

# 614 Project

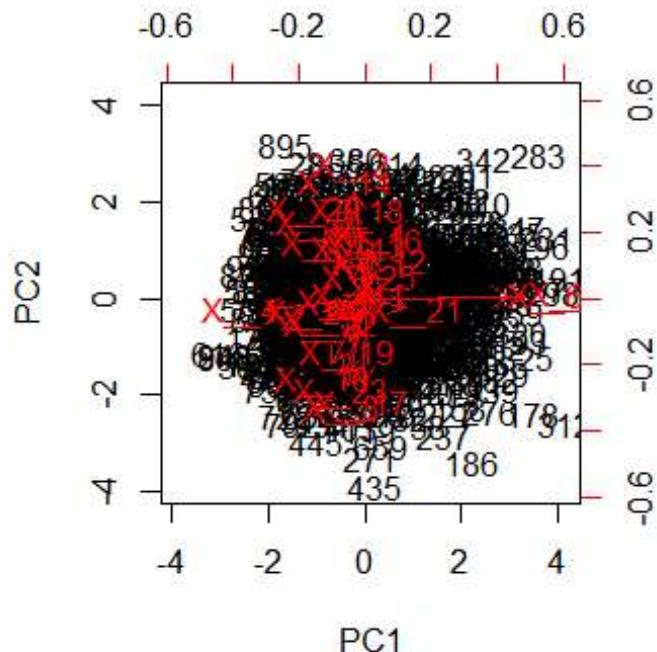
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December 6, 2017

```
library(readxl)
Project_data <- read_excel("Project_data.xlsx",
                           col_names = FALSE)
#View(Project_data)
#PCA
pca=prcomp(Project_data,scale = T)
pca$sdev

## [1] 1.2706247 1.1241929 1.1163074 1.0911532 1.0809568 1.0676043 1.0581909
## [8] 1.0496262 1.0250884 1.0098225 1.0043088 1.0004415 0.9959623 0.9859729
## [15] 0.9721307 0.9629673 0.9529222 0.9398268 0.9289453 0.9262012 0.9147261
## [22] 0.8854170 0.8790350 0.8690745 0.7602094

biplot(pca, scale=0)
```



```
pr.var=pca$sdev^2
pr.var
```

```

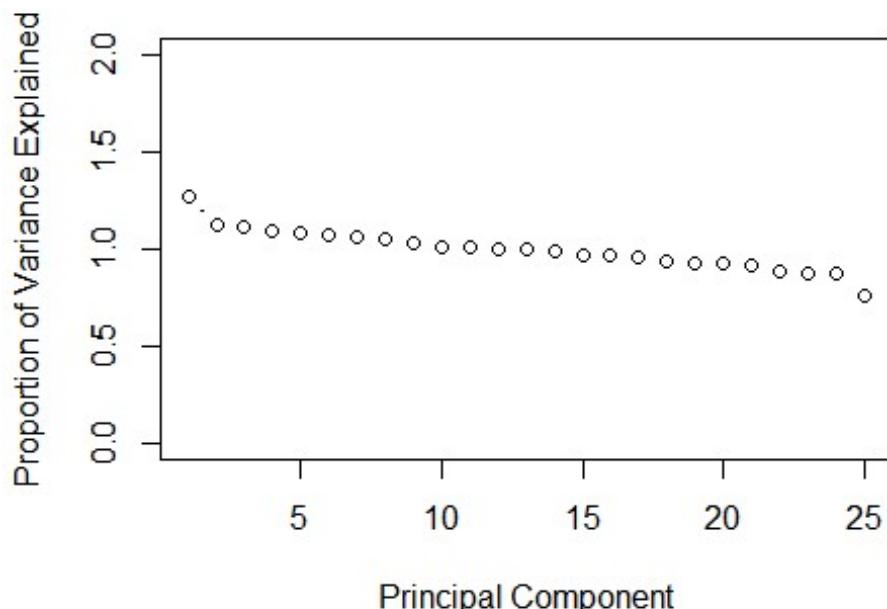
## [1] 1.6144871 1.2638097 1.2461421 1.1906154 1.1684676 1.1397789 1.1197679
## [8] 1.1017152 1.0508063 1.0197415 1.0086361 1.0008831 0.9919409 0.9721425
## [15] 0.9450380 0.9273059 0.9080608 0.8832745 0.8629393 0.8578487 0.8367238
## [22] 0.7839633 0.7727026 0.7552906 0.5779184

pve=pr.var/sum(pr.var)
pve

## [1] 0.06457948 0.05055239 0.04984568 0.04762461 0.04673870 0.04559116
## [7] 0.04479072 0.04406861 0.04203225 0.04078966 0.04034544 0.04003532
## [13] 0.03967763 0.03888570 0.03780152 0.03709224 0.03632243 0.03533098
## [19] 0.03451757 0.03431395 0.03346895 0.03135853 0.03090810 0.03021162
## [25] 0.02311673

plot(pca$sdev, xlab="Principal Component", ylab="Proportion of Variance Explained", ylim=c(0,2), type='b')

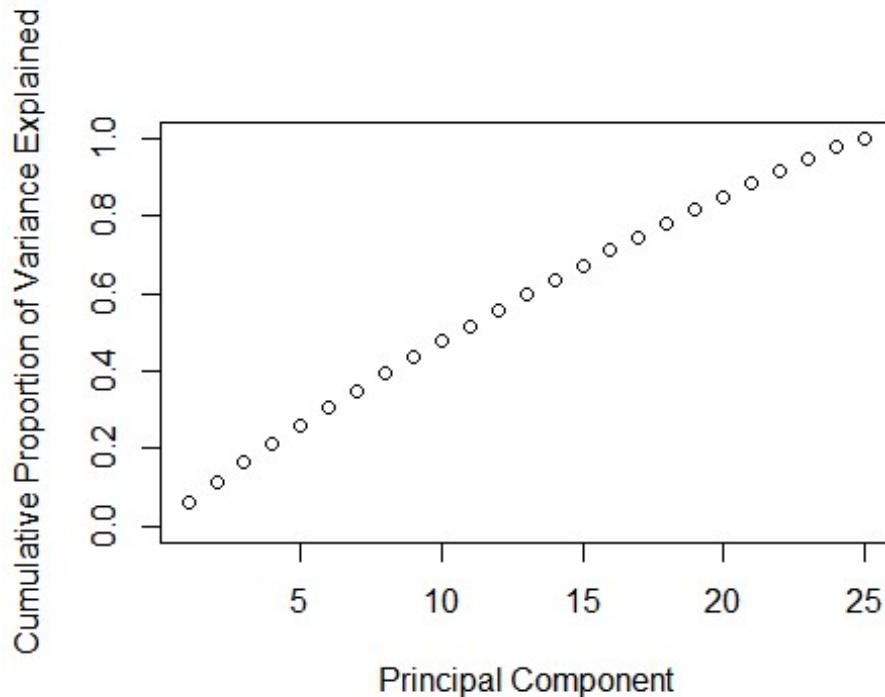
```



```

plot(cumsum(pve), xlab="Principal Component", ylab="Cumulative Proportion of Variance Explained", ylim=c(0,1), type='b')

```



```
#T2 Chart
library(qcc)

## Package 'qcc' version 2.7
## Type 'citation("qcc")' for citing this R package in publications.

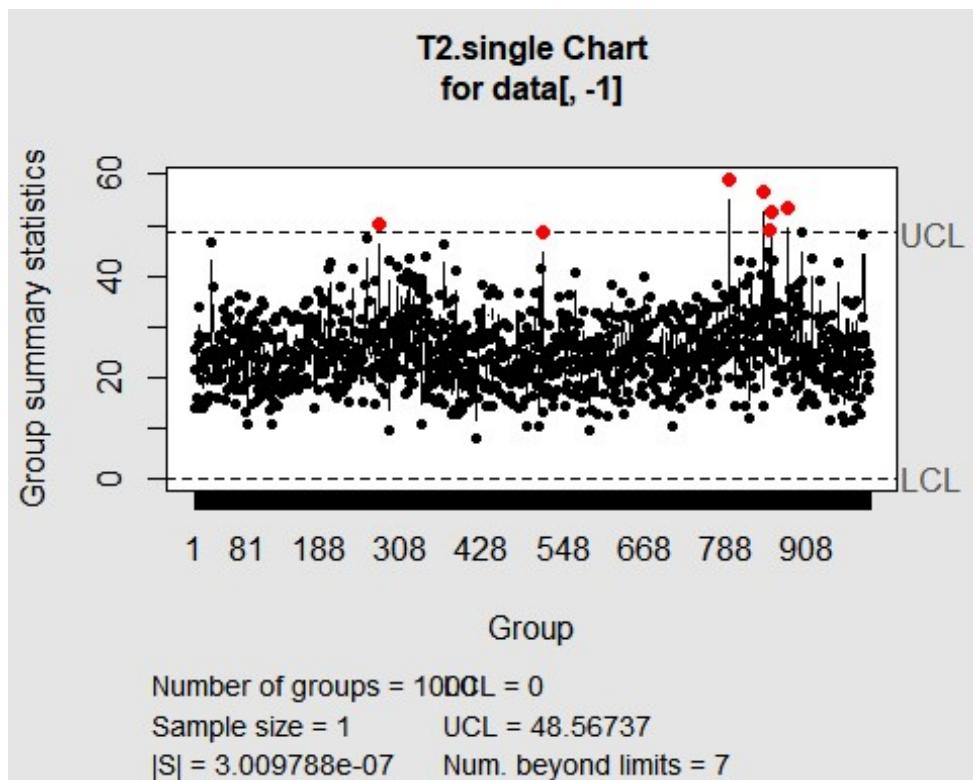
indices=c(1:1000)

data=cbind(indices,Project_data)

lim=limits.T2(nGroups=1000,size=1,nvars=25,conf=0.9973)

## Warning in qf(conf, p, m * n - m - p + 1): NaNs produced
## Warning in qf(conf, p, m * n - m - p + 1): NaNs produced

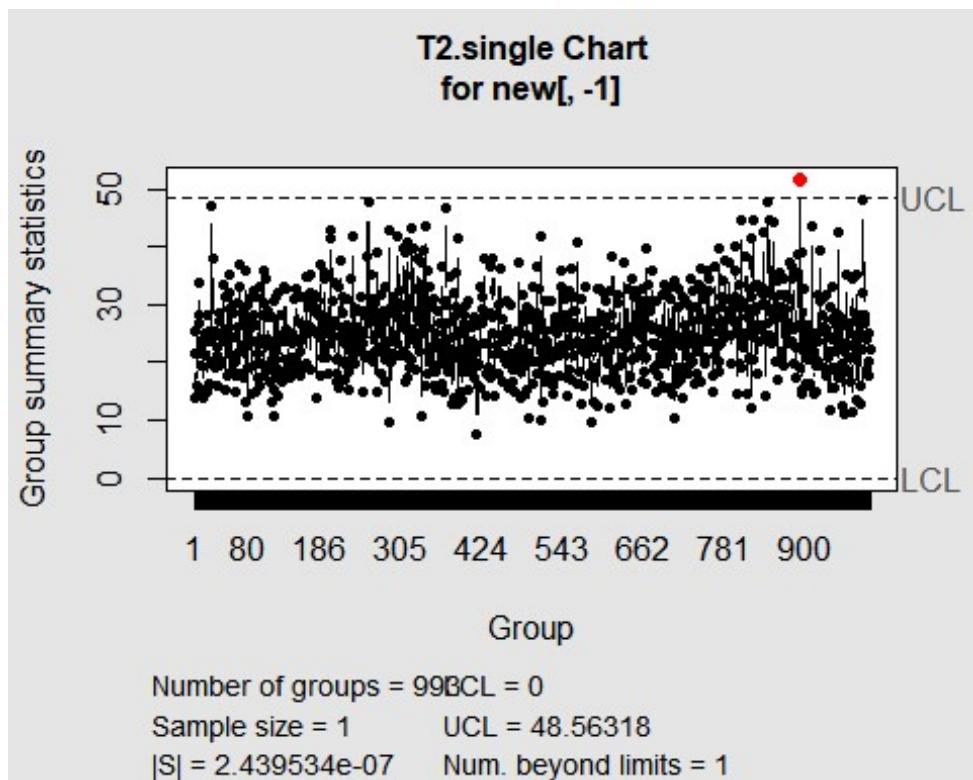
CHART=mqcc(data[,-1], type = c("T2"),
            pred.limits = FALSE,confidence.level = .9973,
            limits=TRUE, rules = shewhart.rules,
            plot = TRUE)
```



```

violation=CHART$violations$beyond.limits
new=data[-violation,]
CHART1=mqcc(new[,-1], type = c("T2"), center=NULL, cov=NULL,
            limits = TRUE, pred.limits = FALSE,
            confidence.level = .9973, rules = shewhart.rules,
            plot = TRUE)

```



```

violation1=CHART1$violations$beyond.limits
new1=new[-violation1,]
CHART2=mqcc(new1[,-1], type = c("T2"), center=NULL, cov=NULL,
            limits = TRUE, pred.limits = FALSE,
            confidence.level = .9973, rules = shewhart.rules,
            plot = TRUE)

```

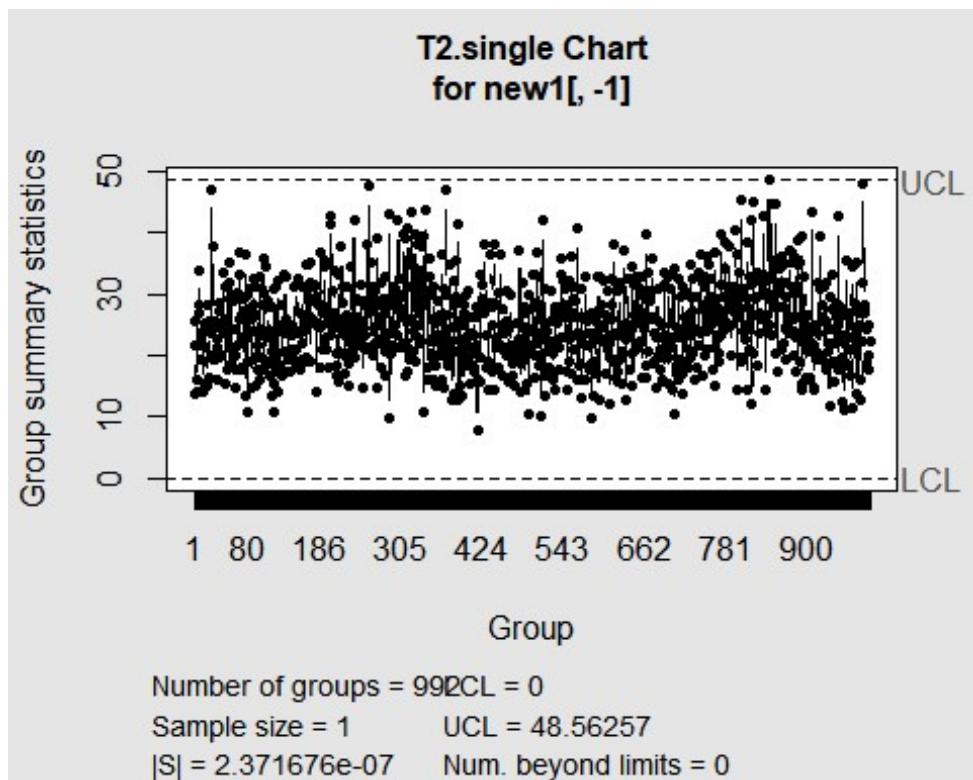


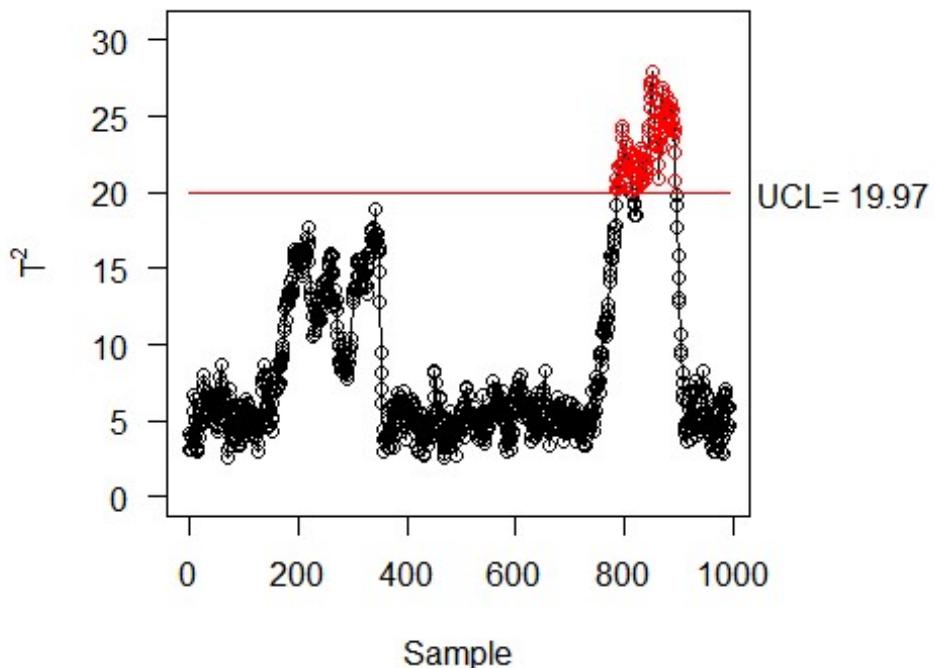
CHART2\$center

```
##      X_1        X_2        X_3        X_4        X_5
## -0.006295196 0.018433697 -0.041747459 -0.096047712 -0.039822558
##      X_6        X_7        X_8        X_9        X_10
##  0.202684805  0.394032719  0.009722109 -0.018130408  0.012051320
##      X_11       X_12       X_13       X_14       X_15
## -0.043382042 -0.015808032 -0.011056646  0.013070983  0.023711541
##      X_16       X_17       X_18       X_19       X_20
## -0.018168694 -0.008417846 -0.013173940  0.025662505  0.007566129
##      X_21       X_22       X_23       X_24       X_25
## -0.398066317  0.066318856  0.002529854 -0.016192226 -0.008873372
```

#Mcusum Chart

```
library(MSQC)
cus=mult.chart(type = "mcusum", x=new1[,-1], alpha = 0.0027, k = 2, h =
19.97, phase = 1, method = "sw")
```

## MCUSUM Control Chart by Crosier (1988)



```
summary(cus)

##          Length Class  Mode
## ucl           1   -none- character
## t2            992  -none- numeric
## Xmv           25   -none- numeric
## covariance  625   -none- numeric

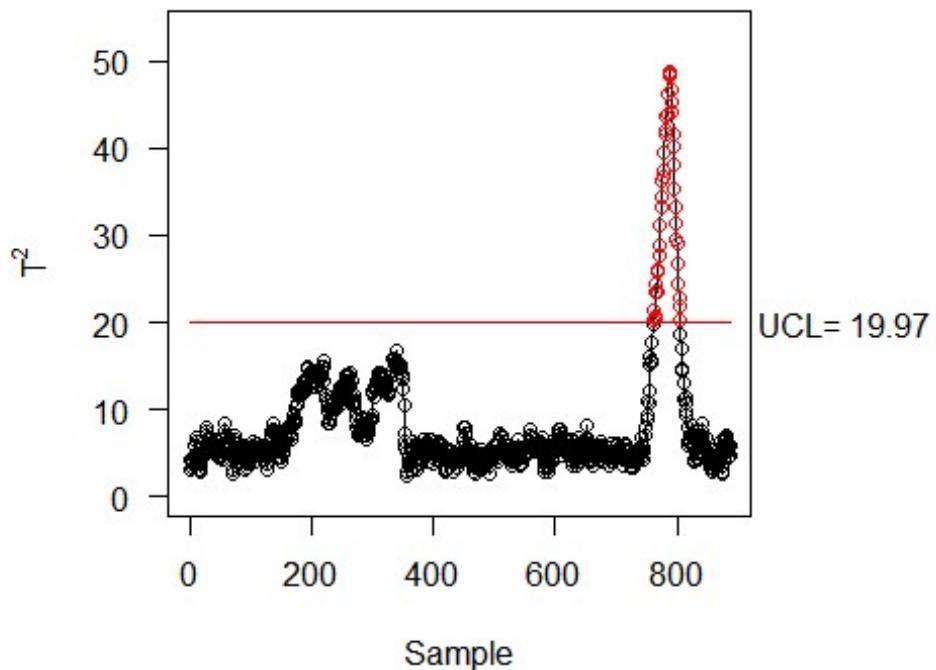
#cus$t2

itr_points1=c(785:815,821:894)

new2=new1[-itr_points1,]

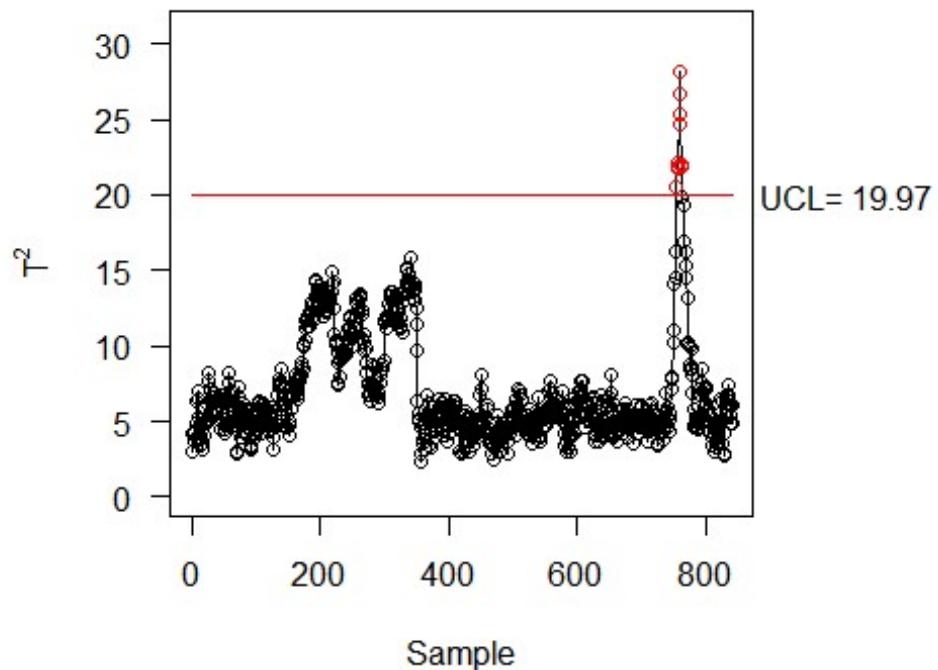
cus2=mult.chart(type = "mcusum", x=new2[,-1], alpha = 0.0027, k = 2, h =
19.97, phase = 1, method = "sw")
```

## MCUSUM Control Chart by Crosier (1988)



```
#cus2$t2  
  
itr_points2=c(761:805)  
new3=new2[-itr_points2,]  
  
cus3=mult.chart(type = "mcusum", x=new3[,-1], alpha = 0.0027, k = 2, h =  
19.97, phase = 1, method = "sw")
```

## MCUSUM Control Chart by Crosier (1988)

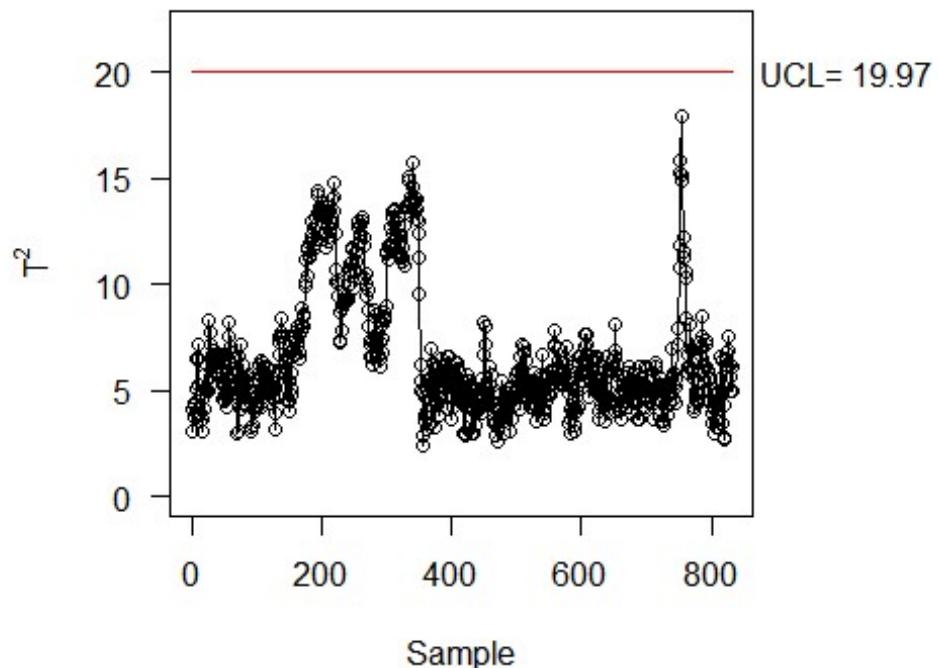


```
#cus3$t2
```

```
itr_points3=c(755:764)
new4=new3[-itr_points3,]

cus4=mult.chart(type = "mcusum", x=new4[,-1], alpha = 0.0027, k = 2, h =
19.97, phase = 1, method = "sw")
```

