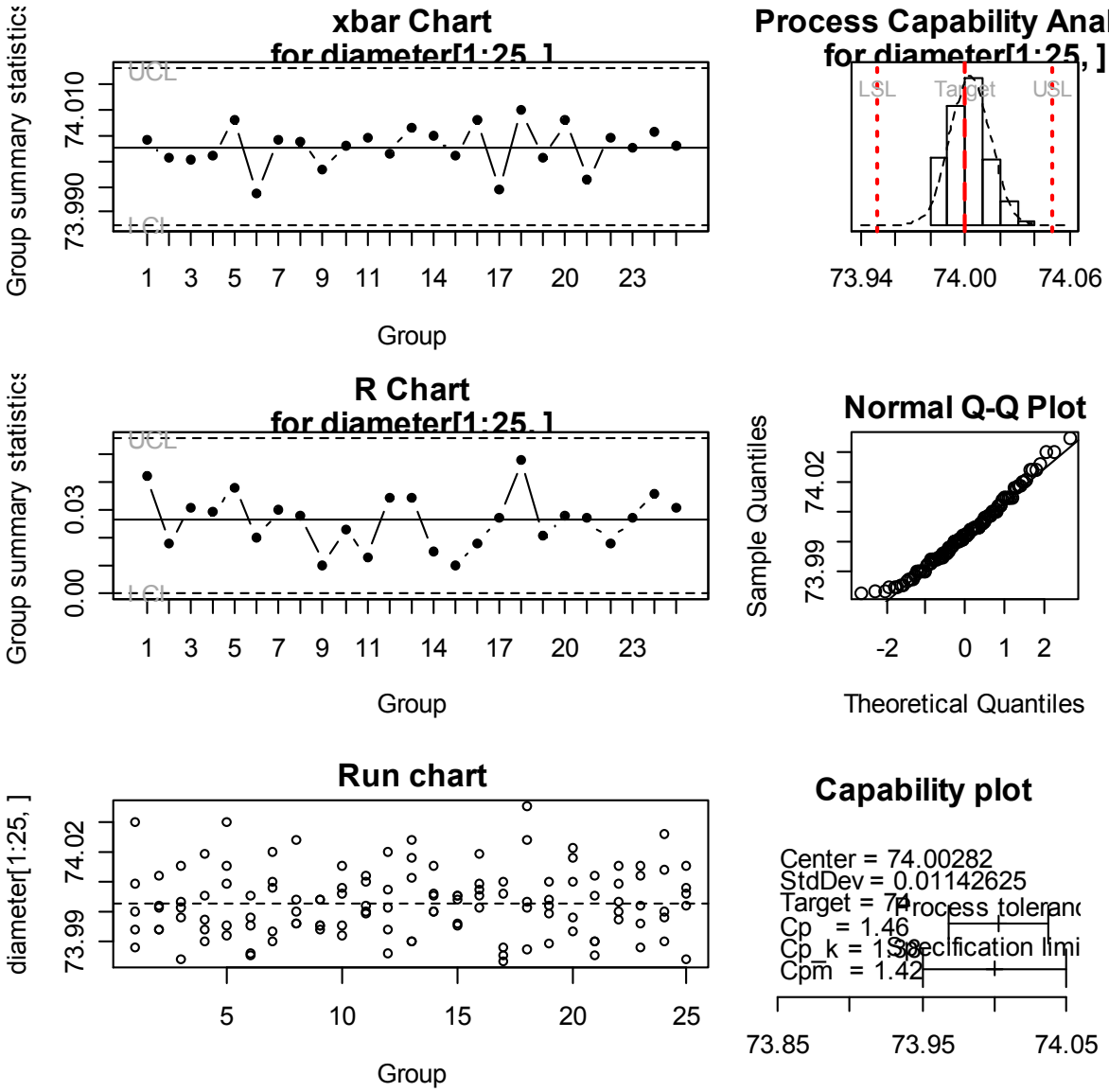

OC curves for xbar chart
Prob. type II error
0.0
0.2
0.4
0.6
0.8
1.0
0
1
2
3
4
5
Process shift (std.dev)
n = 5
n = 1
n = 10
n = 15
n = 20


Error frequency
0
50
100
150
200
250
300
contact num.
price code
supplier code
part num.