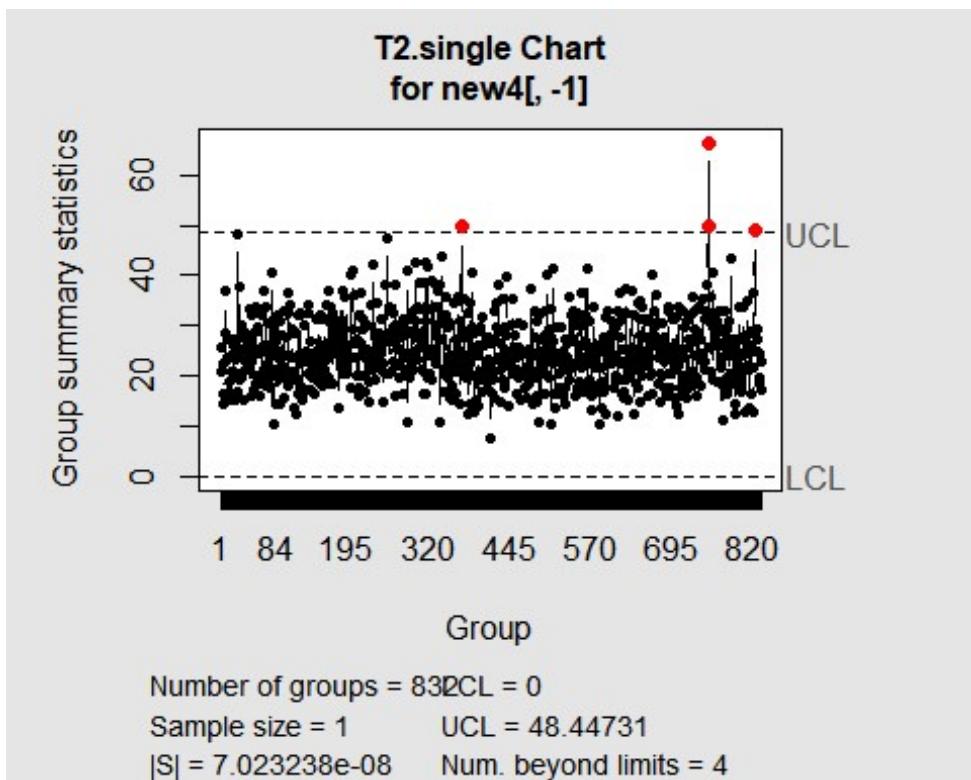
## MCUSUM Control Chart by Crosier (1988)



```
#cus4$t2
```

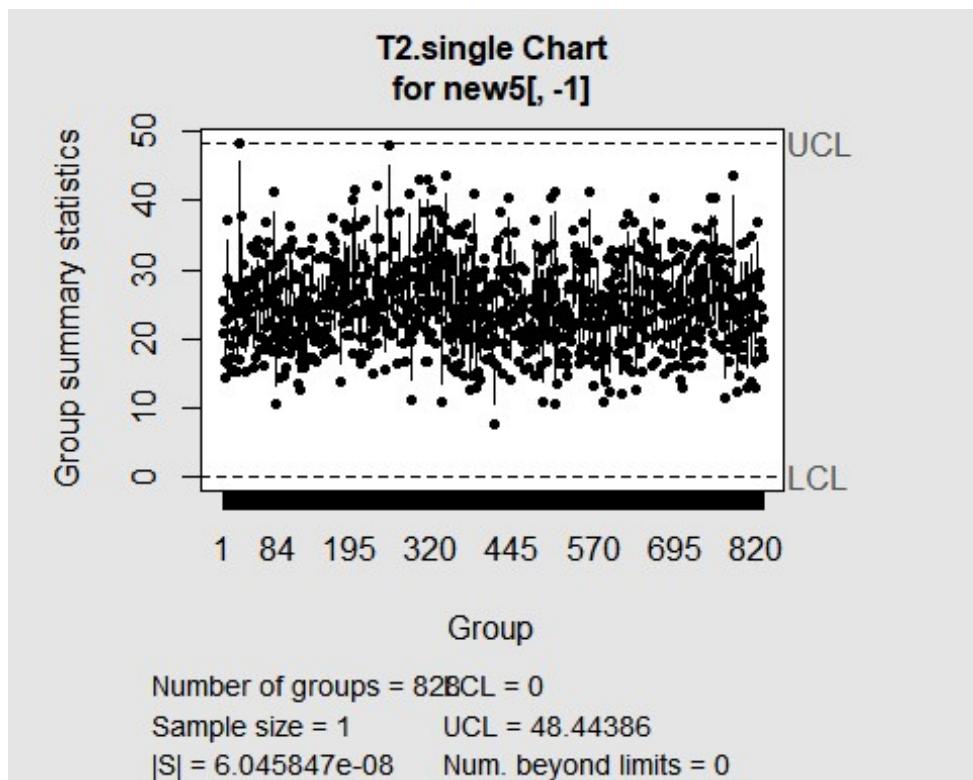
```
#checking in t2 chart
```

```
Chart3=mqcc(new4[,-1], type = c("T2"), center=NULL, cov=NULL,
            limits = TRUE, pred.limits = FALSE,
            confidence.level = .9973, rules = shewhart.rules,
            plot = TRUE)
```



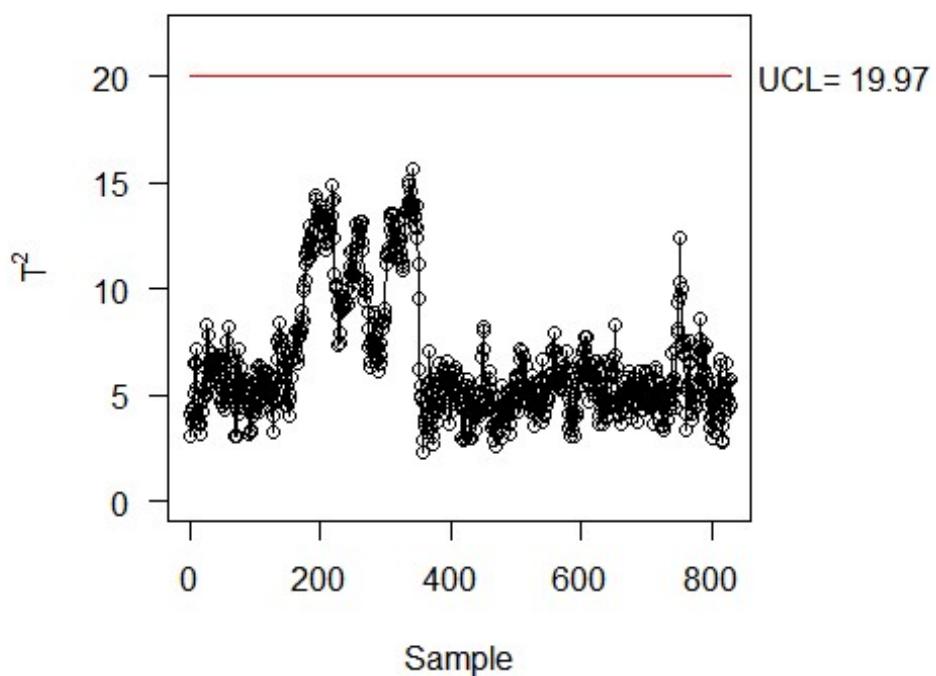
```
violation2=Chart3$violations$beyond.limits
new5=new4[-violation2,]
```

```
Chart4=mqcc(new5[,-1], type = c("T2"), center=NULL, cov=NULL,
            limits = TRUE, pred.limits = FALSE,
            confidence.level = .9973, rules = shewhart.rules,
            plot = TRUE)
```



```
#checking in cusum chart
cus5=mult.chart(type = "mcusum", x=new5[,-1], alpha = 0.0027, k = 2, h =
19.97, phase = 1, method = "sw")
```

### MCUSUM Control Chart by Crosier (1988)



```
cus5$t2
```

```
##      [,1]
## [1,] 3.06
## [2,] 4.16
## [3,] 4.38
## [4,] 4.31
## [5,] 3.78
## [6,] 3.97
## [7,] 5.06
## [8,] 6.47
## [9,] 7.17
## [10,] 6.50
## [11,] 5.37
## [12,] 4.87
## [13,] 3.95
## [14,] 3.63
## [15,] 4.63
## [16,] 3.70
## [17,] 3.18
## [18,] 4.25
## [19,] 5.83
## [20,] 5.16
## [21,] 5.10
## [22,] 6.35
## [23,] 5.12
## [24,] 4.99
## [25,] 5.06
## [26,] 8.34
## [27,] 7.81
## [28,] 7.16
## [29,] 5.67
## [30,] 5.67
## [31,] 6.71
## [32,] 5.47
## [33,] 6.40
## [34,] 6.97
## [35,] 6.70
## [36,] 5.90
## [37,] 6.34
## [38,] 5.78
## [39,] 6.58
## [40,] 6.22
## [41,] 6.72
## [42,] 6.78
## [43,] 6.62
## [44,] 6.88
## [45,] 6.63
## [46,] 4.66
## [47,] 5.47
```

```
## [48,] 6.52
## [49,] 5.21
## [50,] 4.80
## [51,] 4.54
## [52,] 4.29
## [53,] 5.63
## [54,] 5.11
## [55,] 4.70
## [56,] 5.54
## [57,] 7.52
## [58,] 8.26
## [59,] 7.11
## [60,] 6.77
## [61,] 6.28
## [62,] 5.72
## [63,] 5.99
## [64,] 5.78
## [65,] 5.76
## [66,] 4.91
## [67,] 5.21
## [68,] 5.99
## [69,] 4.74
## [70,] 3.05
## [71,] 3.08
## [72,] 4.62
## [73,] 6.57
## [74,] 7.18
## [75,] 5.50
## [76,] 4.14
## [77,] 5.64
## [78,] 4.90
## [79,] 6.28
## [80,] 5.60
## [81,] 4.41
## [82,] 5.18
## [83,] 4.45
## [84,] 5.28
## [85,] 5.67
## [86,] 5.47
## [87,] 5.76
## [88,] 5.77
## [89,] 4.53
## [90,] 4.61
## [91,] 3.17
## [92,] 3.24
## [93,] 3.39
## [94,] 4.59
## [95,] 4.22
## [96,] 5.27
## [97,] 4.78
```

```
## [98,] 4.05
## [99,] 4.25
## [100,] 4.53
## [101,] 4.67
## [102,] 5.78
## [103,] 5.46
## [104,] 6.29
## [105,] 6.40
## [106,] 5.69
## [107,] 4.23
## [108,] 5.24
## [109,] 6.16
## [110,] 6.35
## [111,] 5.10
## [112,] 5.56
## [113,] 5.84
## [114,] 5.87
## [115,] 6.10
## [116,] 5.80
## [117,] 5.09
## [118,] 6.10
## [119,] 5.01
## [120,] 4.52
## [121,] 4.94
## [122,] 5.71
## [123,] 4.99
## [124,] 4.64
## [125,] 5.98
## [126,] 4.77
## [127,] 3.23
## [128,] 4.05
## [129,] 5.24
## [130,] 5.83
## [131,] 5.75
## [132,] 4.85
## [133,] 4.71
## [134,] 6.72
## [135,] 7.53
## [136,] 7.26
## [137,] 7.76
## [138,] 8.43
## [139,] 7.58
## [140,] 7.52
## [141,] 7.26
## [142,] 6.18
## [143,] 6.07
## [144,] 6.32
## [145,] 5.84
## [146,] 4.54
## [147,] 6.64
```

```
## [148,] 6.50
## [149,] 5.45
## [150,] 4.55
## [151,] 4.05
## [152,] 4.75
## [153,] 5.07
## [154,] 5.85
## [155,] 6.72
## [156,] 6.98
## [157,] 6.74
## [158,] 6.72
## [159,] 6.71
## [160,] 7.74
## [161,] 7.25
## [162,] 8.06
## [163,] 7.11
## [164,] 7.89
## [165,] 6.52
## [166,] 6.84
## [167,] 7.70
## [168,] 7.86
## [169,] 8.14
## [170,] 8.94
## [171,] 8.58
## [172,] 8.02
## [173,] 8.51
## [174,] 9.96
## [175,] 10.13
## [176,] 11.13
## [177,] 10.39
## [178,] 11.64
## [179,] 11.77
## [180,] 11.34
## [181,] 11.93
## [182,] 11.42
## [183,] 12.13
## [184,] 12.29
## [185,] 12.99
## [186,] 12.26
## [187,] 11.84
## [188,] 12.65
## [189,] 11.72
## [190,] 11.99
## [191,] 12.79
## [192,] 13.21
## [193,] 14.18
## [194,] 14.41
## [195,] 13.38
## [196,] 13.64
## [197,] 13.56
```

```
## [198,] 13.49
## [199,] 13.88
## [200,] 13.36
## [201,] 13.61
## [202,] 13.44
## [203,] 13.64
## [204,] 13.33
## [205,] 13.45
## [206,] 12.45
## [207,] 11.82
## [208,] 12.25
## [209,] 12.07
## [210,] 12.66
## [211,] 13.48
## [212,] 12.64
## [213,] 12.65
## [214,] 13.16
## [215,] 12.88
## [216,] 13.05
## [217,] 14.07
## [218,] 13.49
## [219,] 14.84
## [220,] 14.18
## [221,] 12.37
## [222,] 10.67
## [223,] 10.15
## [224,] 10.22
## [225,] 10.04
## [226,] 9.46
## [227,] 8.77
## [228,] 7.36
## [229,] 7.44
## [230,] 7.91
## [231,] 9.11
## [232,] 8.94
## [233,] 9.60
## [234,] 9.34
## [235,] 9.15
## [236,] 9.20
## [237,] 9.30
## [238,] 9.49
## [239,] 9.96
## [240,] 9.41
## [241,] 9.27
## [242,] 10.45
## [243,] 10.07
## [244,] 11.02
## [245,] 10.66
## [246,] 11.69
## [247,] 11.07
```

```
## [248,] 11.79
## [249,]  9.86
## [250,] 10.73
## [251,] 10.70
## [252,] 10.62
## [253,] 11.08
## [254,] 11.55
## [255,] 11.88
## [256,] 13.02
## [257,] 12.68
## [258,] 12.30
## [259,] 12.00
## [260,] 12.79
## [261,] 12.98
## [262,] 13.15
## [263,] 13.14
## [264,] 11.83
## [265,] 12.20
## [266,] 10.35
## [267,]  9.43
## [268,]  9.45
## [269,] 10.53
## [270,] 10.12
## [271,]  9.81
## [272,]  8.90
## [273,]  8.14
## [274,]  7.31
## [275,]  7.42
## [276,]  6.62
## [277,]  6.28
## [278,]  6.63
## [279,]  7.27
## [280,]  7.29
## [281,]  7.69
## [282,]  8.87
## [283,]  8.65
## [284,]  6.88
## [285,]  7.22
## [286,]  6.68
## [287,]  7.78
## [288,]  6.67
## [289,]  7.31
## [290,]  6.11
## [291,]  6.54
## [292,]  6.85
## [293,]  7.50
## [294,]  8.12
## [295,]  8.37
## [296,]  8.46
## [297,]  8.78
```

```
## [298,]  8.55
## [299,]  9.05
## [300,] 11.57
## [301,] 11.68
## [302,] 11.21
## [303,] 11.76
## [304,] 11.89
## [305,] 11.75
## [306,] 11.87
## [307,] 12.75
## [308,] 13.24
## [309,] 13.51
## [310,] 12.48
## [311,] 13.53
## [312,] 13.44
## [313,] 12.87
## [314,] 12.06
## [315,] 11.49
## [316,] 11.46
## [317,] 11.42
## [318,] 11.56
## [319,] 13.17
## [320,] 12.08
## [321,] 12.37
## [322,] 12.34
## [323,] 11.48
## [324,] 11.72
## [325,] 11.04
## [326,] 11.21
## [327,] 10.87
## [328,] 12.78
## [329,] 13.35
## [330,] 13.61
## [331,] 13.68
## [332,] 13.72
## [333,] 13.64
## [334,] 14.91
## [335,] 15.09
## [336,] 14.13
## [337,] 14.13
## [338,] 13.71
## [339,] 14.56
## [340,] 13.97
## [341,] 15.67
## [342,] 13.81
## [343,] 14.05
## [344,] 13.38
## [345,] 12.98
## [346,] 13.48
## [347,] 13.93
```

```
## [348,] 12.89
## [349,] 12.36
## [350,] 11.20
## [351,] 9.53
## [352,] 6.21
## [353,] 5.47
## [354,] 5.02
## [355,] 4.90
## [356,] 2.90
## [357,] 2.35
## [358,] 4.71
## [359,] 3.60
## [360,] 3.96
## [361,] 3.80
## [362,] 4.08
## [363,] 3.24
## [364,] 5.30
## [365,] 5.57
## [366,] 5.56
## [367,] 7.06
## [368,] 5.76
## [369,] 3.49
## [370,] 4.94
## [371,] 3.97
## [372,] 3.07
## [373,] 2.67
## [374,] 5.19
## [375,] 4.59
## [376,] 4.76
## [377,] 4.29
## [378,] 4.27
## [379,] 3.78
## [380,] 4.63
## [381,] 5.75
## [382,] 5.51
## [383,] 6.53
## [384,] 5.98
## [385,] 5.96
## [386,] 5.93
## [387,] 6.12
## [388,] 5.25
## [389,] 6.25
## [390,] 5.36
## [391,] 4.09
## [392,] 5.59
## [393,] 6.60
## [394,] 5.27
## [395,] 6.60
## [396,] 5.47
## [397,] 4.85
```

```
## [398,] 3.64
## [399,] 5.18
## [400,] 4.65
## [401,] 4.25
## [402,] 5.60
## [403,] 5.98
## [404,] 5.11
## [405,] 5.38
## [406,] 6.28
## [407,] 6.09
## [408,] 6.35
## [409,] 5.24
## [410,] 5.91
## [411,] 5.95
## [412,] 4.88
## [413,] 5.02
## [414,] 5.15
## [415,] 4.40
## [416,] 4.64
## [417,] 2.97
## [418,] 4.31
## [419,] 2.92
## [420,] 4.45
## [421,] 3.01
## [422,] 4.87
## [423,] 5.50
## [424,] 5.71
## [425,] 5.50
## [426,] 5.16
## [427,] 4.70
## [428,] 5.07
## [429,] 4.33
## [430,] 3.00
## [431,] 3.74
## [432,] 2.97
## [433,] 4.55
## [434,] 5.05
## [435,] 5.08
## [436,] 3.99
## [437,] 3.39
## [438,] 4.54
## [439,] 4.22
## [440,] 4.97
## [441,] 4.14
## [442,] 4.28
## [443,] 4.32
## [444,] 4.01
## [445,] 5.14
## [446,] 5.61
## [447,] 5.21
```

```
## [448,] 6.78
## [449,] 8.21
## [450,] 8.05
## [451,] 7.19
## [452,] 5.19
## [453,] 4.77
## [454,] 4.38
## [455,] 4.90
## [456,] 4.48
## [457,] 4.35
## [458,] 5.27
## [459,] 6.13
## [460,] 5.77
## [461,] 4.56
## [462,] 4.45
## [463,] 4.86
## [464,] 3.50
## [465,] 3.69
## [466,] 2.91
## [467,] 3.59
## [468,] 3.50
## [469,] 2.57
## [470,] 3.25
## [471,] 4.09
## [472,] 3.72
## [473,] 4.86
## [474,] 4.26
## [475,] 4.38
## [476,] 3.80
## [477,] 5.49
## [478,] 4.45
## [479,] 2.99
## [480,] 3.76
## [481,] 3.81
## [482,] 4.91
## [483,] 4.43
## [484,] 4.65
## [485,] 4.06
## [486,] 4.07
## [487,] 4.18
## [488,] 5.04
## [489,] 5.28
## [490,] 3.15
## [491,] 3.69
## [492,] 4.63
## [493,] 5.21
## [494,] 4.90
## [495,] 4.59
## [496,] 4.33
## [497,] 5.12
```

```
## [498,] 4.88
## [499,] 5.77
## [500,] 5.95
## [501,] 5.84
## [502,] 4.91
## [503,] 4.18
## [504,] 5.03
## [505,] 6.71
## [506,] 6.04
## [507,] 7.22
## [508,] 5.41
## [509,] 5.23
## [510,] 7.05
## [511,] 6.78
## [512,] 5.42
## [513,] 4.78
## [514,] 6.43
## [515,] 4.68
## [516,] 5.30
## [517,] 4.62
## [518,] 5.05
## [519,] 4.95
## [520,] 4.85
## [521,] 4.22
## [522,] 4.91
## [523,] 5.15
## [524,] 5.59
## [525,] 5.95
## [526,] 4.53
## [527,] 4.13
## [528,] 4.34
## [529,] 3.59
## [530,] 4.71
## [531,] 5.27
## [532,] 5.15
## [533,] 5.04
## [534,] 4.42
## [535,] 4.35
## [536,] 5.32
## [537,] 5.77
## [538,] 5.63
## [539,] 6.70
## [540,] 5.17
## [541,] 3.75
## [542,] 4.17
## [543,] 4.00
## [544,] 5.58
## [545,] 5.69
## [546,] 4.55
## [547,] 4.85
```

```
## [548,] 5.65
## [549,] 4.86
## [550,] 4.77
## [551,] 5.33
## [552,] 5.99
## [553,] 5.90
## [554,] 5.41
## [555,] 5.99
## [556,] 7.08
## [557,] 7.19
## [558,] 7.89
## [559,] 5.89
## [560,] 5.58
## [561,] 5.78
## [562,] 7.06
## [563,] 5.85
## [564,] 6.14
## [565,] 5.41
## [566,] 5.79
## [567,] 5.39
## [568,] 5.29
## [569,] 5.28
## [570,] 5.96
## [571,] 6.28
## [572,] 5.83
## [573,] 5.62
## [574,] 5.27
## [575,] 6.45
## [576,] 6.23
## [577,] 7.07
## [578,] 5.61
## [579,] 4.90
## [580,] 3.43
## [581,] 4.15
## [582,] 3.10
## [583,] 3.63
## [584,] 4.58
## [585,] 5.15
## [586,] 4.06
## [587,] 3.35
## [588,] 4.26
## [589,] 3.08
## [590,] 3.95
## [591,] 5.01
## [592,] 5.87
## [593,] 4.05
## [594,] 4.24
## [595,] 5.36
## [596,] 6.62
## [597,] 6.64
```

```
## [598,] 5.80
## [599,] 5.96
## [600,] 6.44
## [601,] 5.47
## [602,] 6.45
## [603,] 7.08
## [604,] 7.72
## [605,] 7.15
## [606,] 7.24
## [607,] 7.74
## [608,] 6.83
## [609,] 6.76
## [610,] 5.64
## [611,] 4.71
## [612,] 5.42
## [613,] 6.11
## [614,] 6.05
## [615,] 6.44
## [616,] 6.49
## [617,] 6.01
## [618,] 5.23
## [619,] 5.08
## [620,] 5.02
## [621,] 5.46
## [622,] 6.63
## [623,] 6.60
## [624,] 5.23
## [625,] 5.27
## [626,] 3.65
## [627,] 4.07
## [628,] 4.80
## [629,] 5.47
## [630,] 4.31
## [631,] 6.17
## [632,] 4.72
## [633,] 4.93
## [634,] 3.62
## [635,] 4.38
## [636,] 5.93
## [637,] 6.62
## [638,] 5.64
## [639,] 4.04
## [640,] 3.93
## [641,] 4.47
## [642,] 4.76
## [643,] 4.44
## [644,] 4.50
## [645,] 4.65
## [646,] 5.98
## [647,] 6.42
```

```
## [648,] 6.16
## [649,] 6.15
## [650,] 6.65
## [651,] 6.92
## [652,] 8.30
## [653,] 5.82
## [654,] 6.27
## [655,] 5.41
## [656,] 4.84
## [657,] 4.05
## [658,] 4.14
## [659,] 4.75
## [660,] 4.32
## [661,] 3.67
## [662,] 5.07
## [663,] 5.30
## [664,] 4.36
## [665,] 5.69
## [666,] 4.95
## [667,] 5.21
## [668,] 5.11
## [669,] 5.27
## [670,] 4.19
## [671,] 5.83
## [672,] 5.23
## [673,] 5.41
## [674,] 6.14
## [675,] 4.84
## [676,] 5.51
## [677,] 3.97
## [678,] 4.92
## [679,] 5.83
## [680,] 4.42
## [681,] 5.41
## [682,] 5.25
## [683,] 5.55
## [684,] 5.60
## [685,] 5.41
## [686,] 3.70
## [687,] 3.73
## [688,] 5.22
## [689,] 6.13
## [690,] 5.30
## [691,] 4.86
## [692,] 4.33
## [693,] 5.22
## [694,] 5.44
## [695,] 5.44
## [696,] 4.33
## [697,] 5.31
```

```
## [698,] 5.28
## [699,] 6.17
## [700,] 6.07
## [701,] 5.46
## [702,] 5.21
## [703,] 4.82
## [704,] 5.45
## [705,] 4.44
## [706,] 4.67
## [707,] 4.67
## [708,] 5.07
## [709,] 4.37
## [710,] 3.68
## [711,] 4.85
## [712,] 4.66
## [713,] 6.09
## [714,] 6.30
## [715,] 4.98
## [716,] 4.63
## [717,] 4.66
## [718,] 4.98
## [719,] 5.23
## [720,] 5.67
## [721,] 5.54
## [722,] 4.48
## [723,] 4.82
## [724,] 3.57
## [725,] 3.57
## [726,] 3.41
## [727,] 5.32
## [728,] 4.26
## [729,] 5.22
## [730,] 5.25
## [731,] 4.74
## [732,] 4.71
## [733,] 3.84
## [734,] 4.99
## [735,] 4.37
## [736,] 4.78
## [737,] 5.58
## [738,] 5.67
## [739,] 6.99
## [740,] 5.28
## [741,] 5.84
## [742,] 4.60
## [743,] 5.14
## [744,] 4.43
## [745,] 5.59
## [746,] 7.17
## [747,] 7.97
```

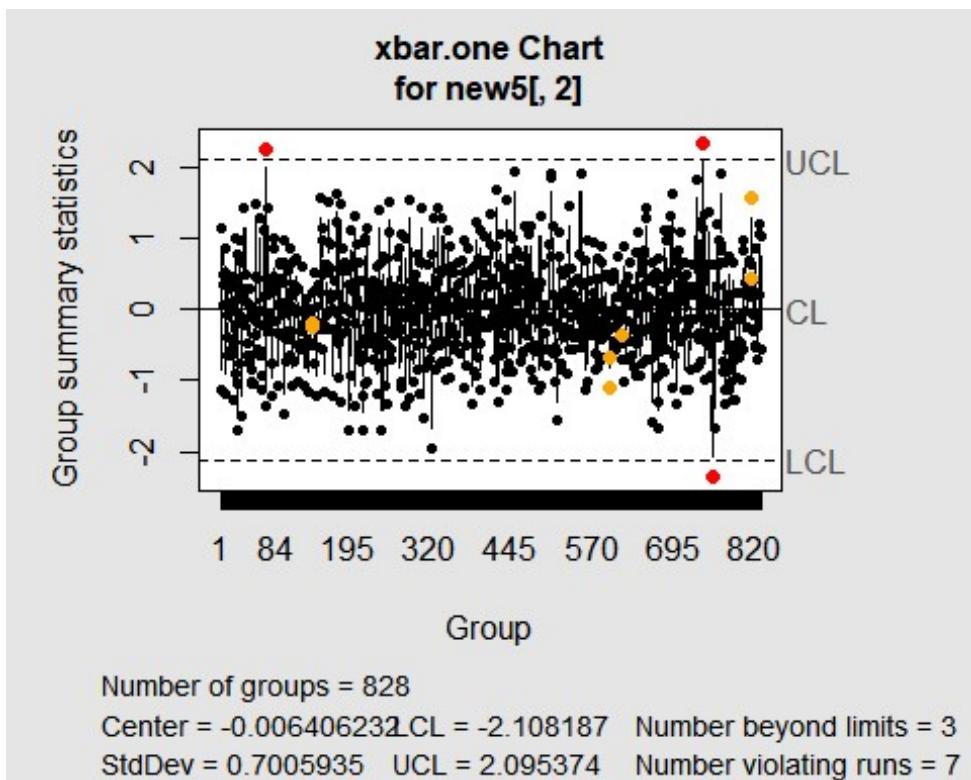
```
## [748,] 8.13
## [749,] 9.32
## [750,] 10.29
## [751,] 12.40
## [752,] 9.62
## [753,] 9.99
## [754,] 7.31
## [755,] 7.46
## [756,] 7.58
## [757,] 6.97
## [758,] 6.88
## [759,] 5.31
## [760,] 3.39
## [761,] 4.16
## [762,] 5.18
## [763,] 5.15
## [764,] 5.36
## [765,] 7.51
## [766,] 6.51
## [767,] 6.64
## [768,] 5.65
## [769,] 3.81
## [770,] 4.13
## [771,] 5.47
## [772,] 4.98
## [773,] 4.60
## [774,] 4.91
## [775,] 4.50
## [776,] 4.45
## [777,] 5.01
## [778,] 5.51
## [779,] 6.77
## [780,] 7.30
## [781,] 7.05
## [782,] 7.64
## [783,] 8.61
## [784,] 7.14
## [785,] 5.00
## [786,] 5.92
## [787,] 6.20
## [788,] 6.15
## [789,] 7.15
## [790,] 7.35
## [791,] 5.92
## [792,] 5.55
## [793,] 4.51
## [794,] 4.54
## [795,] 5.54
## [796,] 4.97
## [797,] 3.46
```

```
## [798,] 3.93
## [799,] 3.45
## [800,] 4.56
## [801,] 2.98
## [802,] 4.08
## [803,] 4.25
## [804,] 3.24
## [805,] 3.63
## [806,] 4.87
## [807,] 4.98
## [808,] 4.19
## [809,] 5.06
## [810,] 4.82
## [811,] 5.65
## [812,] 6.66
## [813,] 6.44
## [814,] 5.00
## [815,] 3.54
## [816,] 2.90
## [817,] 2.76
## [818,] 4.37
## [819,] 4.06
## [820,] 4.94
## [821,] 5.60
## [822,] 4.95
## [823,] 6.53
## [824,] 4.84
## [825,] 4.30
## [826,] 5.65
## [827,] 4.51
## [828,] 5.78

#write.csv(new5[,-1], "new5.csv")
```

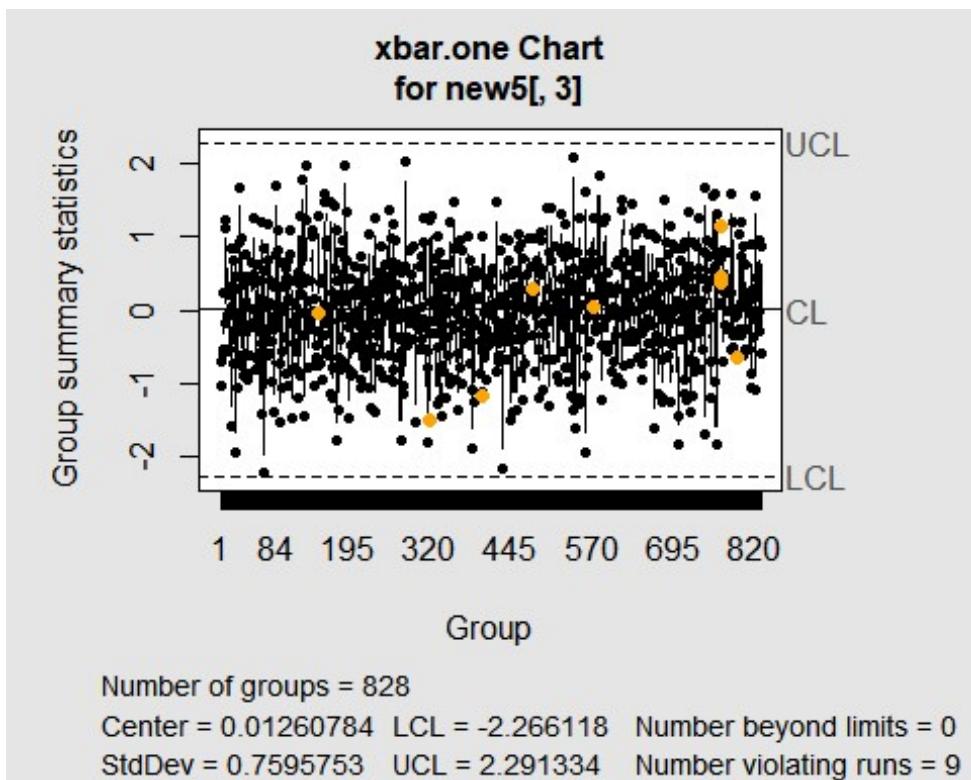
*#checking individual xbar chart*

```
x1=qcc(data=new5[,2],type='xbar.one',sizes = 1, std.dev = "MR")
```



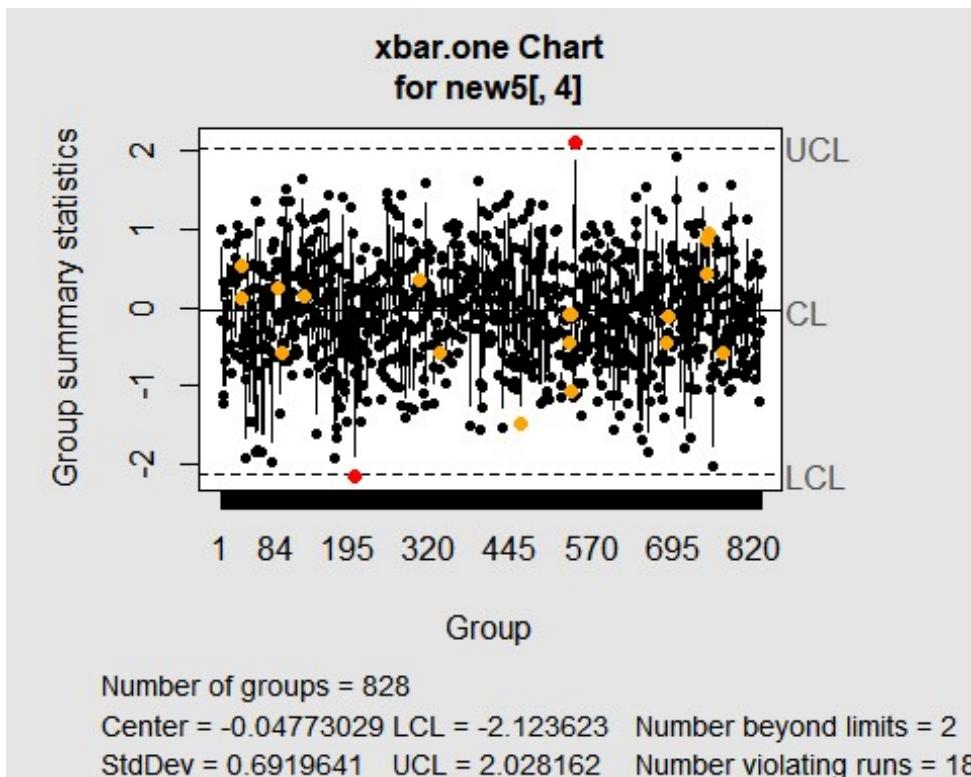
```
xbarViolation1=x1$violations$beyond.limits
```

```
x2=qcc(data=new5[,3],type='xbar.one',sizes = 1, std.dev = "MR")
```



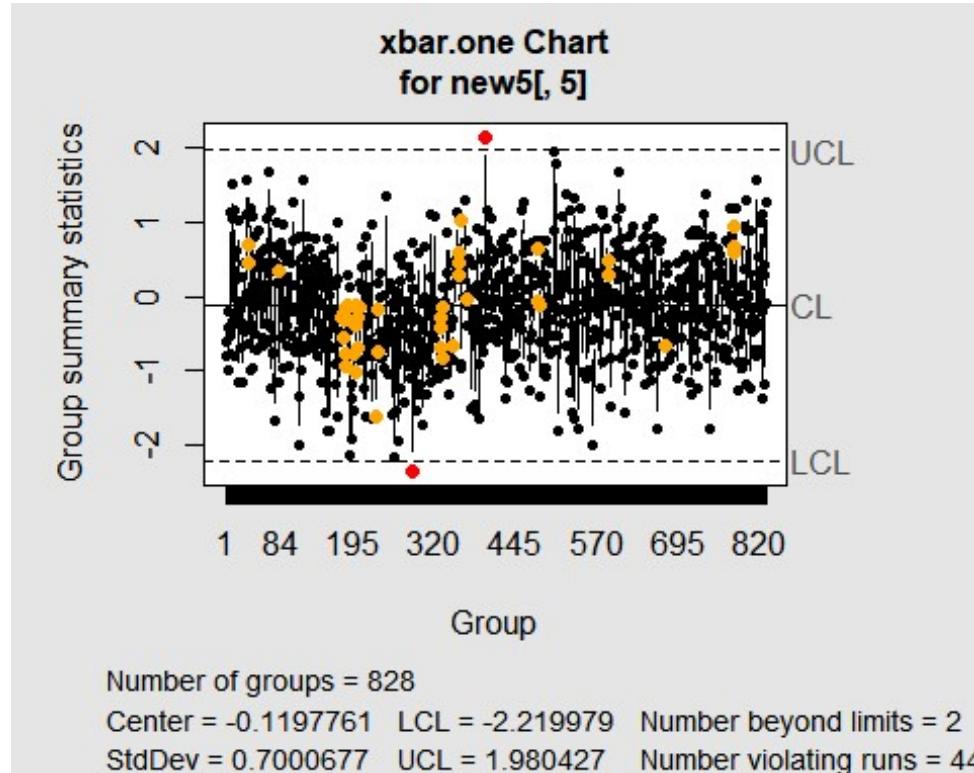
```
xbarViolation2=x2$violations$beyond.limits
```

```
x3=qcc(data=new5[,4],type='xbar.one',sizes = 1, std.dev = "MR")
```



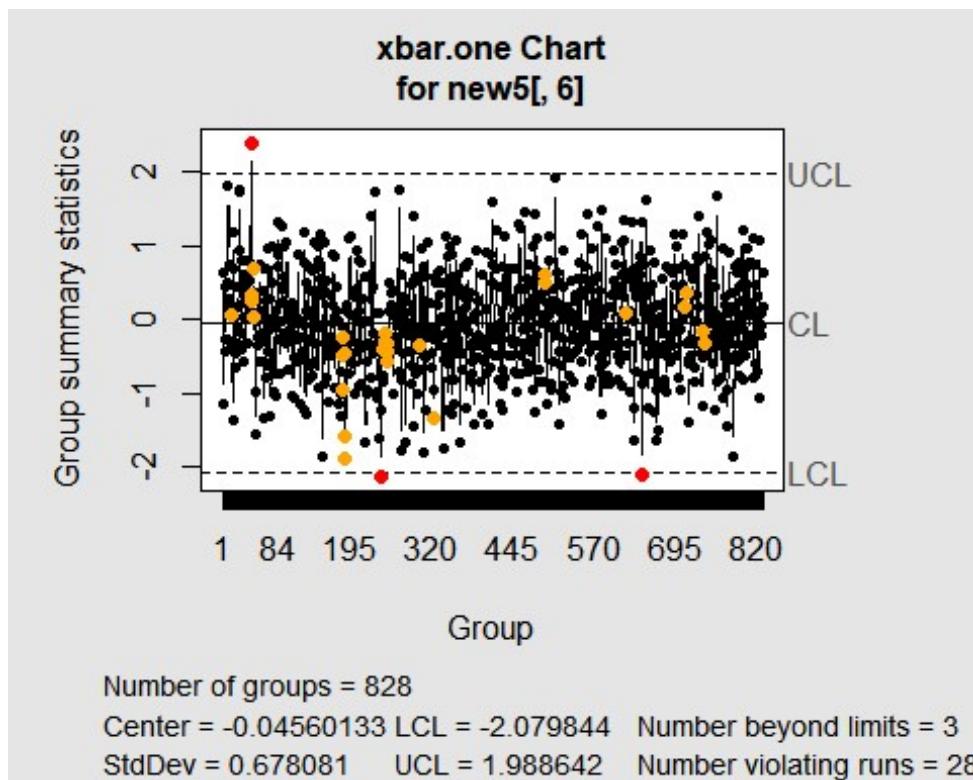
```
xbarViolation3=x3$violations$beyond.limits
```

```
x4=qcc(data=new5[,5],type='xbar.one',sizes = 1, std.dev = "MR")
```



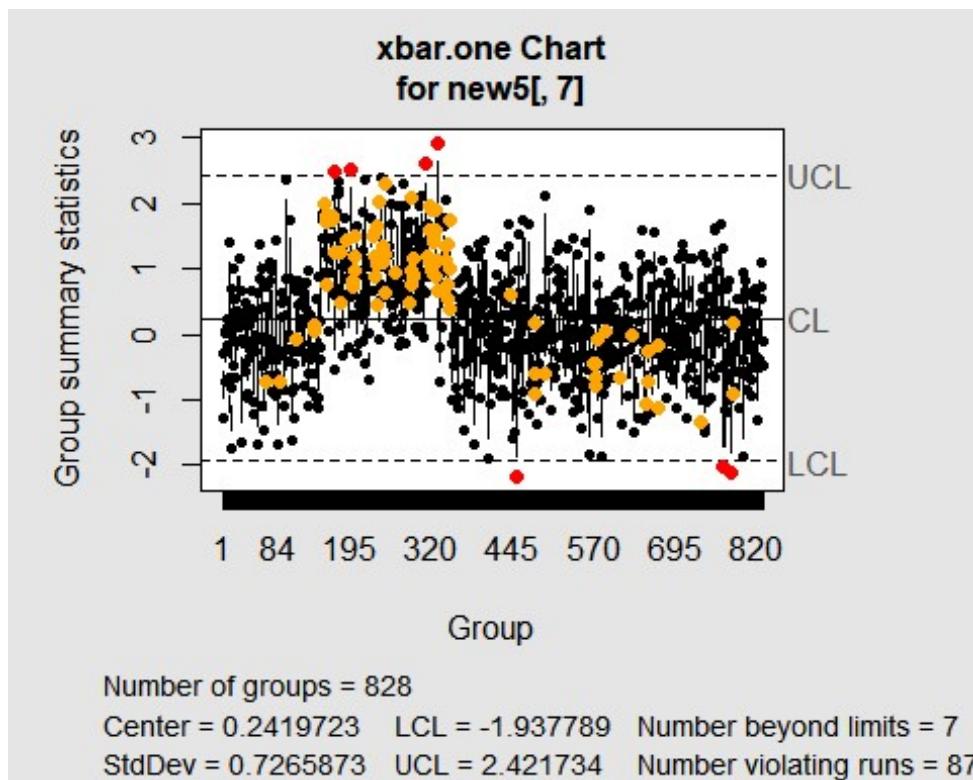
```
xbarViolation4=x4$violations$beyond.limits
```

```
x5=qcc(data=new5[,6],type='xbar.one',sizes = 1, std.dev = "MR")
```



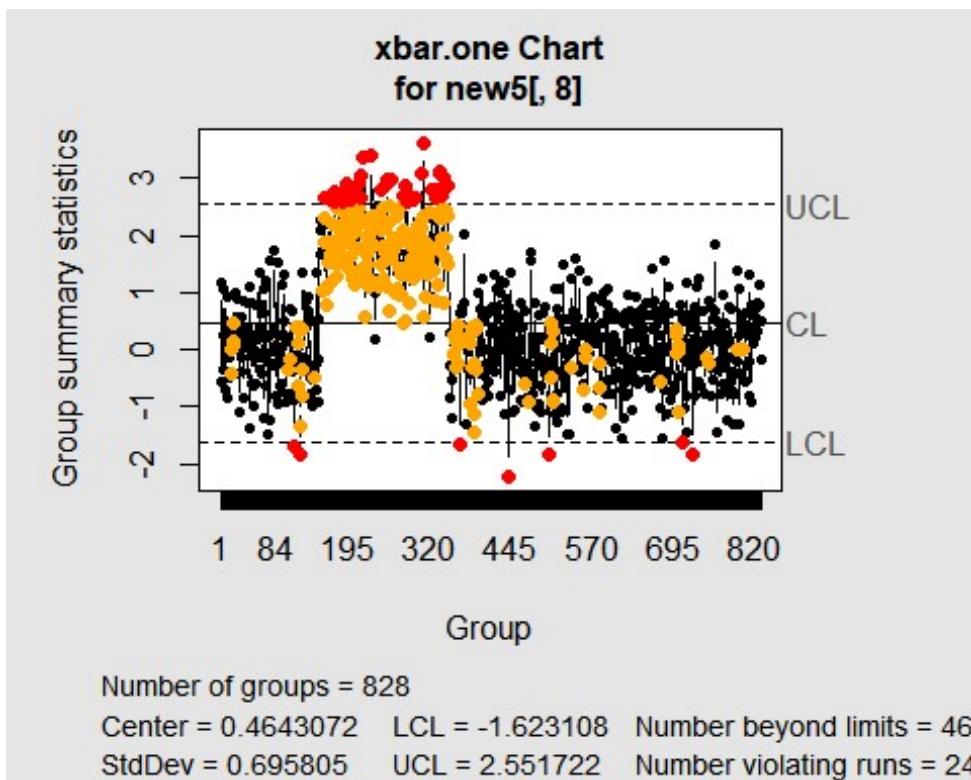
```
xbarViolation5=x5$violations$beyond.limits
```

```
x6=qcc(data=new5[,7],type='xbar.one',sizes = 1, std.dev = "MR")
```



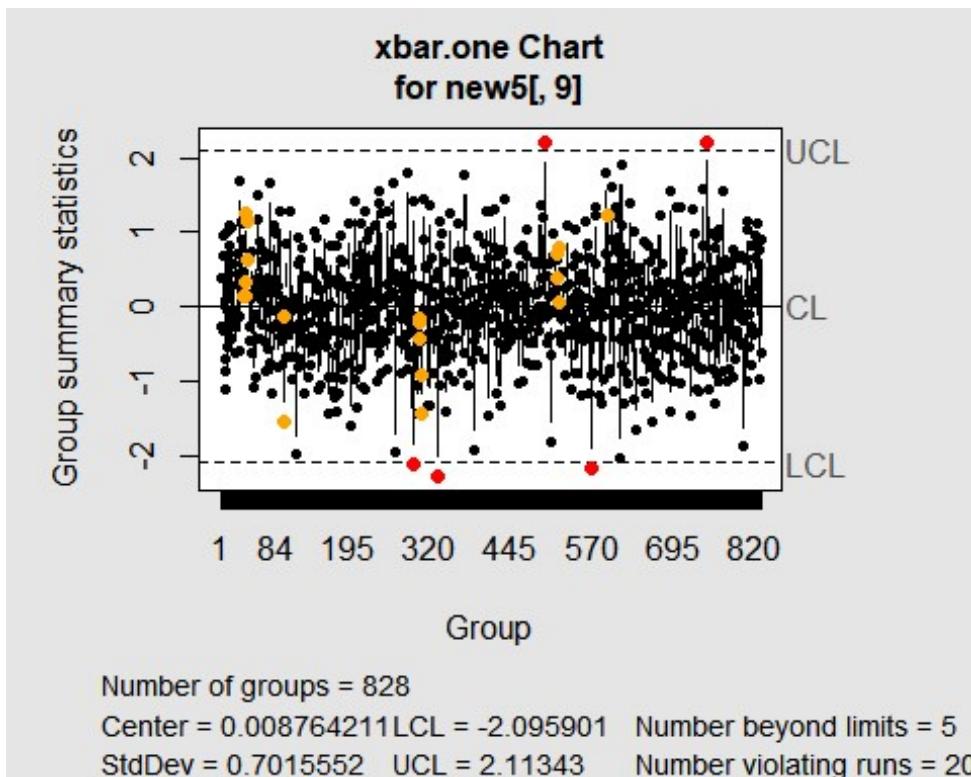
```
xbarViolation6=x6$violations$beyond.limits
```

```
x7=qcc(data=new5[,8],type='xbar.one',sizes = 1, std.dev = "MR")
```

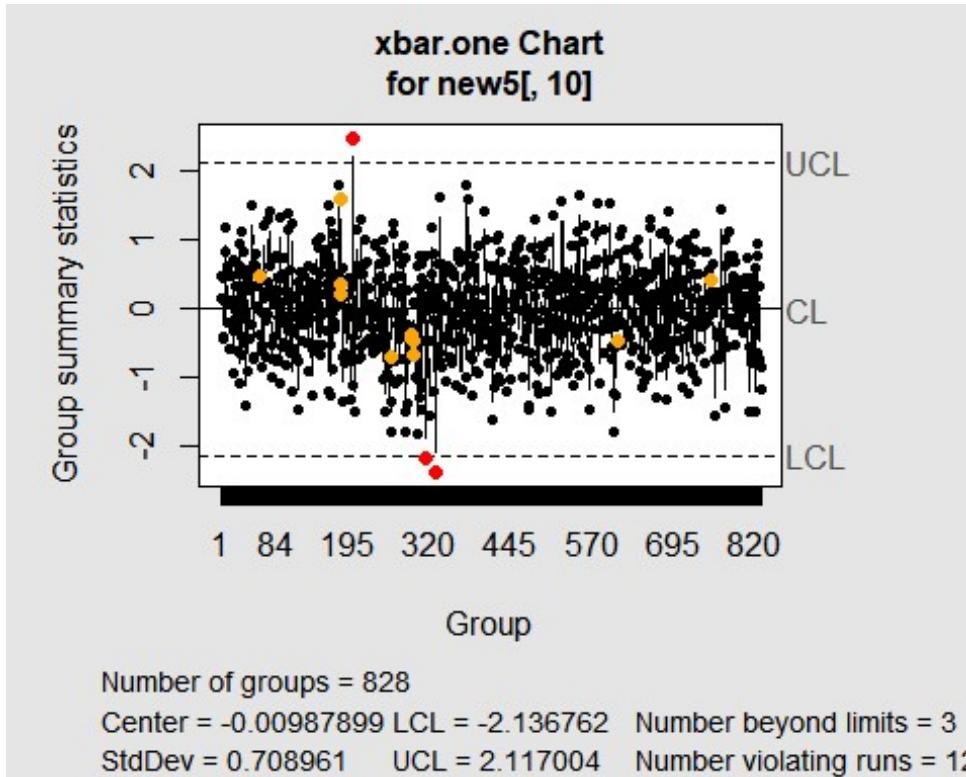


```
xbarViolation7=x7$violations$beyond.limits
```