schedule date
0%
25%
50%
75%
100%
Cumulative Percentage
Pareto Chart for defect

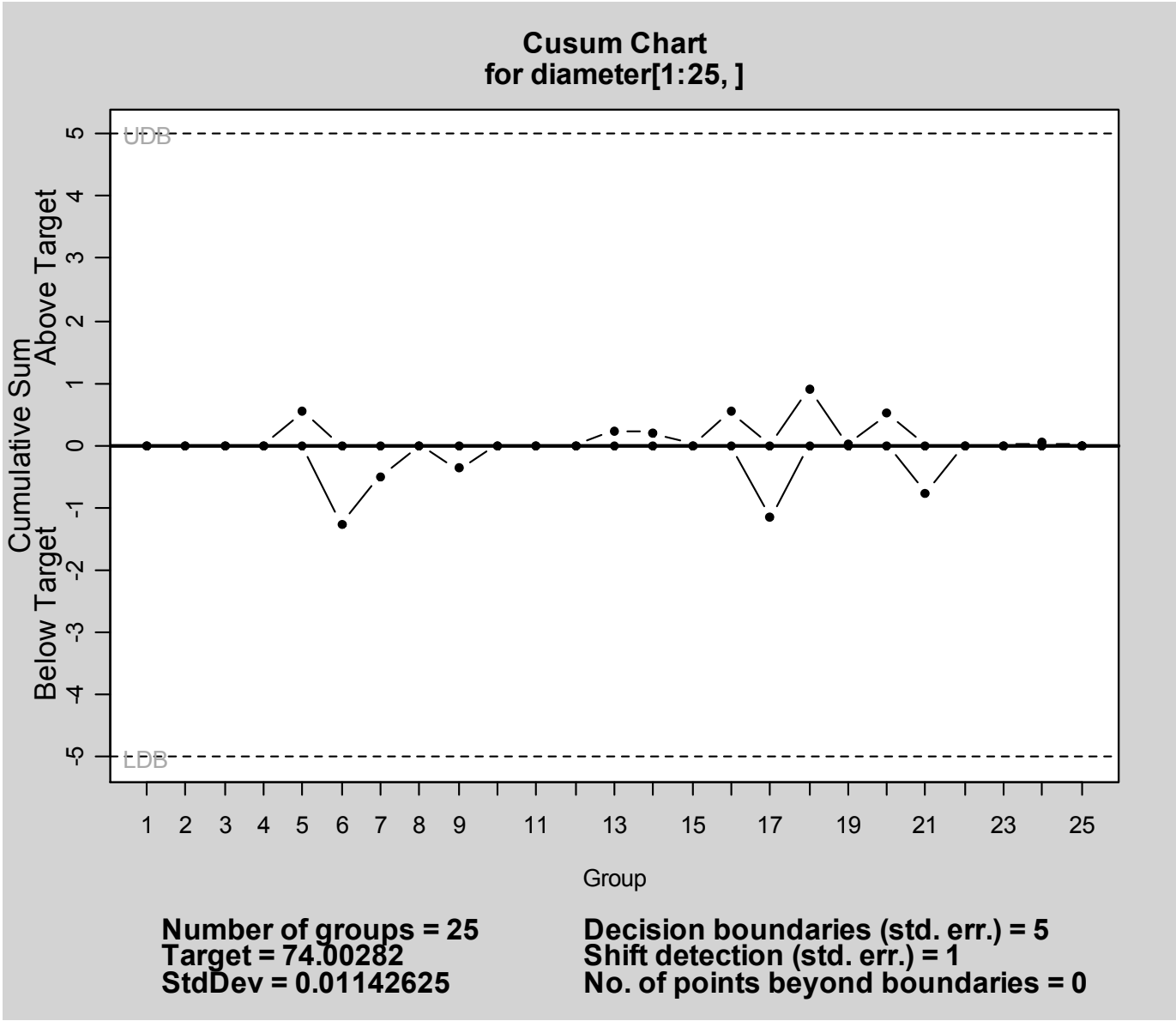
```
q <- qcc(diameter[1:25,], type="xbar", nsigmas=3, plot=FALSE)
process.capability(q, spec.limits=c(73.95,74.05))
```



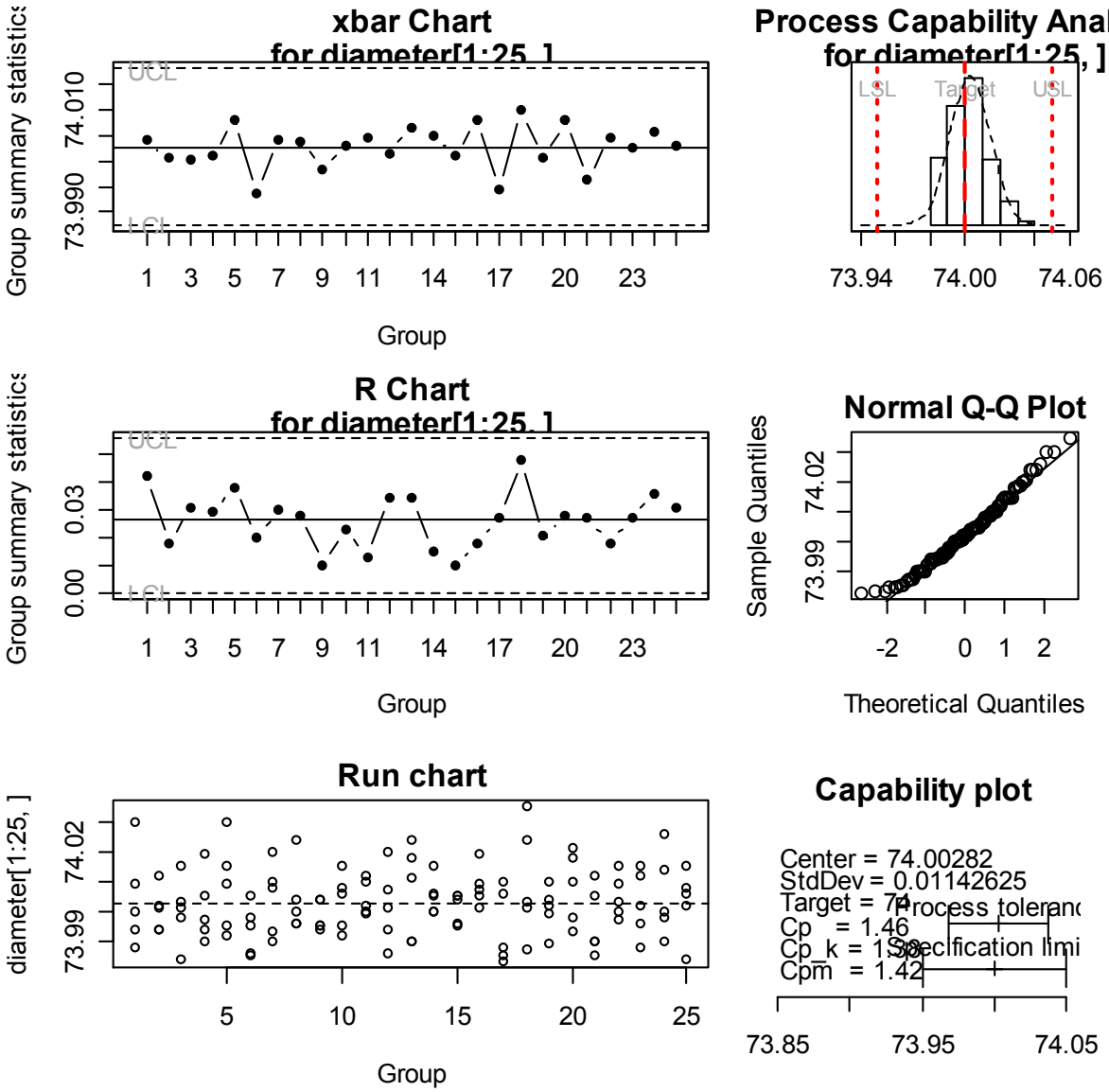
```
> q <- qcc(diameter[1:25,], type="xbar", nsigmas=3, plot=FALSE)
> process.capability.sixpack(q, spec.limits=c(73.95,74.05))
```



```
> q <- qcc(diameter[1:25,], type="xbar", nsigmas=3, plot=FALSE)
> cusum(q)
```



```
> q <- qcc(diameter[1:25,], type="xbar", nsigmas=3, plot=FALSE)
> process.capability.sixpack(q, spec.limits=c(73.95,74.05))
```



```
> q <- qcc(diameter[1:25,], type="xbar", nsigmas=3, plot=FALSE)
> ewma(q, lambda=0.2)
```