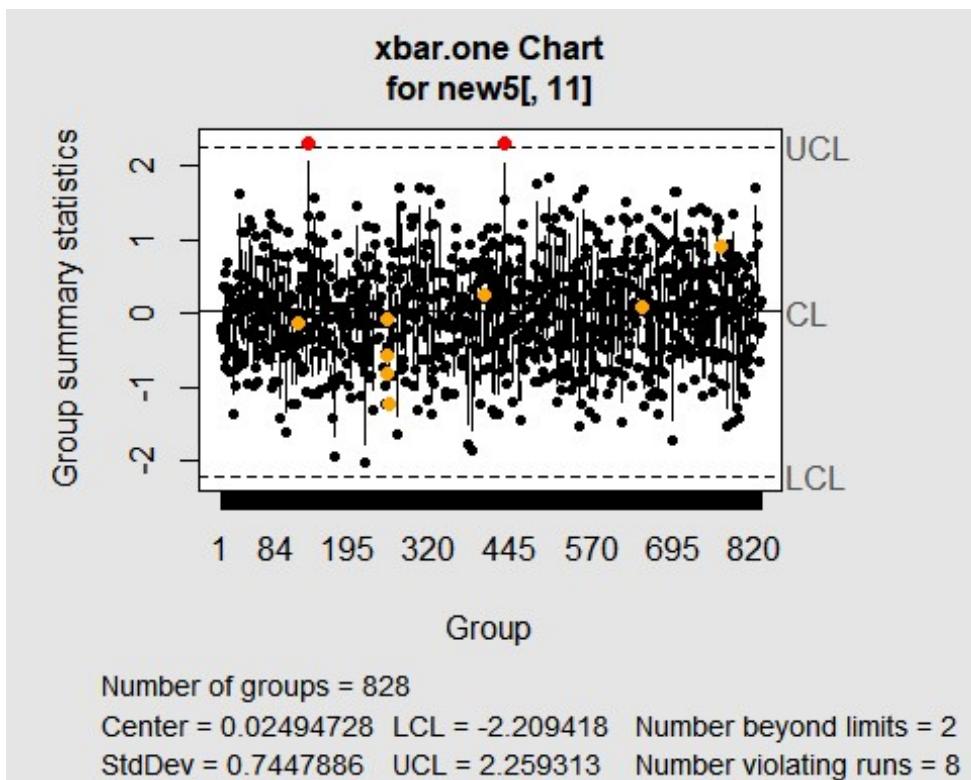
```
x8=qcc(data=new5[, 9], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation8=x8$violations$beyond.limits  
x9=qcc(data=new5[,10],type='xbar.one',sizes = 1, std.dev = "MR")
```

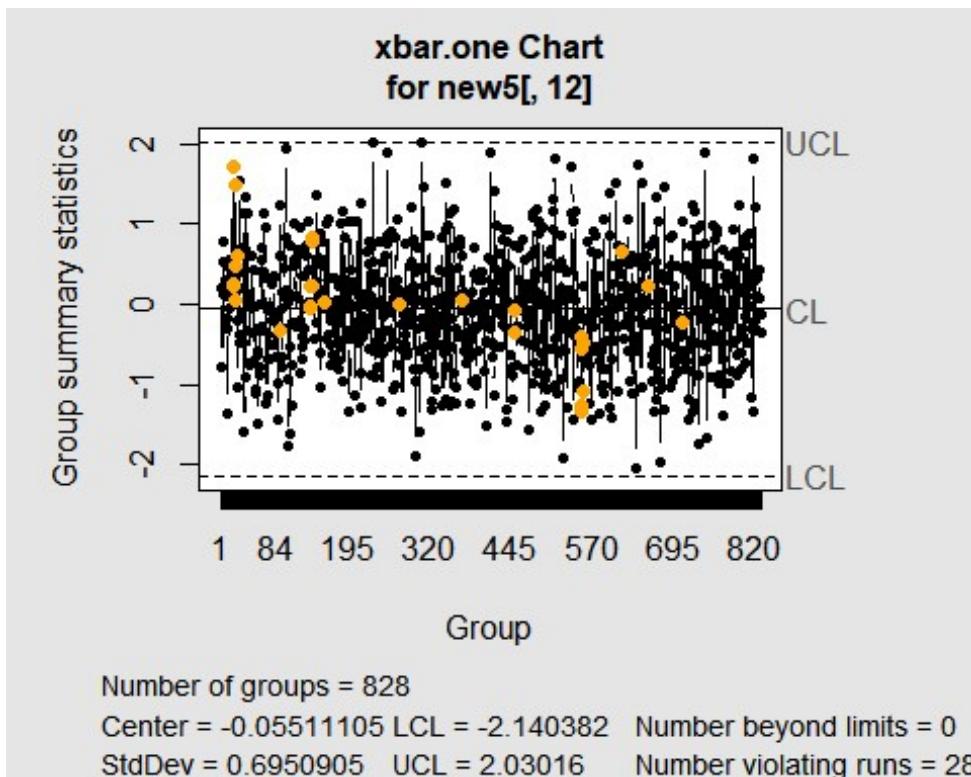


```
xbarViolation9=x9$violations$beyond.limits  
x10=qcc(data=new5[,11],type='xbar.one',sizes = 1, std.dev = "MR")
```

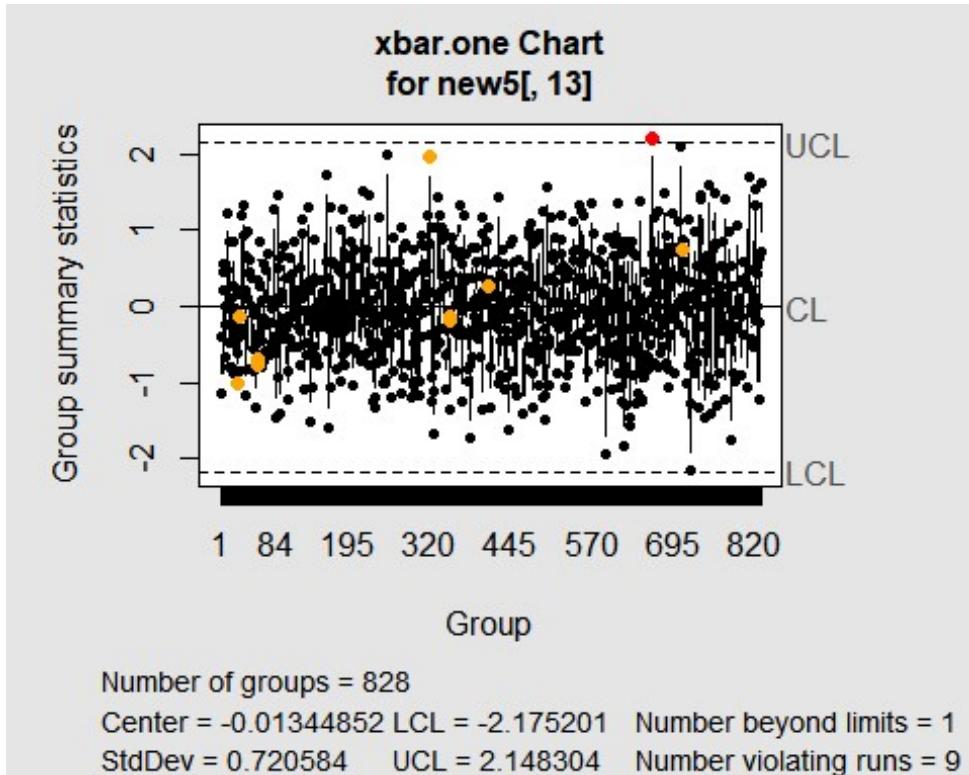


```
xbarViolation10=x10$violations$beyond.limits
```

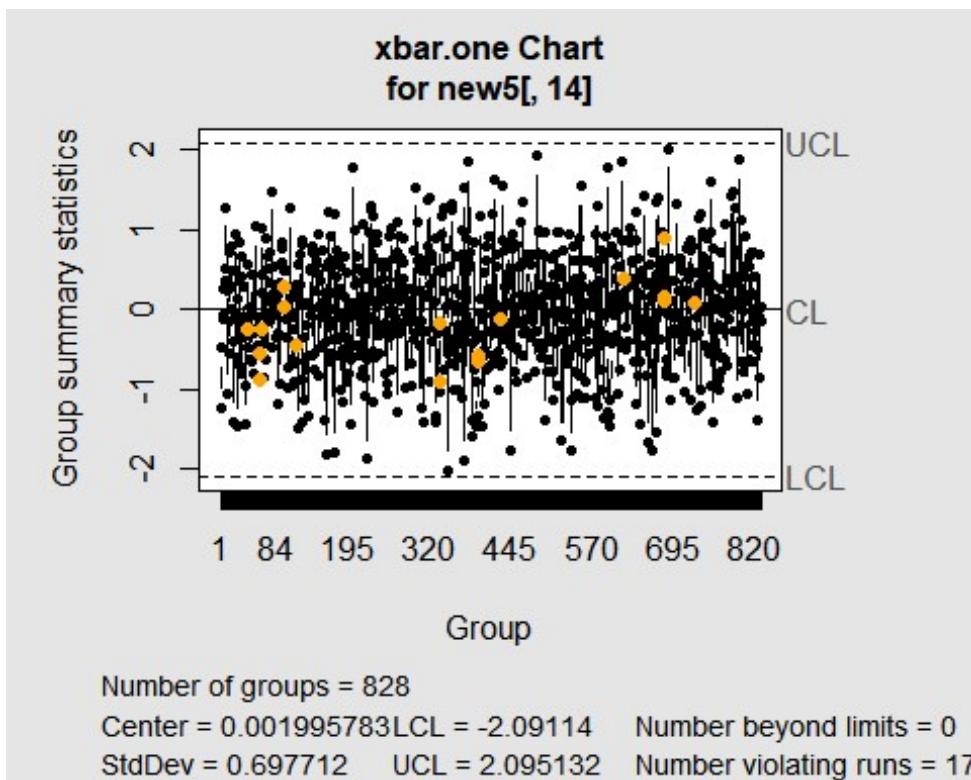
```
x11=qcc(data=new5[, 12], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation11=x11$violations$beyond.limits  
x12=qcc(data=new5[,13],type='xbar.one',sizes = 1, std.dev = "MR")
```

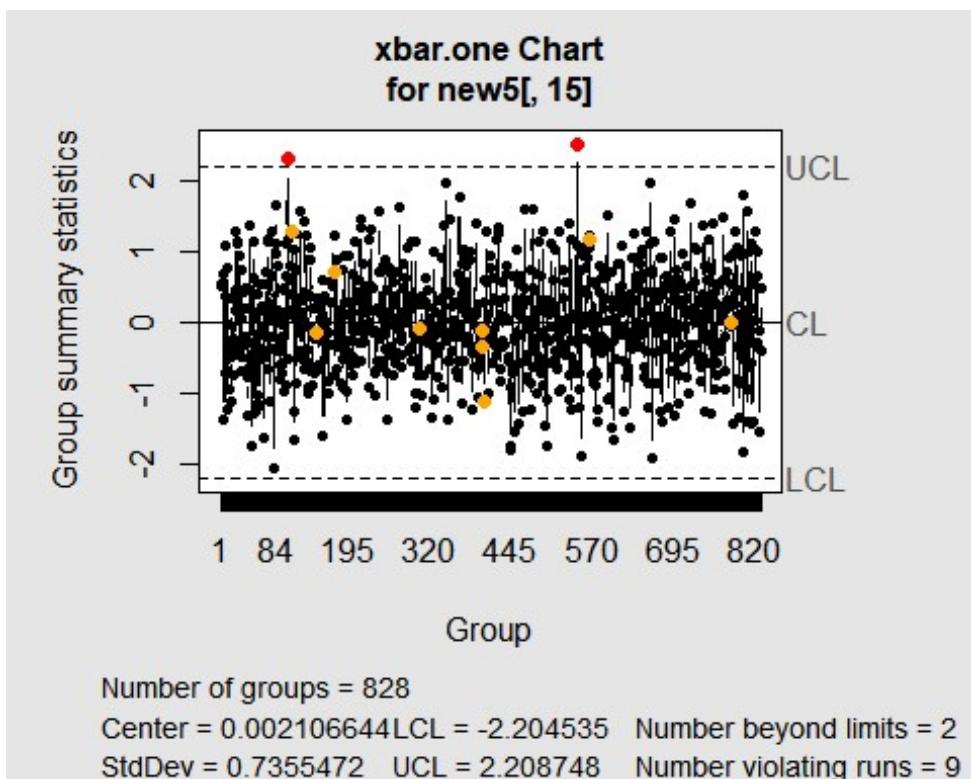


```
xbarViolation12=x12$violations$beyond.limits  
x13=qcc(data=new5[,14],type='xbar.one',sizes = 1, std.dev = "MR")
```

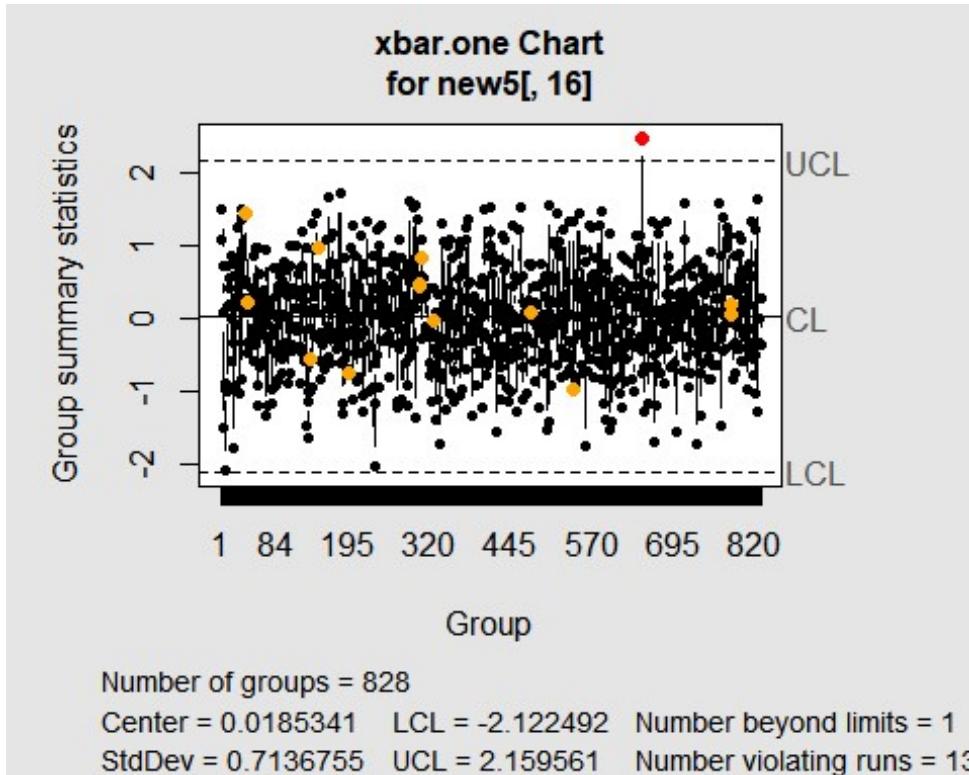


```
xbarViolation13=x13$violations$beyond.limits
```

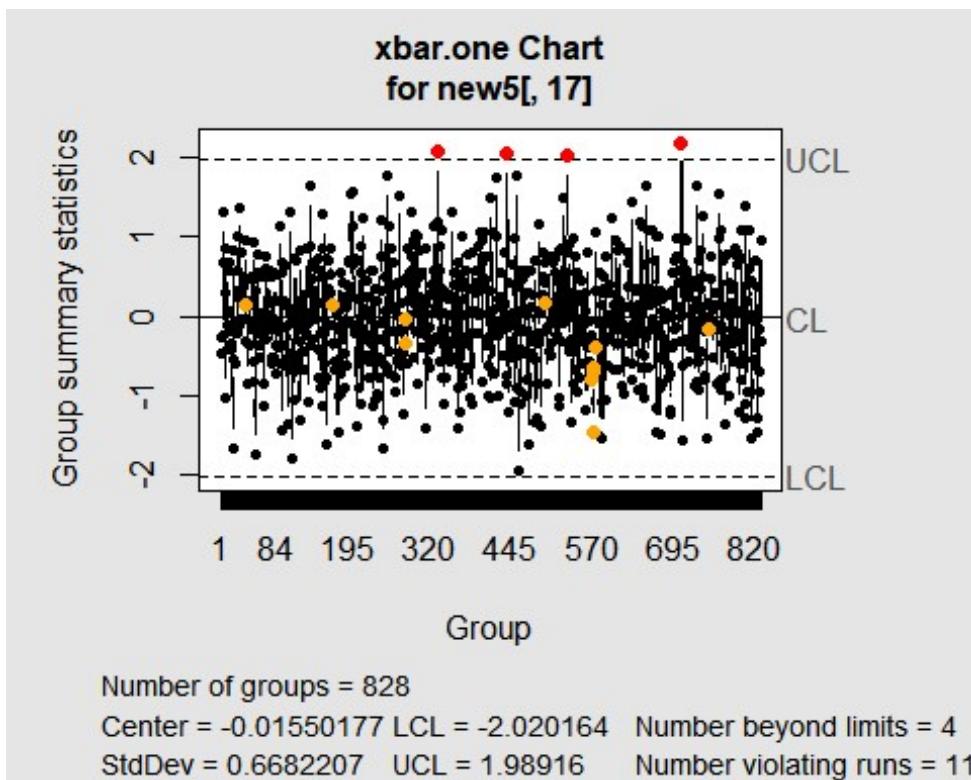
```
x14=qcc(data=new5[,15],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation14=x14$violations$beyond.limits  
x15=qcc(data=new5[,16],type='xbar.one',sizes = 1, std.dev = "MR")
```

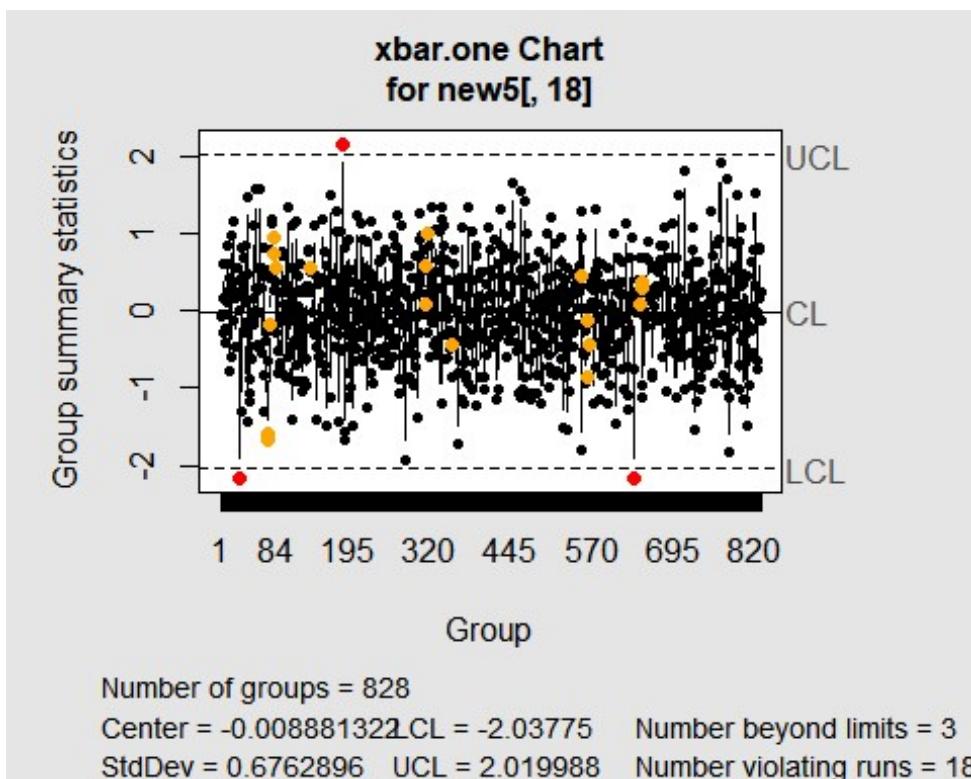


```
xbarViolation15=x15$violations$beyond.limits  
x16=qcc(data=new5[,17],type='xbar.one',sizes = 1, std.dev = "MR")
```

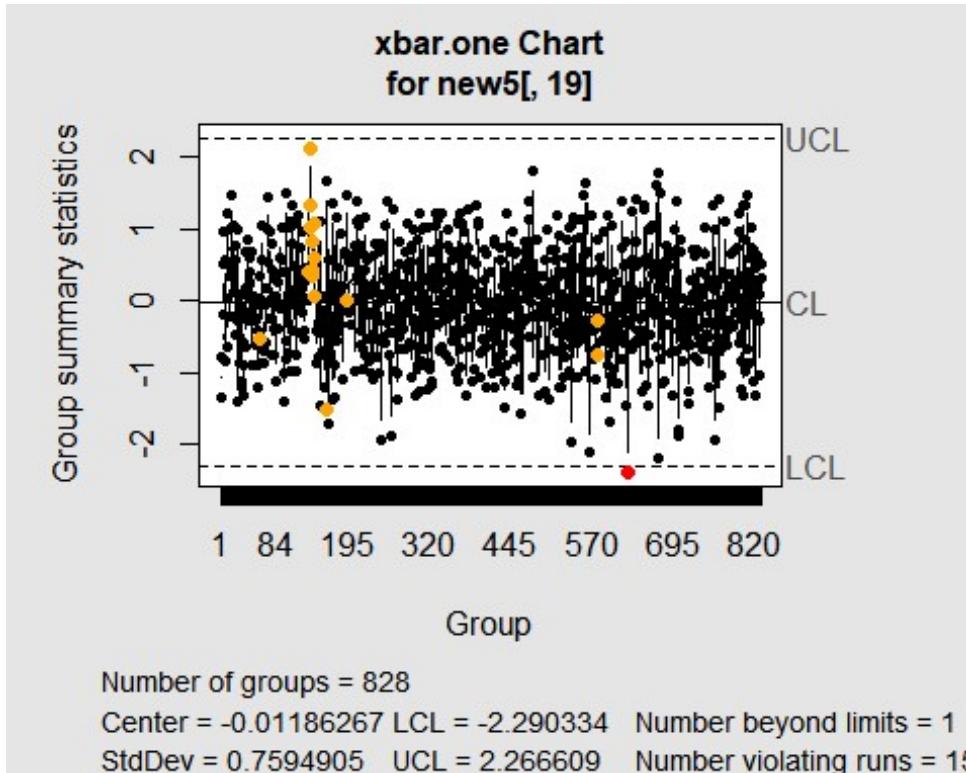


```
xbarViolation16=x16$violations$beyond.limits
```

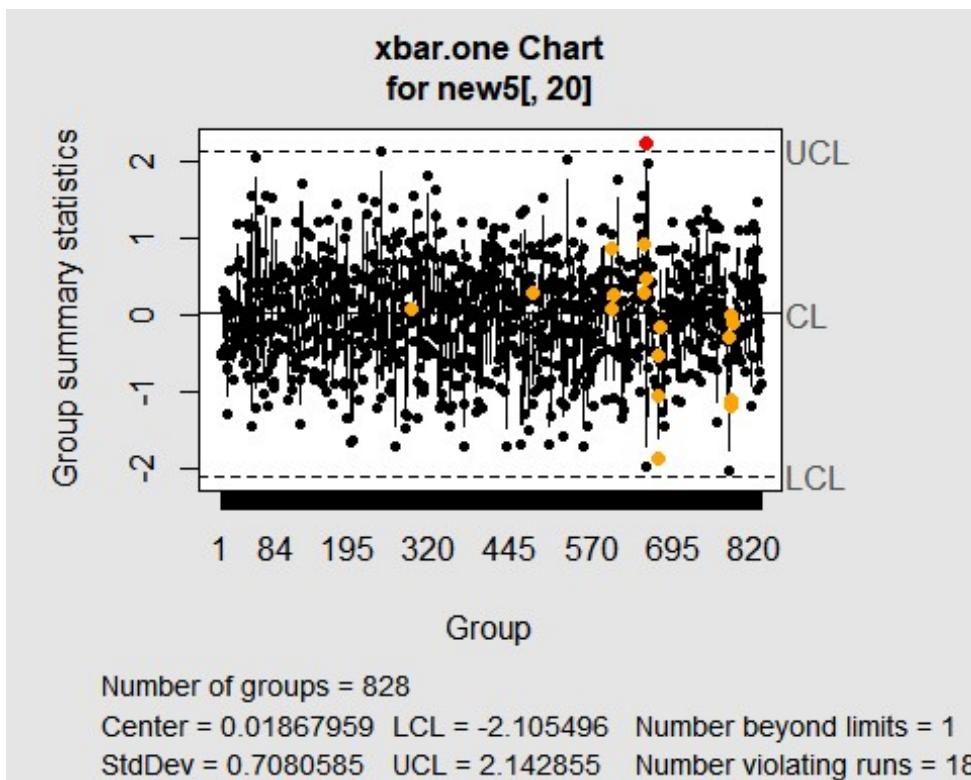
```
x17=qcc(data=new5[,18],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation17=x17$violations$beyond.limits  
x18=qcc(data=new5[,19],type='xbar.one',sizes = 1, std.dev = "MR")
```

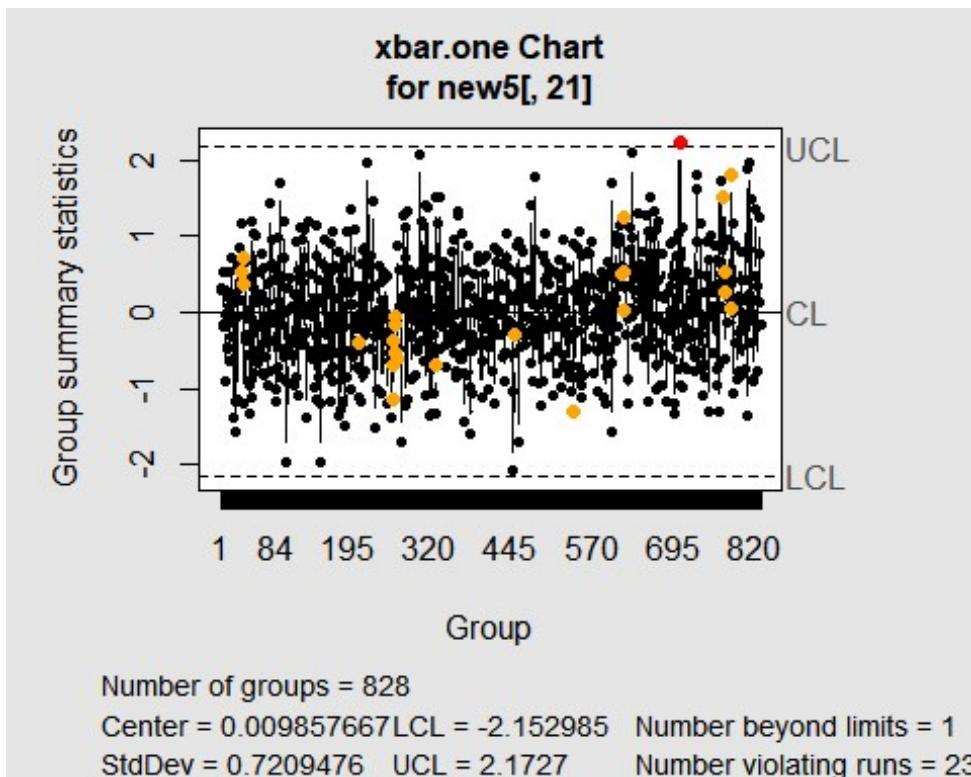


```
xbarViolation18=x18$violations$beyond.limits  
x19=qcc(data=new5[,20],type='xbar.one',sizes = 1, std.dev = "MR")
```

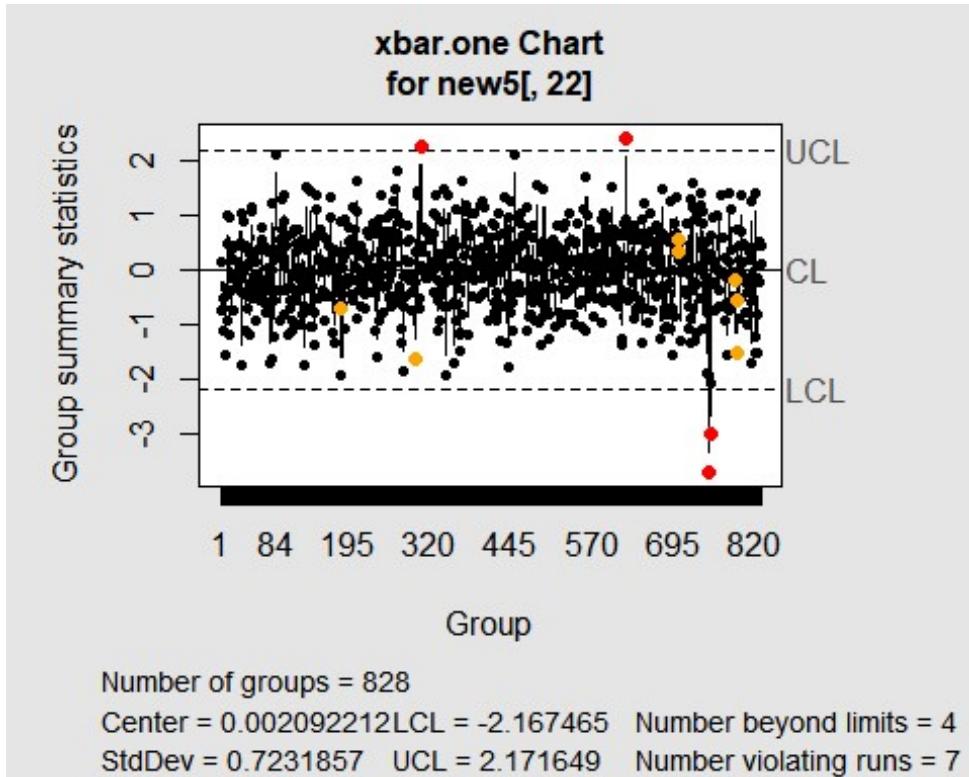


```
xbarViolation19=x19$violations$beyond.limits
```

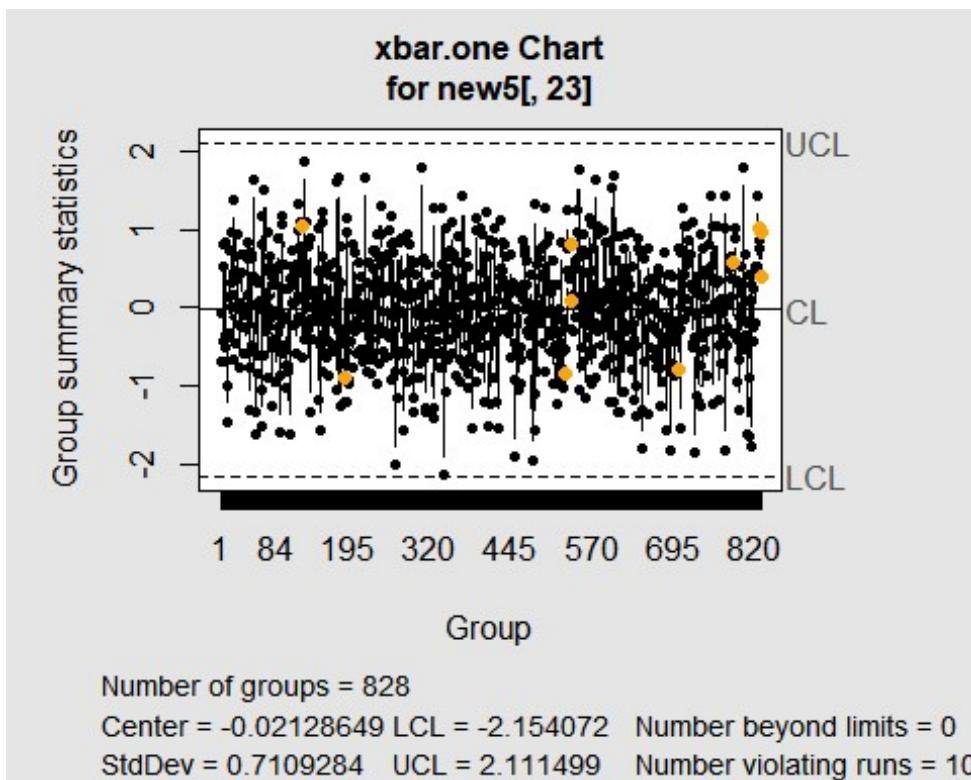
```
x20=qcc(data=new5[, 21], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation20=x20$violations$beyond.limits  
x21=qcc(data=new5[,22],type='xbar.one',sizes = 1, std.dev = "MR")
```

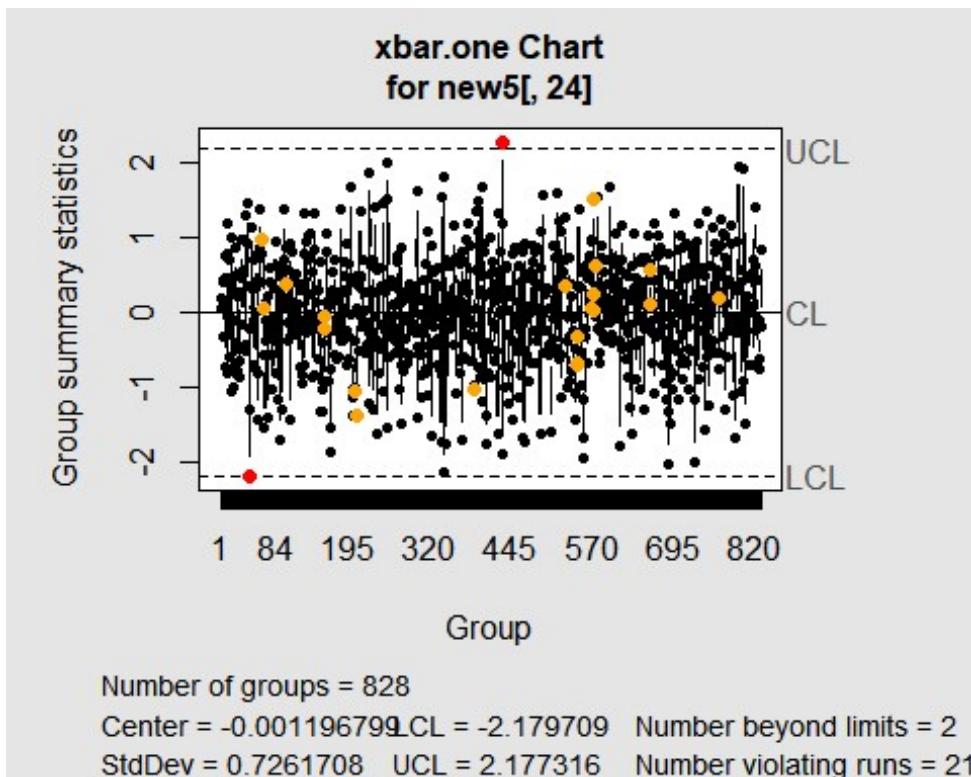


```
xbarViolation21=x21$violations$beyond.limits  
x22=qcc(data=new5[,23],type='xbar.one',sizes = 1, std.dev = "MR")
```

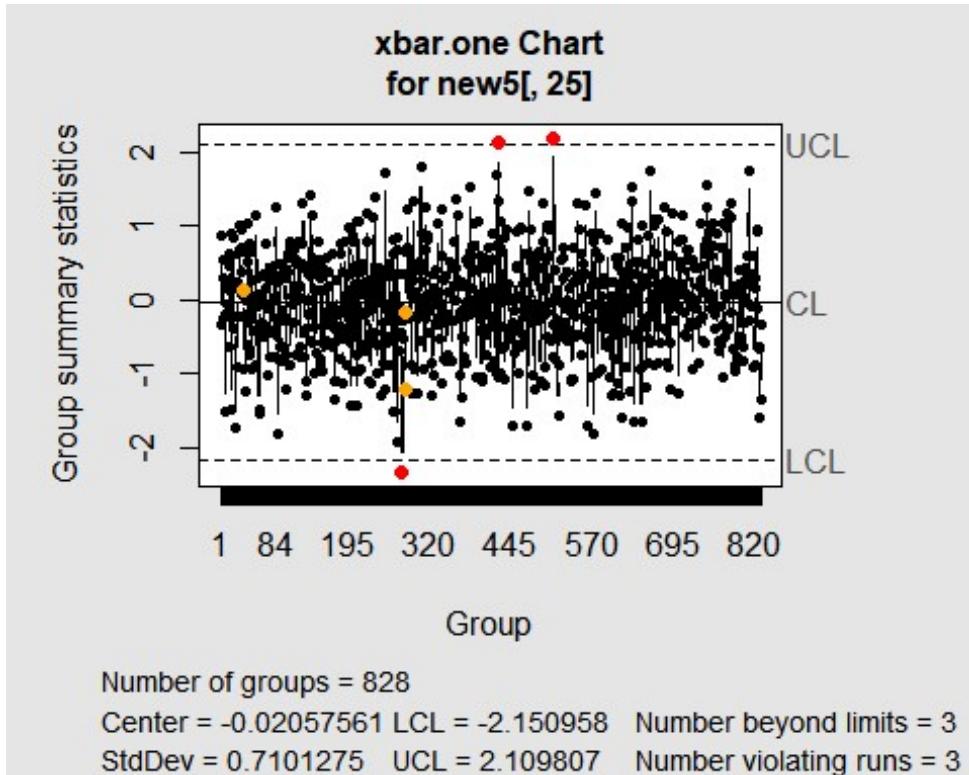


```
xbarViolation22=x22$violations$beyond.limits
```

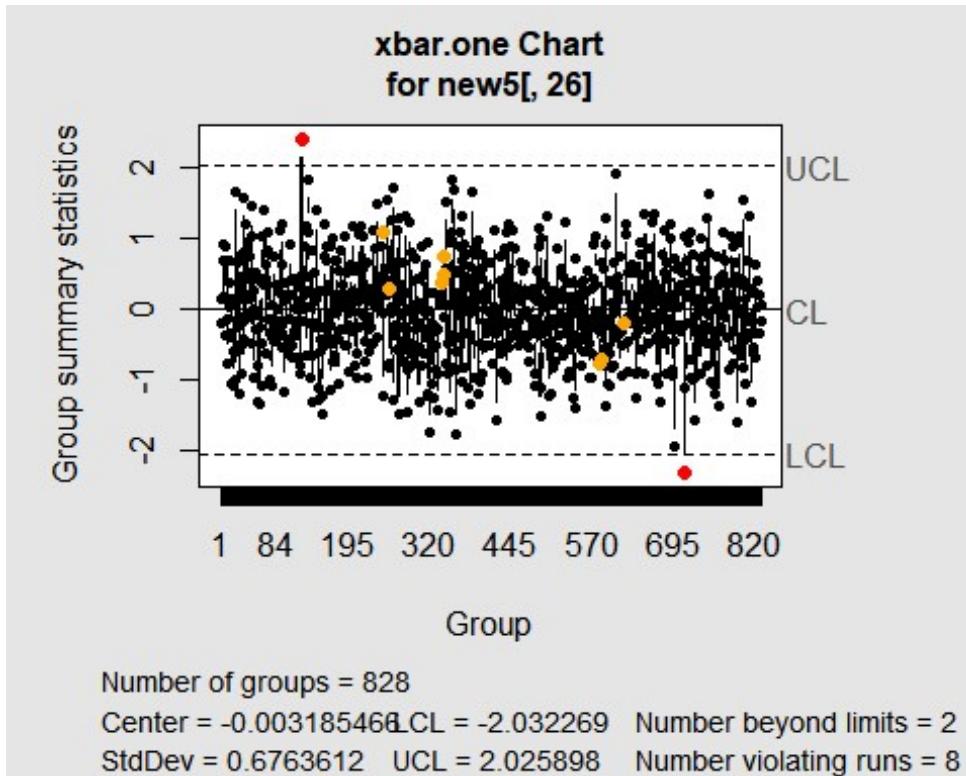
```
x23=qcc(data=new5[, 24], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation23=x23$violations$beyond.limits  
x24=qcc(data=new5[,25],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation24=x24$violations$beyond.limits  
x25=qcc(data=new5[,26],type='xbar.one',sizes = 1, std.dev = "MR")
```



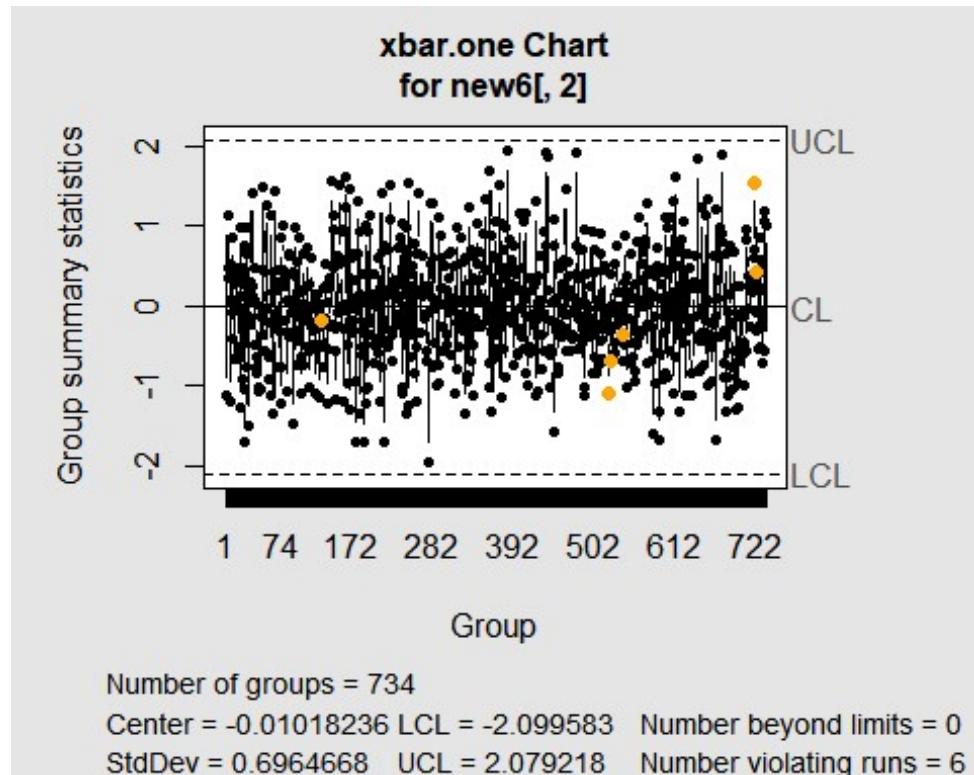
```
xbarViolation25=x25$violations$beyond.limits
```

```
#ooc
xbarv=c(68, 739, 753,
       542, 206,
       397, 287,
       43, 242, 642,
       170, 196, 311, 328, 451, 768, 779,
       160, 167, 170, 174, 175, 179, 183, 188, 191, 193, 200, 203, 208, 210,
       214, 216, 219, 231, 246, 251, 256, 260, 281, 282, 285,
       287, 295, 297, 307, 311, 324, 329, 330, 332, 334, 335, 339, 341, 347,
       112, 122, 367, 440, 502, 707, 724,
       497, 746, 294, 333, 567,
       202, 315, 328,
       134, 434,
       660,
       102, 545,
       646,
       331, 439, 530, 706,
       186, 28, 633,
       623,
       652,
       703,
       306, 622, 748, 751,
```

```
433, 44,
426, 510, 278,
123, 711)
```

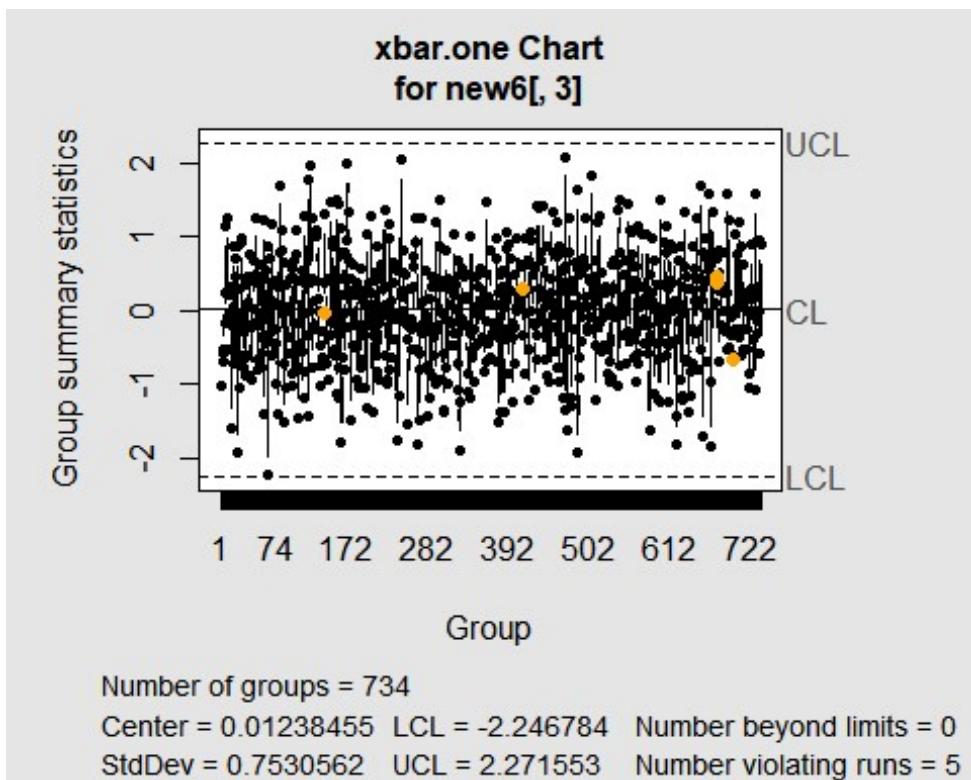
```
new6=new5[-xbarv, ]
```

```
x1=qcc(data=new6[,2],type='xbar.one',sizes = 1, std.dev = "MR")
```



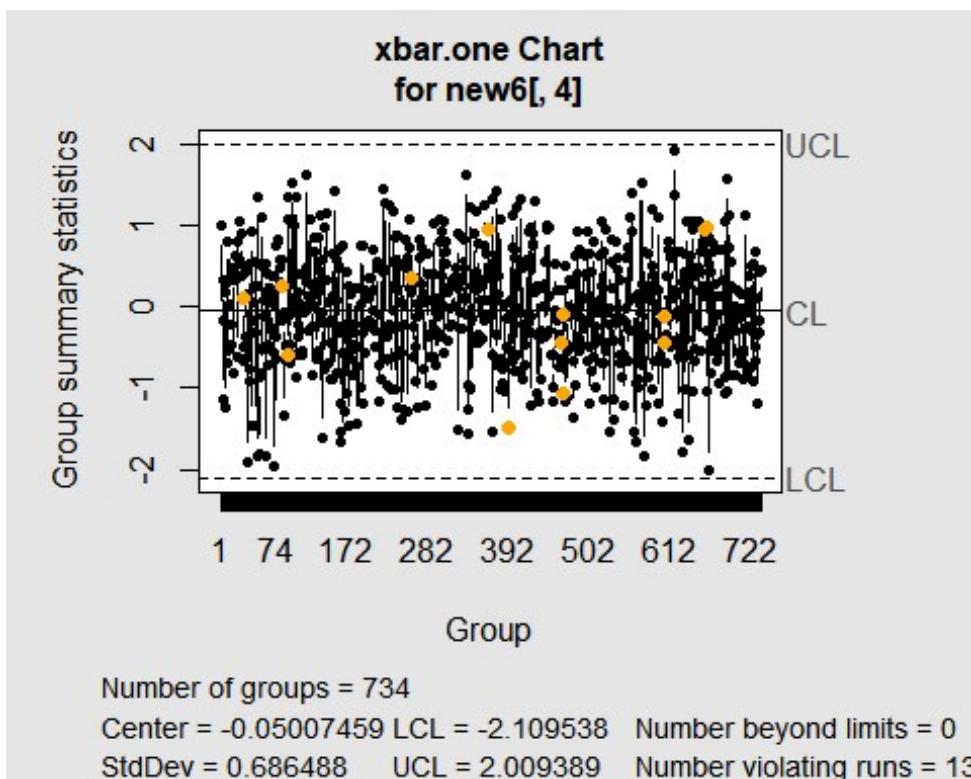
```
xbarViolation1=x1$violations$beyond.limits
```

```
x2=qcc(data=new6[,3],type='xbar.one',sizes = 1, std.dev = "MR")
```



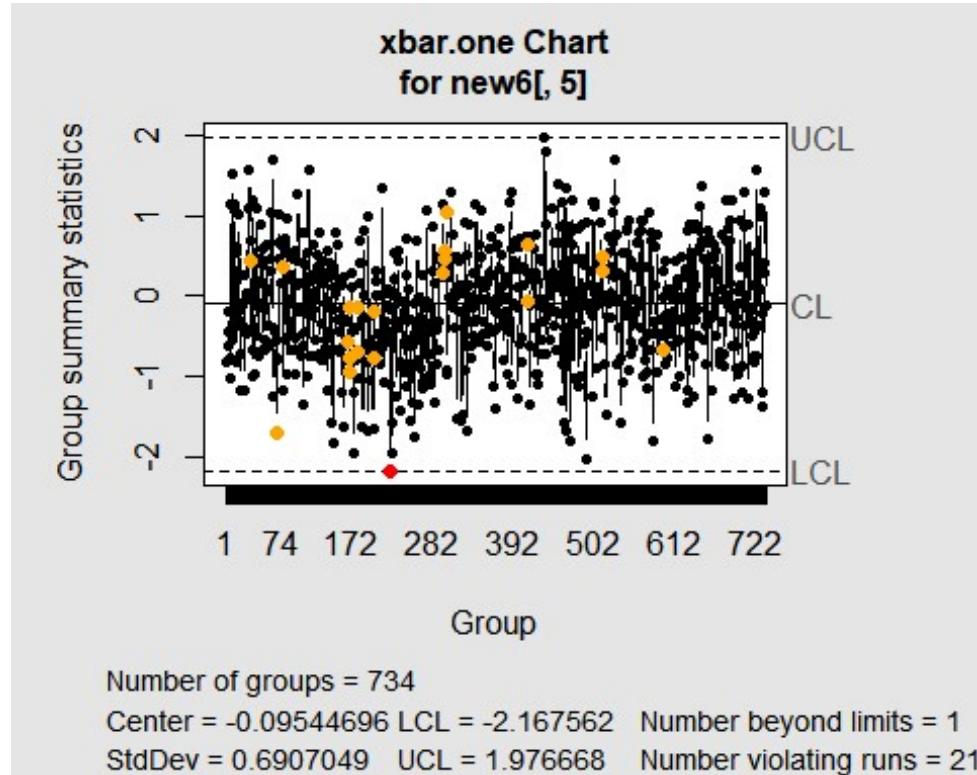
```
xbarViolation2=x2$violations$beyond.limits
```

```
x3=qcc(data=new6[,4],type='xbar.one',sizes = 1, std.dev = "MR")
```



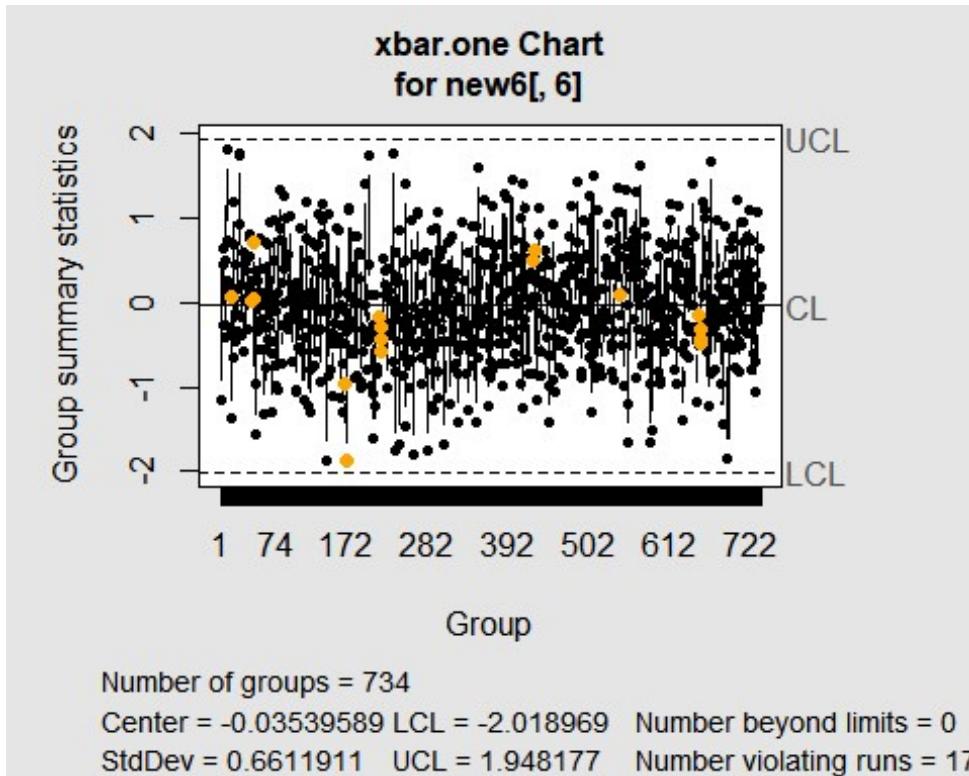
```
xbarViolation3=x3$violations$beyond.limits
```

```
x4=qcc(data=new6[,5],type='xbar.one',sizes = 1, std.dev = "MR")
```



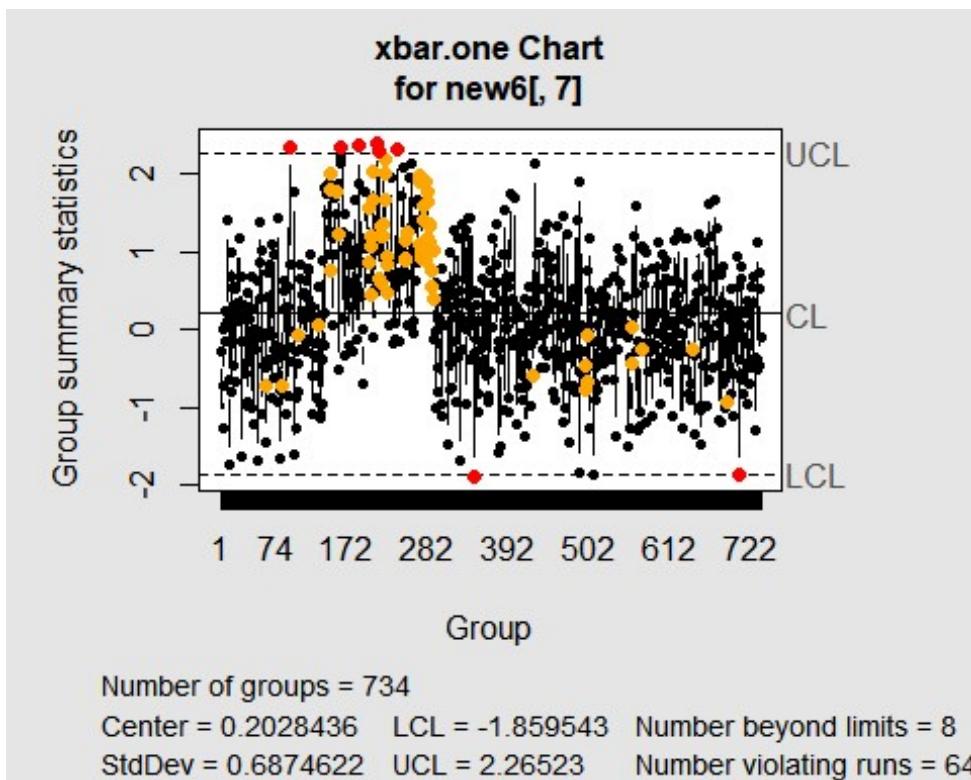
```
xbarViolation4=x4$violations$beyond.limits
```

```
x5=qcc(data=new6[,6],type='xbar.one',sizes = 1, std.dev = "MR")
```



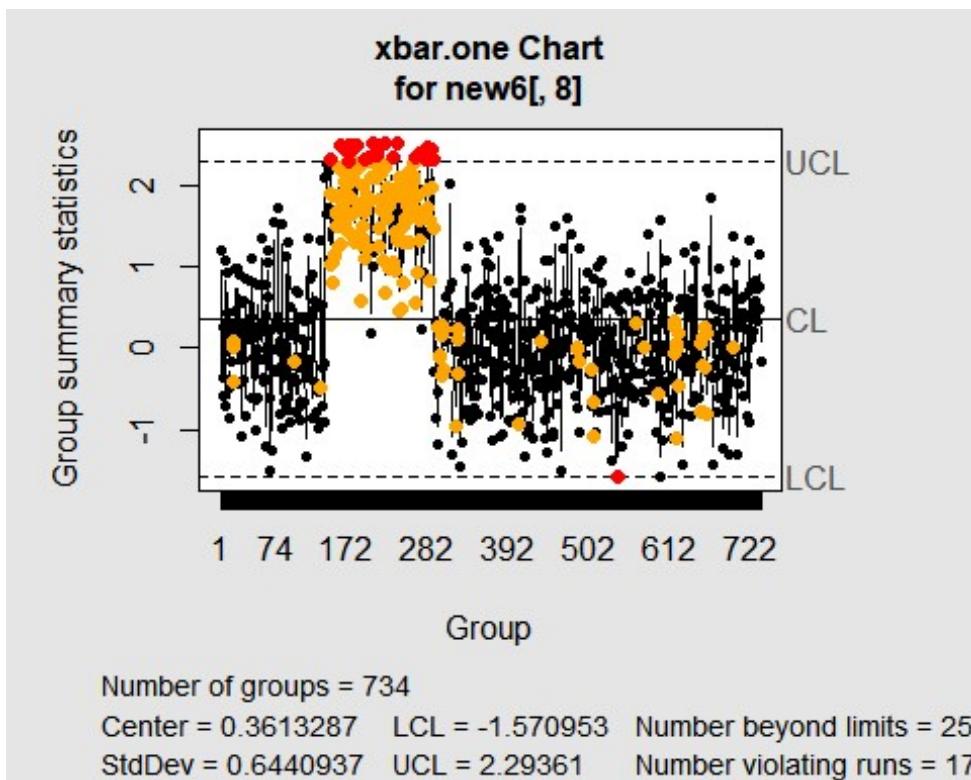
```
xbarViolation5=x5$violations$beyond.limits
```

```
x6=qcc(data=new6[,7],type='xbar.one',sizes = 1, std.dev = "MR")
```



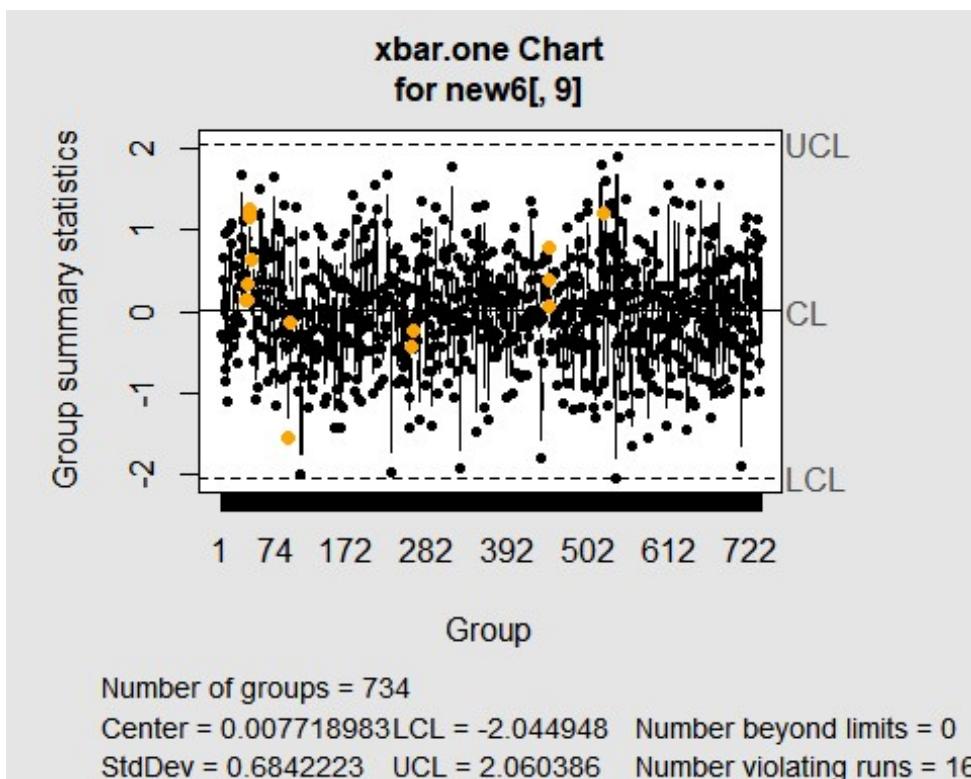
```
xbarViolation6=x6$violations$beyond.limits
```

```
x7=qcc(data=new6[,8],type='xbar.one',sizes = 1, std.dev = "MR")
```

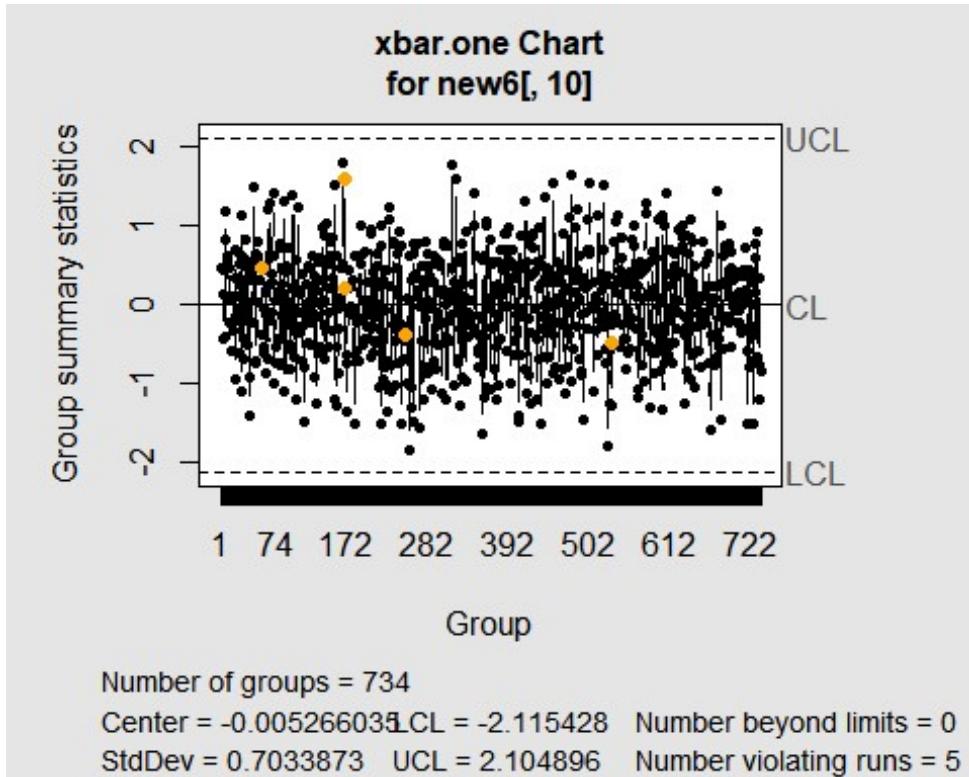


```
xbarViolation7=x7$violations$beyond.limits
```

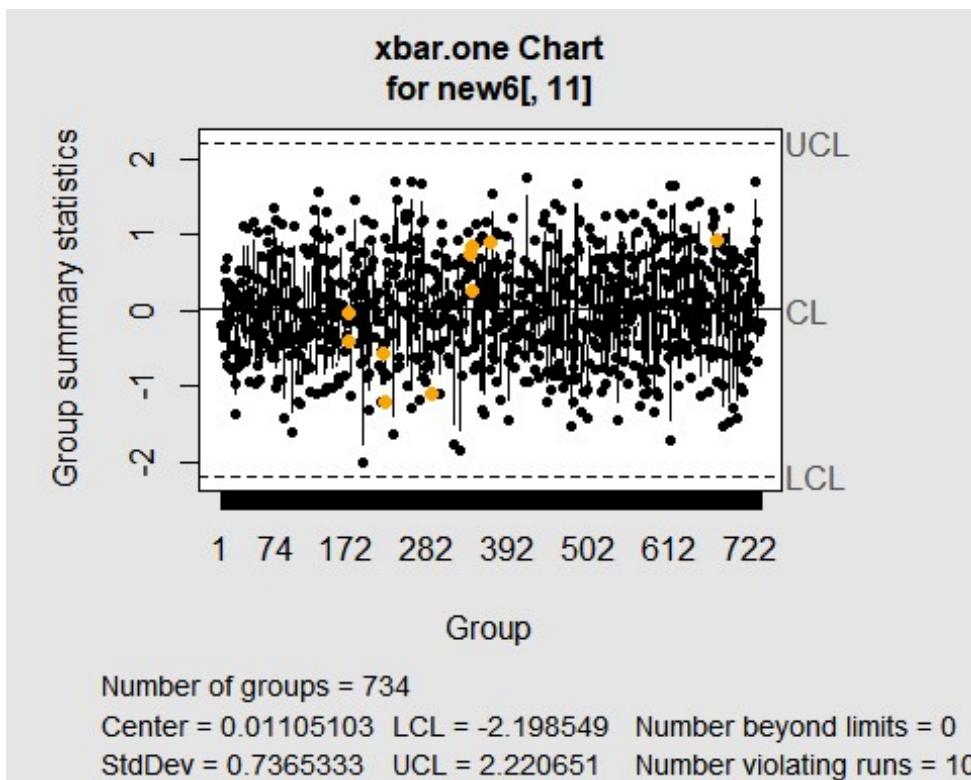
```
x8=qcc(data=new6[, 9], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation8=x8$violations$beyond.limits  
x9=qcc(data=new6[,10],type='xbar.one',sizes = 1, std.dev = "MR")
```

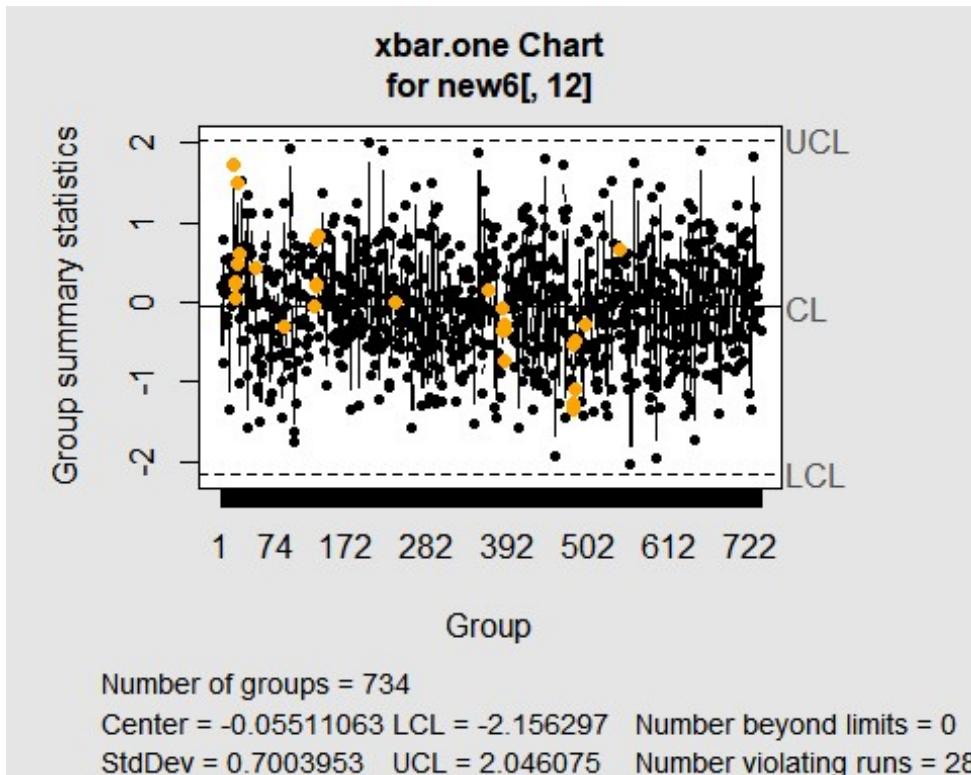


```
xbarViolation9=x9$violations$beyond.limits  
x10=qcc(data=new6[,11],type='xbar.one',sizes = 1, std.dev = "MR")
```

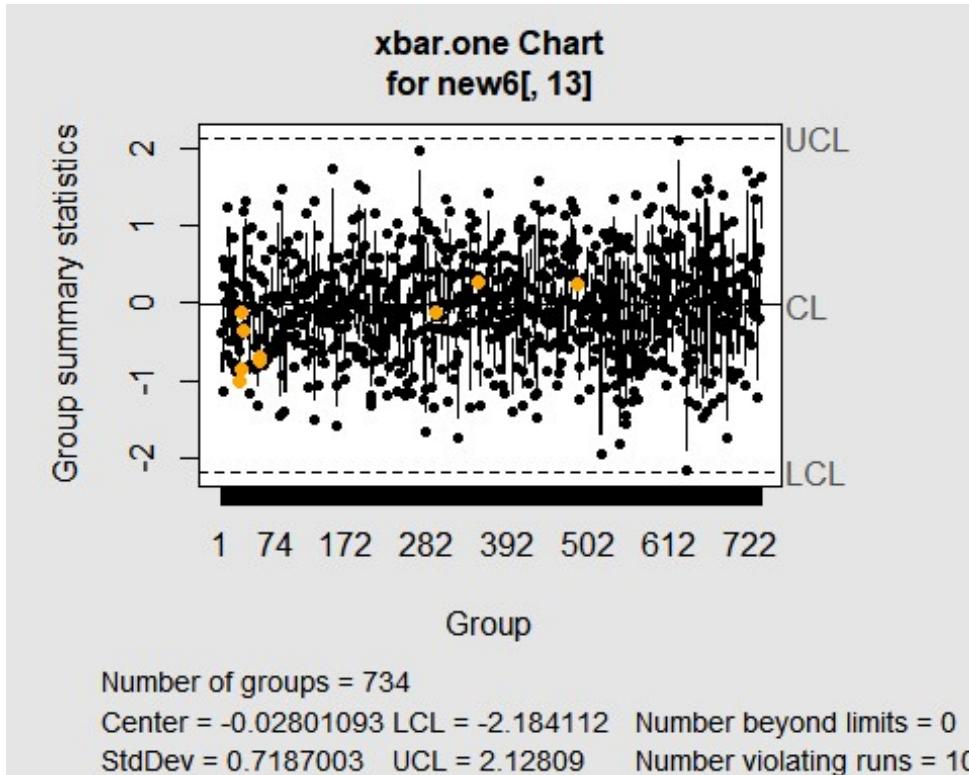


```
xbarViolation10=x10$violations$beyond.limits
```

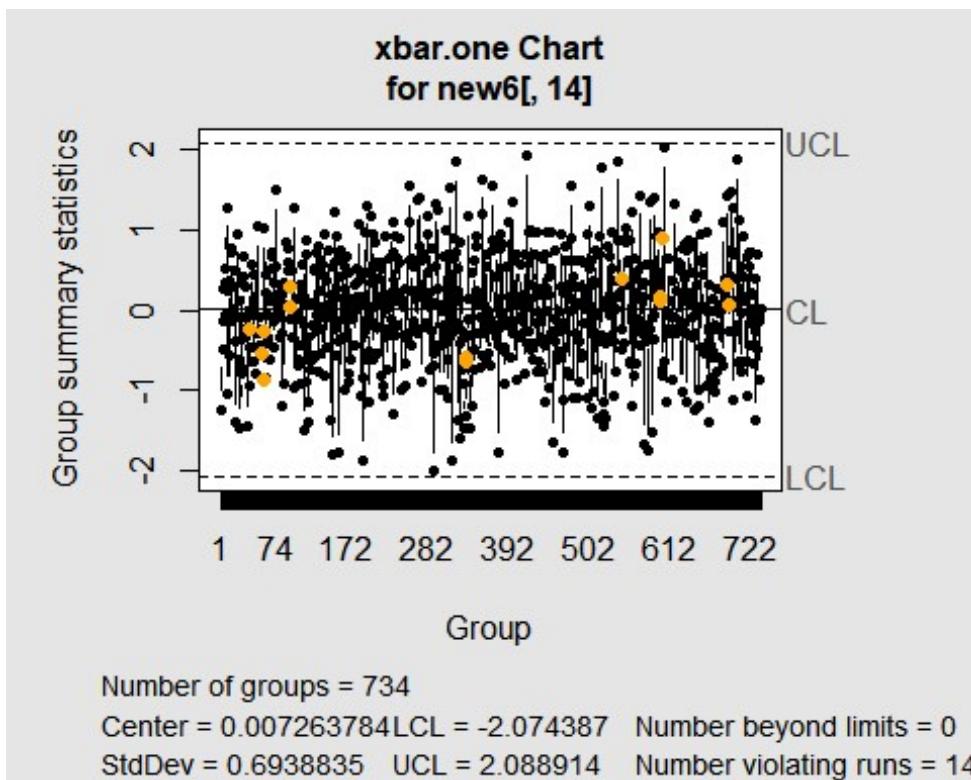
```
x11=qcc(data=new6[, 12], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation11=x11$violations$beyond.limits  
x12=qcc(data=new6[,13],type='xbar.one',sizes = 1, std.dev = "MR")
```

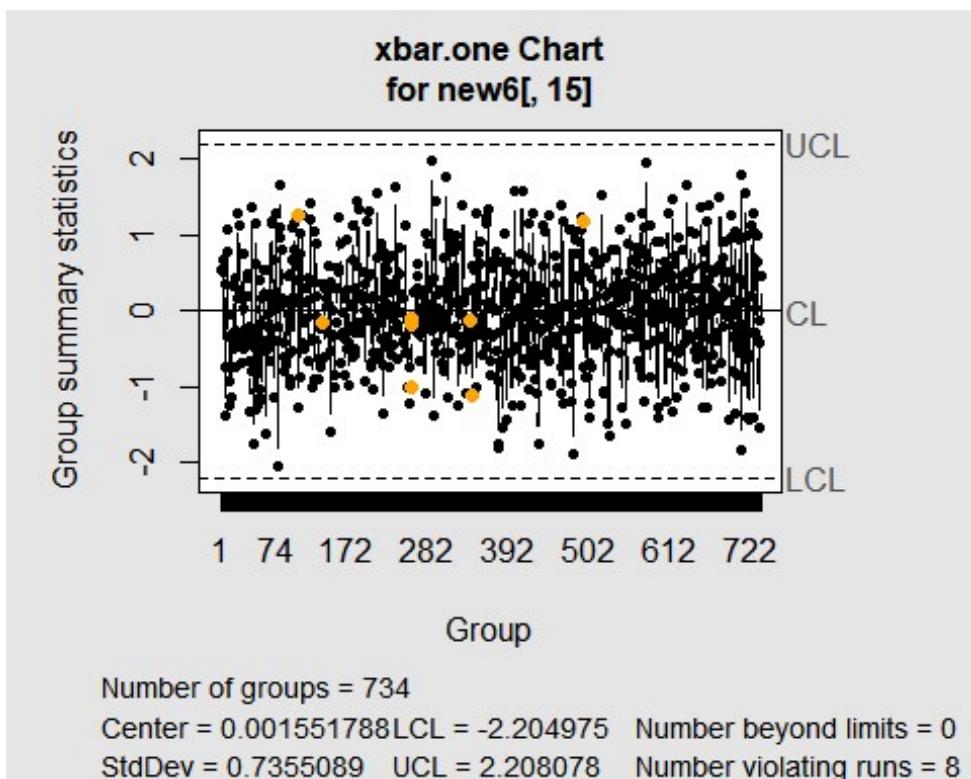


```
xbarViolation12=x12$violations$beyond.limits  
x13=qcc(data=new6[,14],type='xbar.one',sizes = 1, std.dev = "MR")
```

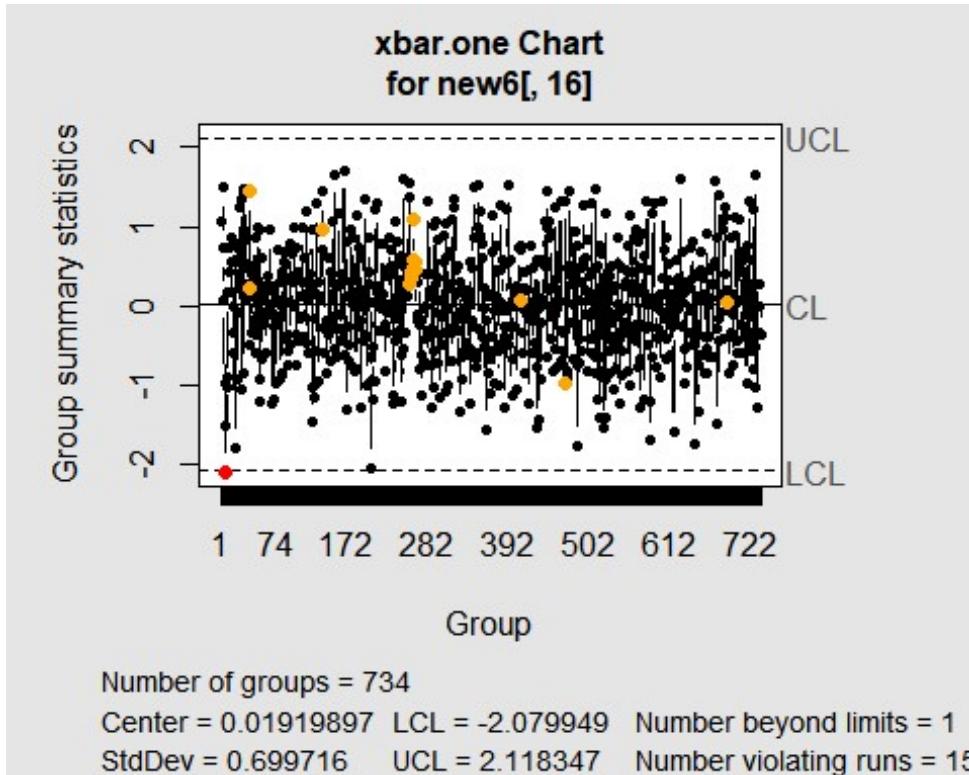


```
xbarViolation13=x13$violations$beyond.limits
```

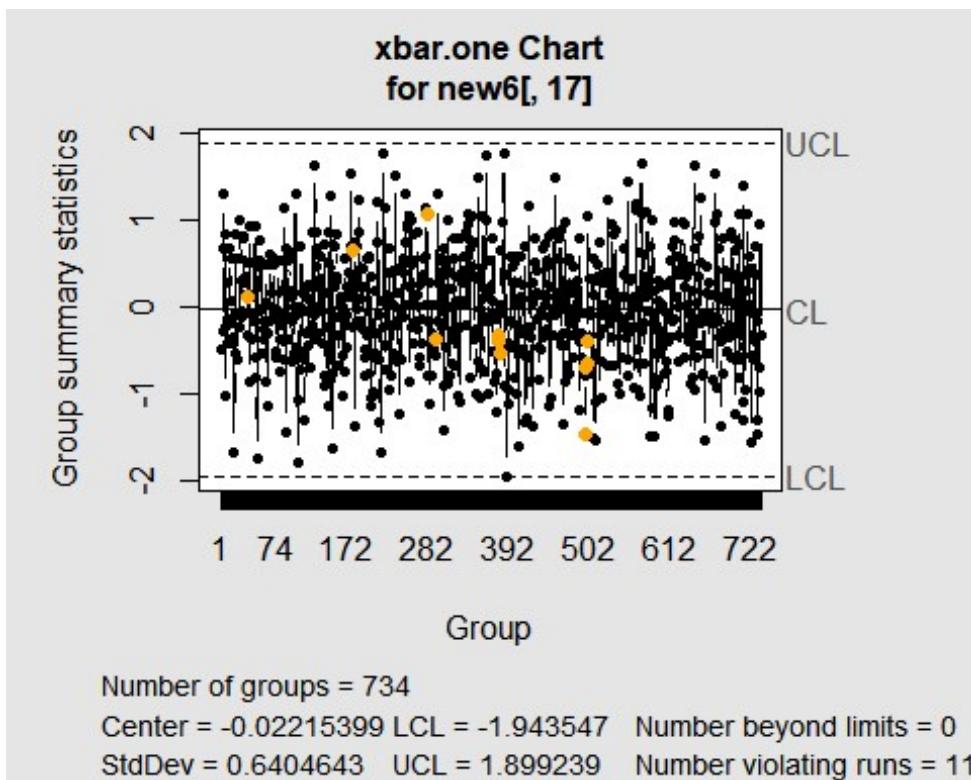
```
x14=qcc(data=new6[, 15], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation14=x14$violations$beyond.limits  
x15=qcc(data=new6[,16],type='xbar.one',sizes = 1, std.dev = "MR")
```

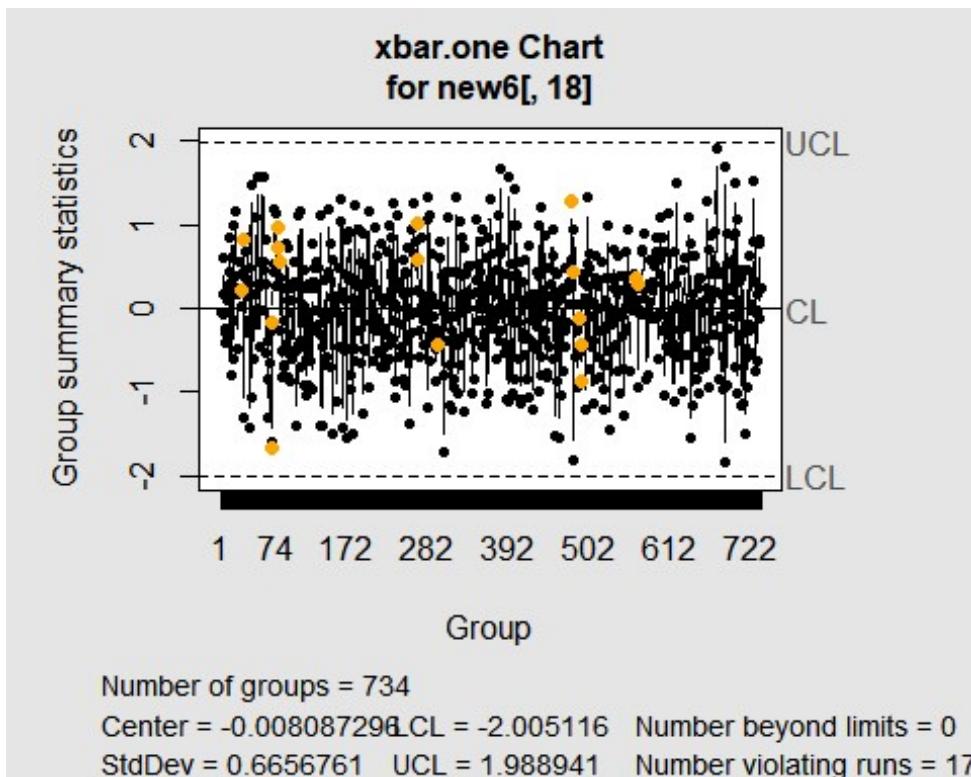


```
xbarViolation15=x15$violations$beyond.limits  
x16=qcc(data=new6[,17],type='xbar.one',sizes = 1, std.dev = "MR")
```

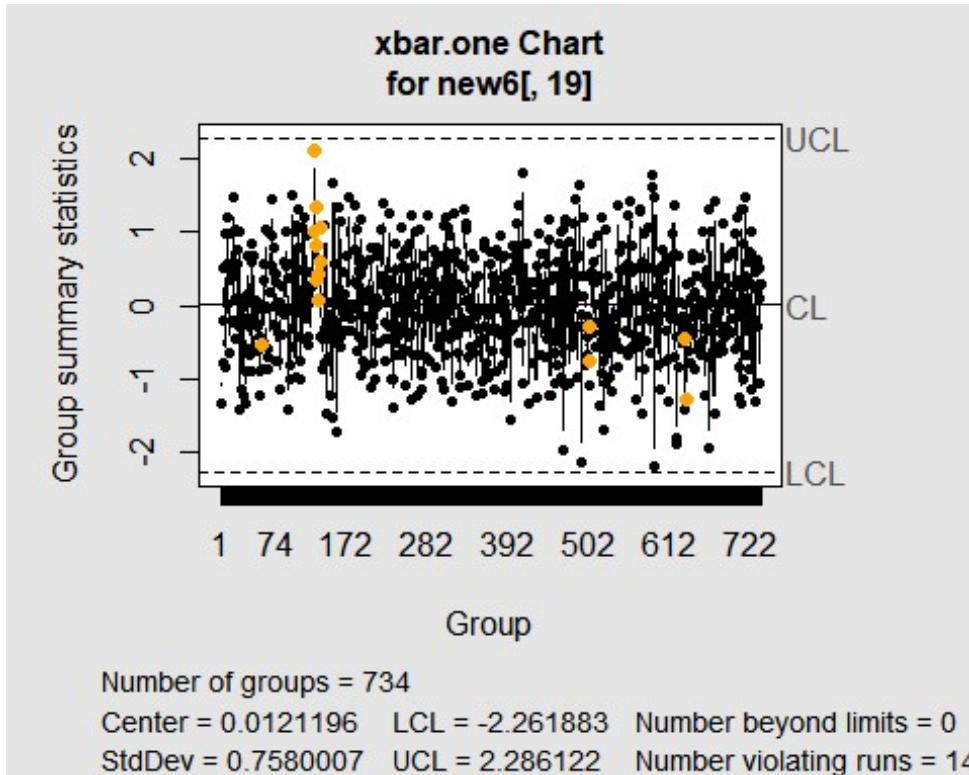


```
xbarViolation16=x16$violations$beyond.limits
```

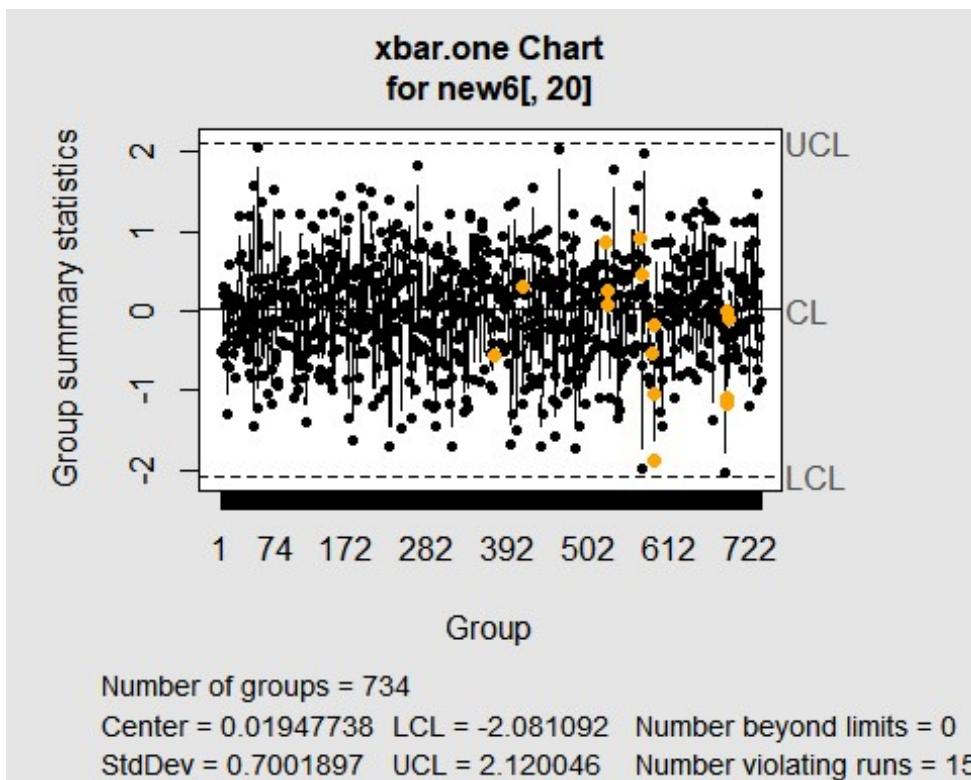
```
x17=qcc(data=new6[,18],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation17=x17$violations$beyond.limits  
x18=qcc(data=new6[,19],type='xbar.one',sizes = 1, std.dev = "MR")
```

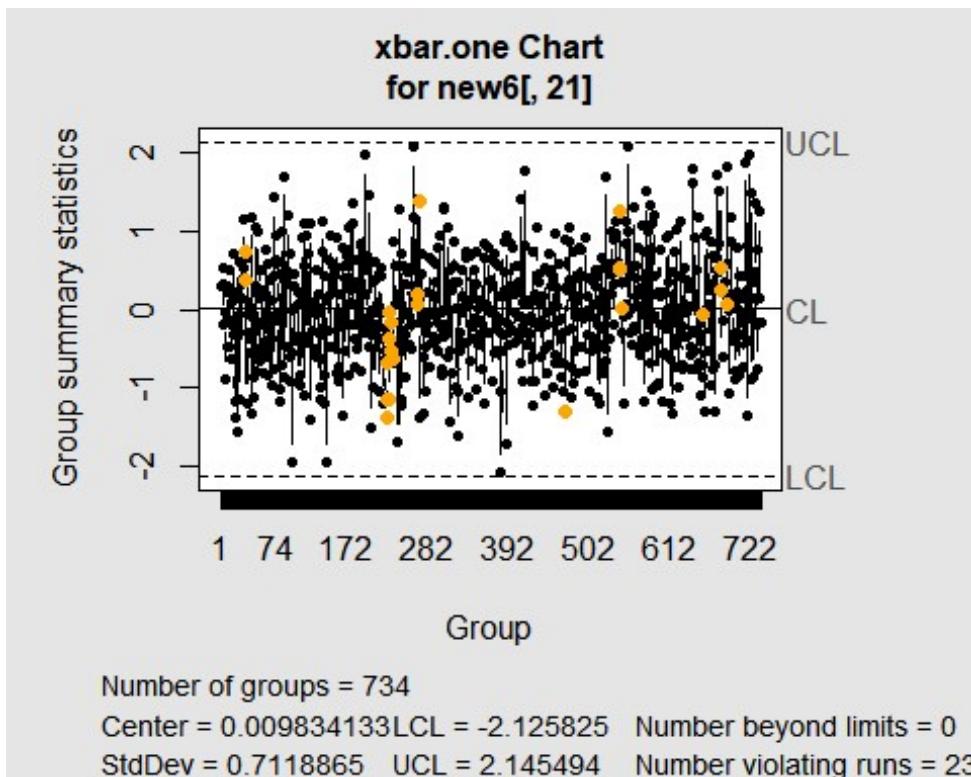


```
xbarViolation18=x18$violations$beyond.limits  
x19=qcc(data=new6[,20],type='xbar.one',sizes = 1, std.dev = "MR")
```

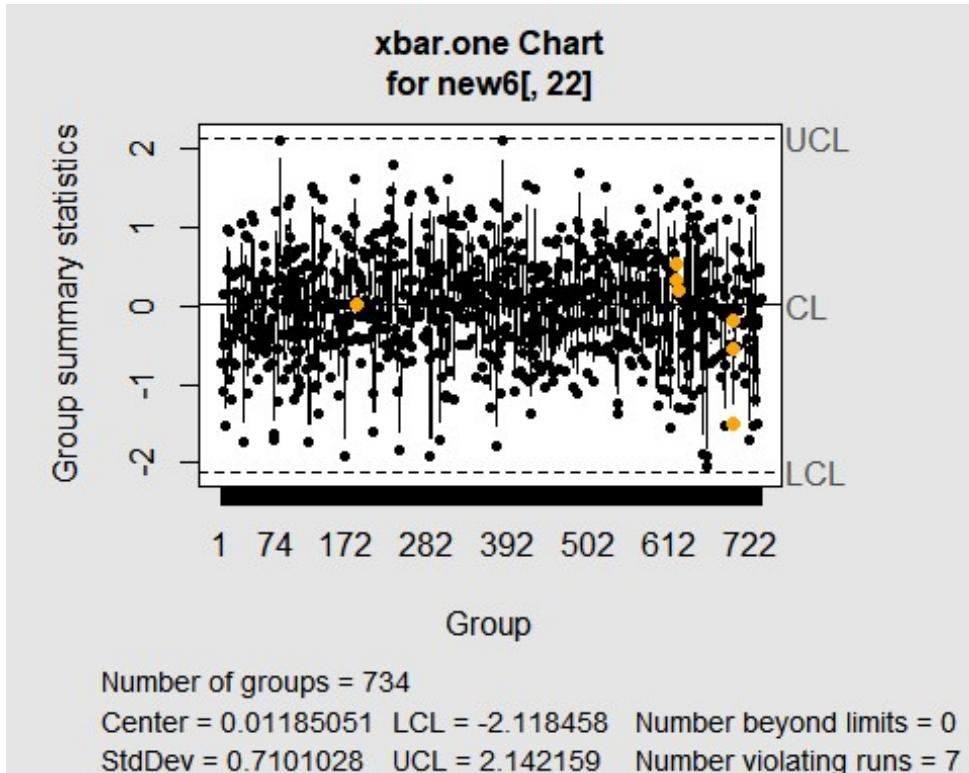


```
xbarViolation19=x19$violations$beyond.limits
```

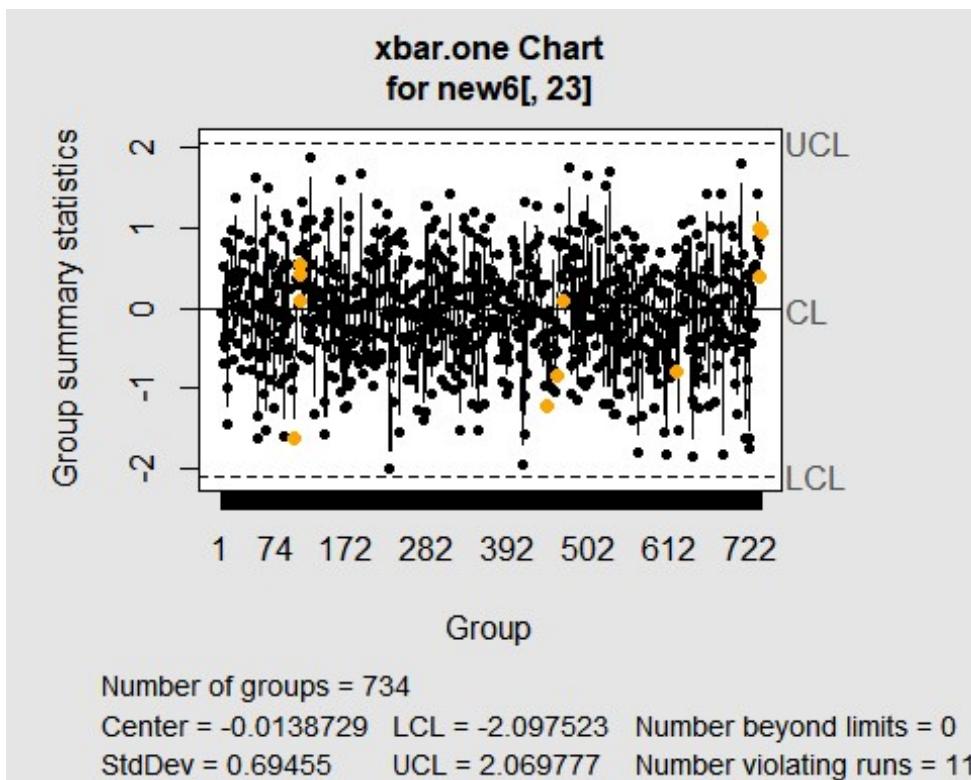
```
x20=qcc(data=new6[, 21], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation20=x20$violations$beyond.limits  
x21=qcc(data=new6[,22],type='xbar.one',sizes = 1, std.dev = "MR")
```

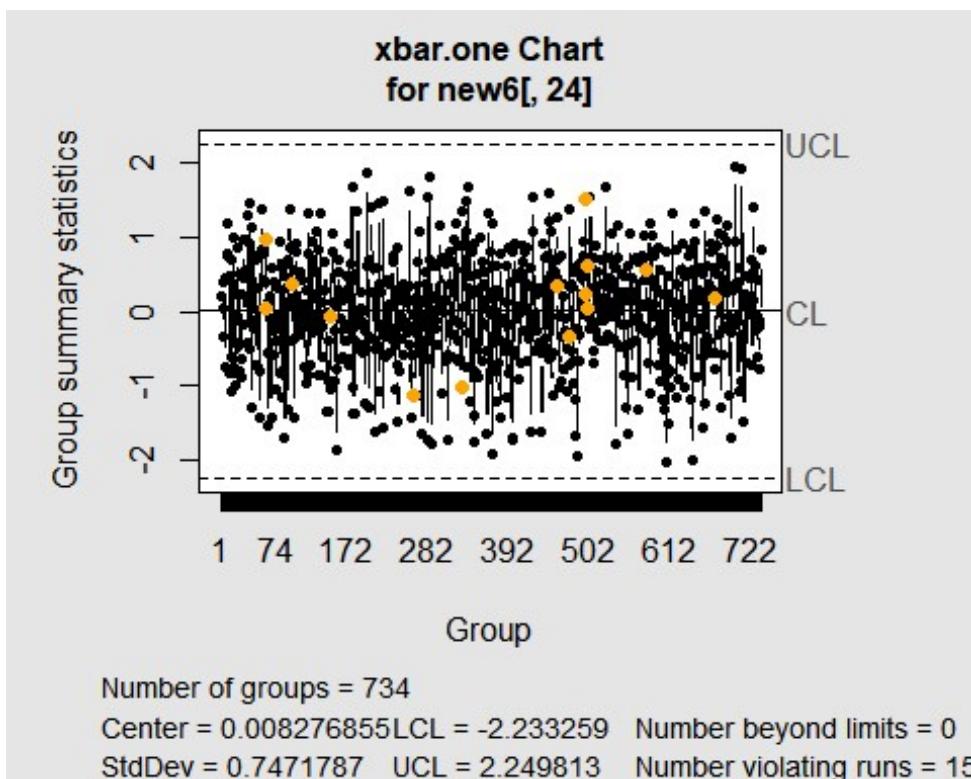


```
xbarViolation21=x21$violations$beyond.limits  
x22=qcc(data=new6[,23],type='xbar.one',sizes = 1, std.dev = "MR")
```

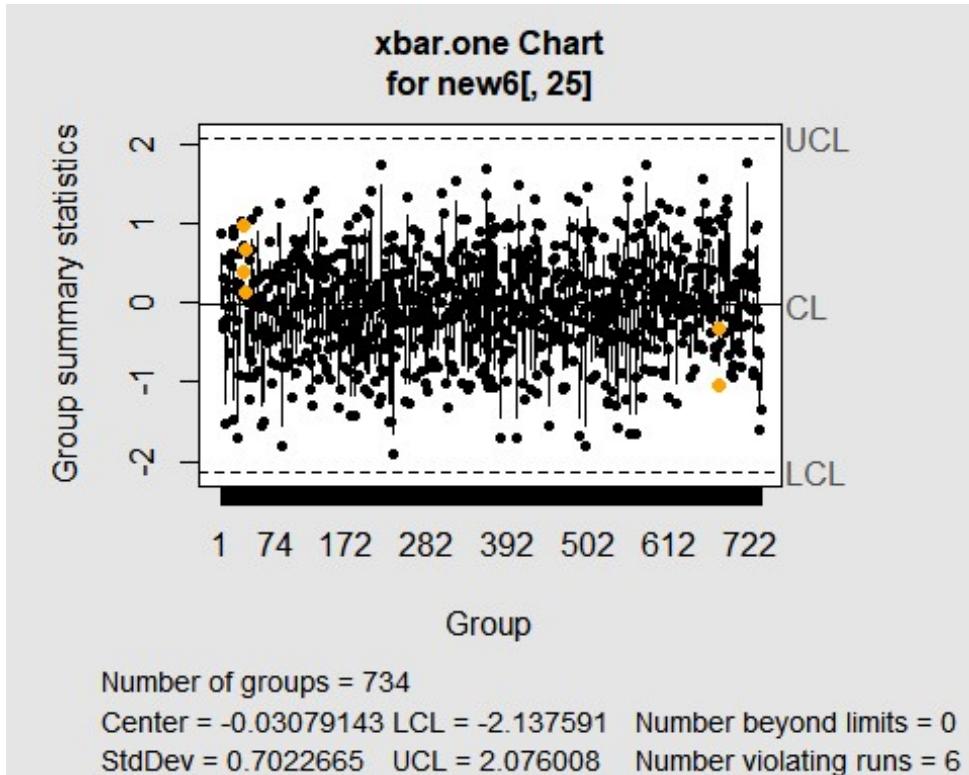


```
xbarViolation22=x22$violations$beyond.limits
```

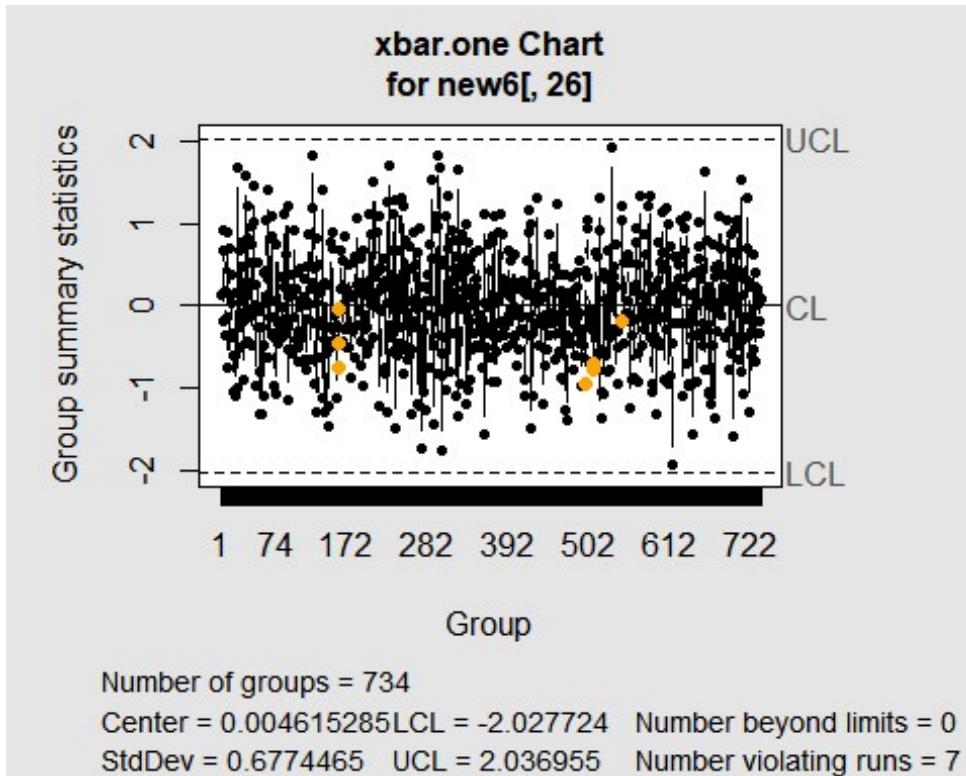
```
x23=qcc(data=new6[, 24], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation23=x23$violations$beyond.limits  
x24=qcc(data=new6[,25],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation24=x24$violations$beyond.limits  
x25=qcc(data=new6[,26],type='xbar.one',sizes = 1, std.dev = "MR")
```

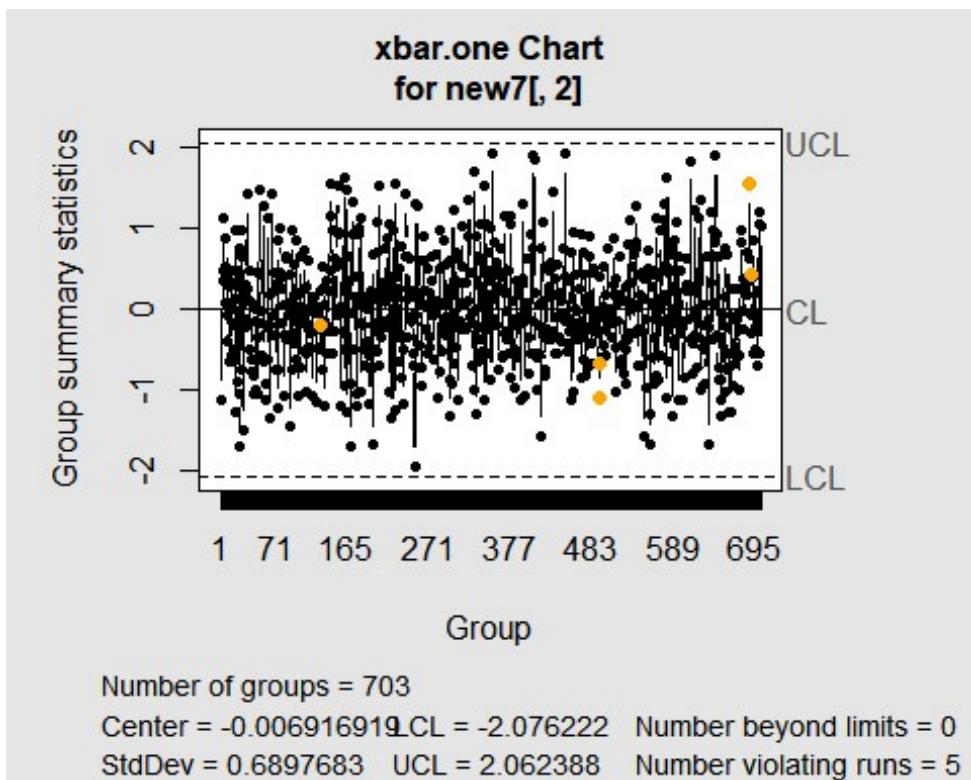


```
xbarViolation25=x25$violations$beyond.limits
```

```
xbarv2=c( 223,
  93, 164, 188, 211, 215, 239, 345, 703,
  149, 164, 169, 171, 173, 174, 179, 181, 184, 196, 202, 208, 211,
  217, 223, 233, 239, 265, 271, 279, 281, 284, 287, 289, 538,
  7)
```

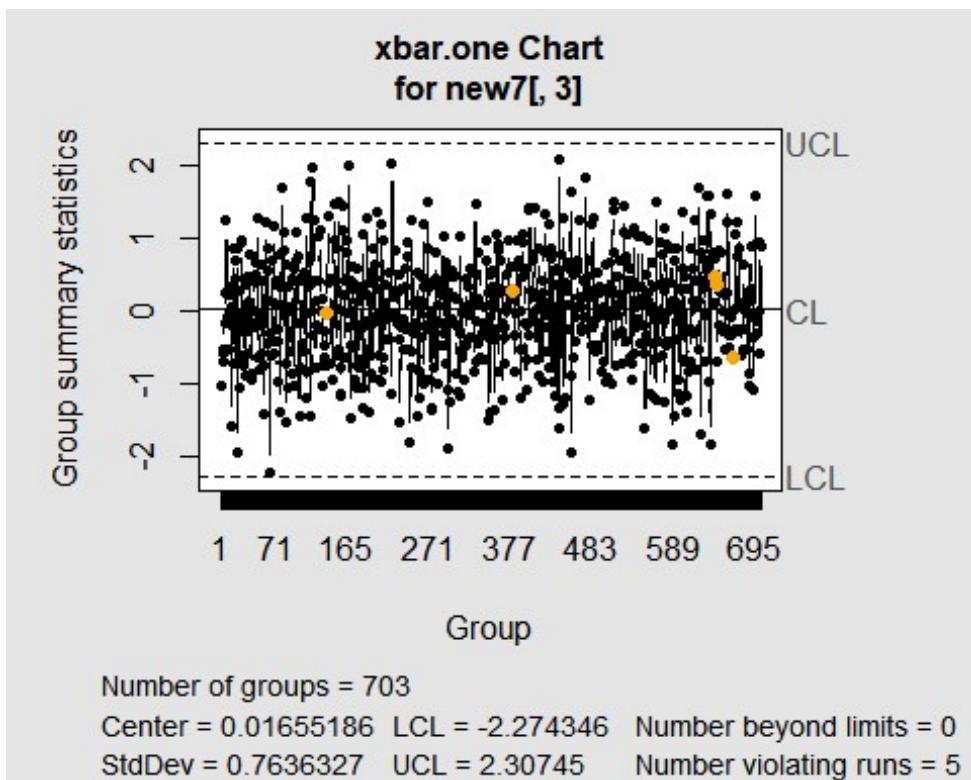
```
new7=new6[-xbarv2, ]
```

```
x1=qcc(data=new7[,2],type='xbar.one',sizes = 1, std.dev = "MR")
```



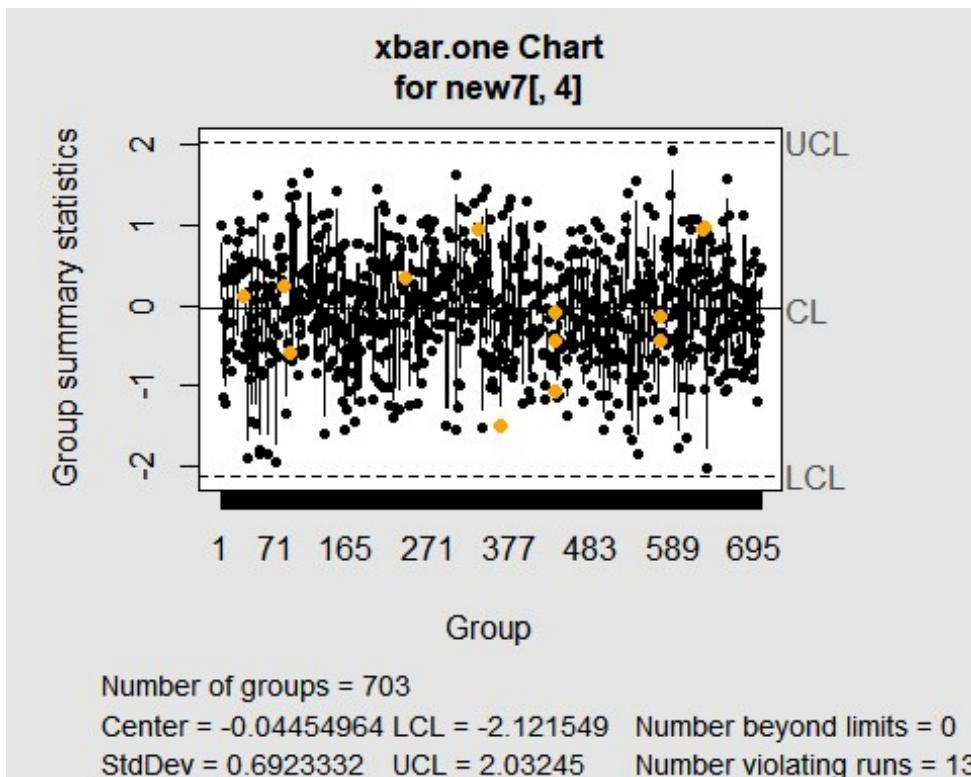
```
xbarViolation1=x1$violations$beyond.limits
```

```
x2=qcc(data=new7[,3],type='xbar.one',sizes = 1, std.dev = "MR")
```



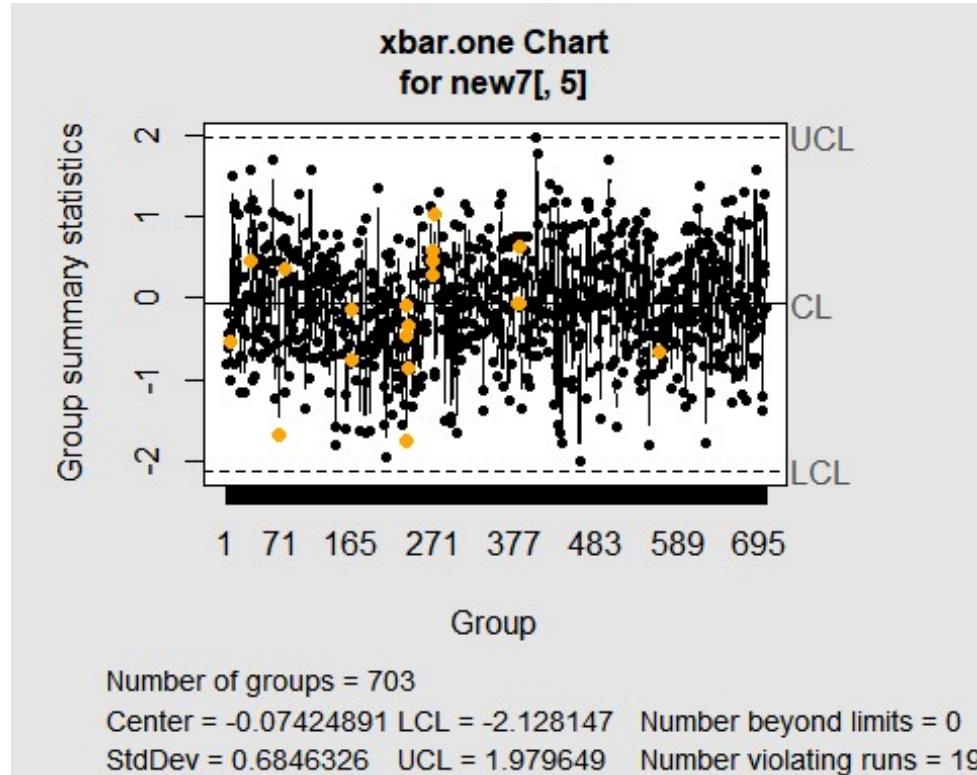
```
xbarViolation2=x2$violations$beyond.limits
```

```
x3=qcc(data=new7[,4],type='xbar.one',sizes = 1, std.dev = "MR")
```



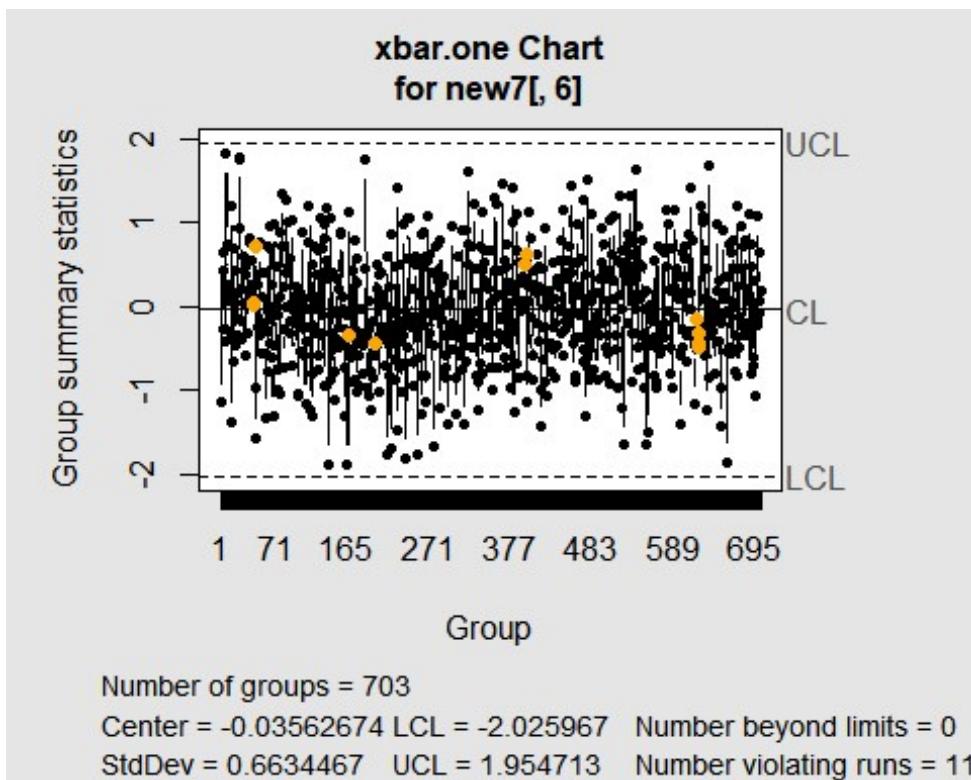
```
xbarViolation3=x3$violations$beyond.limits
```

```
x4=qcc(data=new7[,5],type='xbar.one',sizes = 1, std.dev = "MR")
```



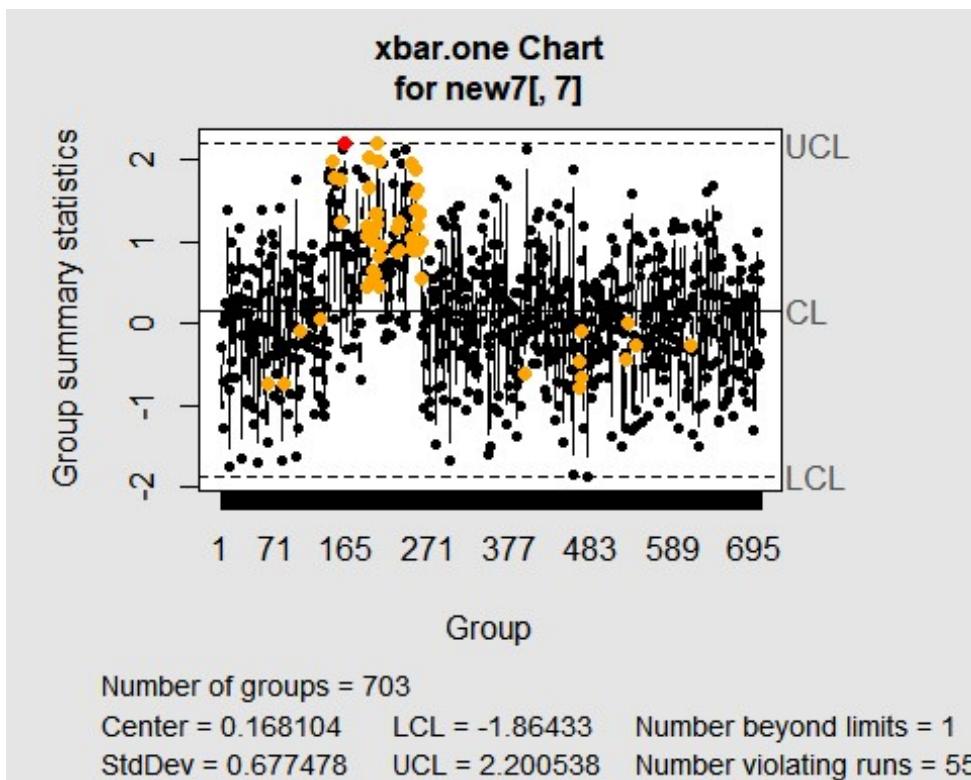
```
xbarViolation4=x4$violations$beyond.limits
```

```
x5=qcc(data=new7[,6],type='xbar.one',sizes = 1, std.dev = "MR")
```



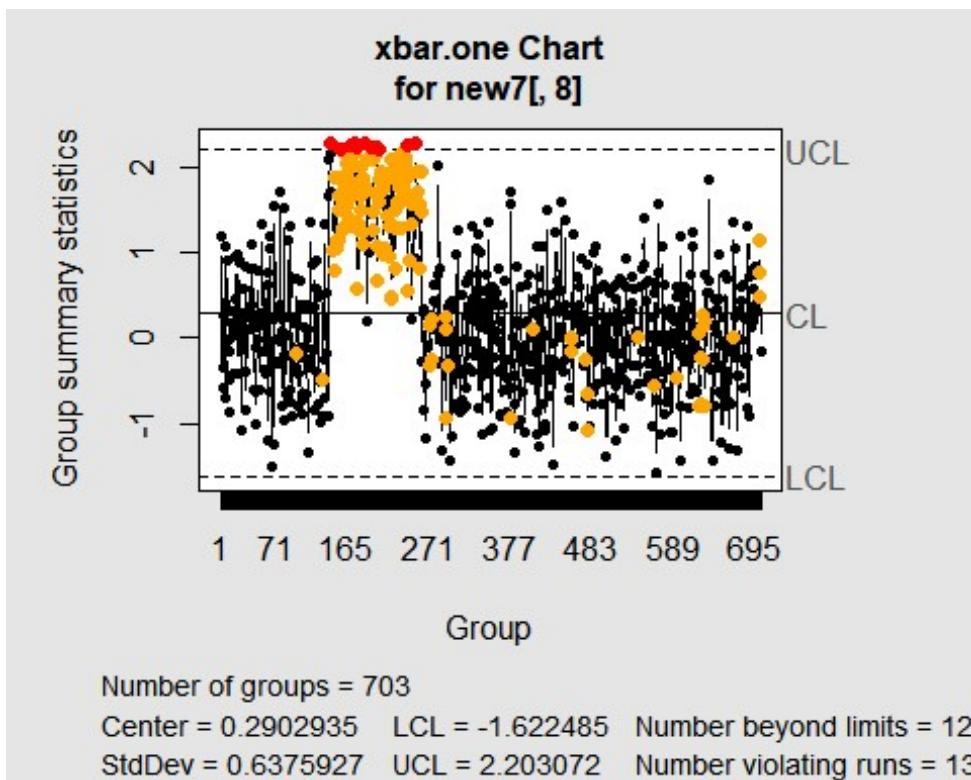
```
xbarViolation5=x5$violations$beyond.limits
```

```
x6=qcc(data=new7[,7],type='xbar.one',sizes = 1, std.dev = "MR")
```



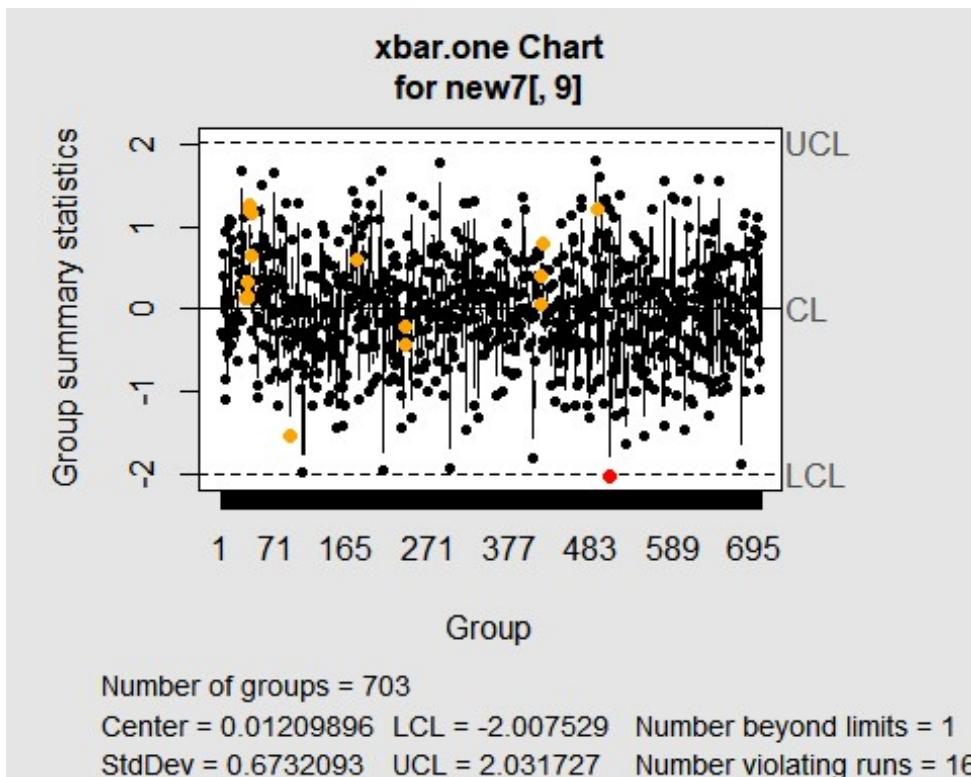
```
xbarViolation6=x6$violations$beyond.limits
```

```
x7=qcc(data=new7[,8],type='xbar.one',sizes = 1, std.dev = "MR")
```

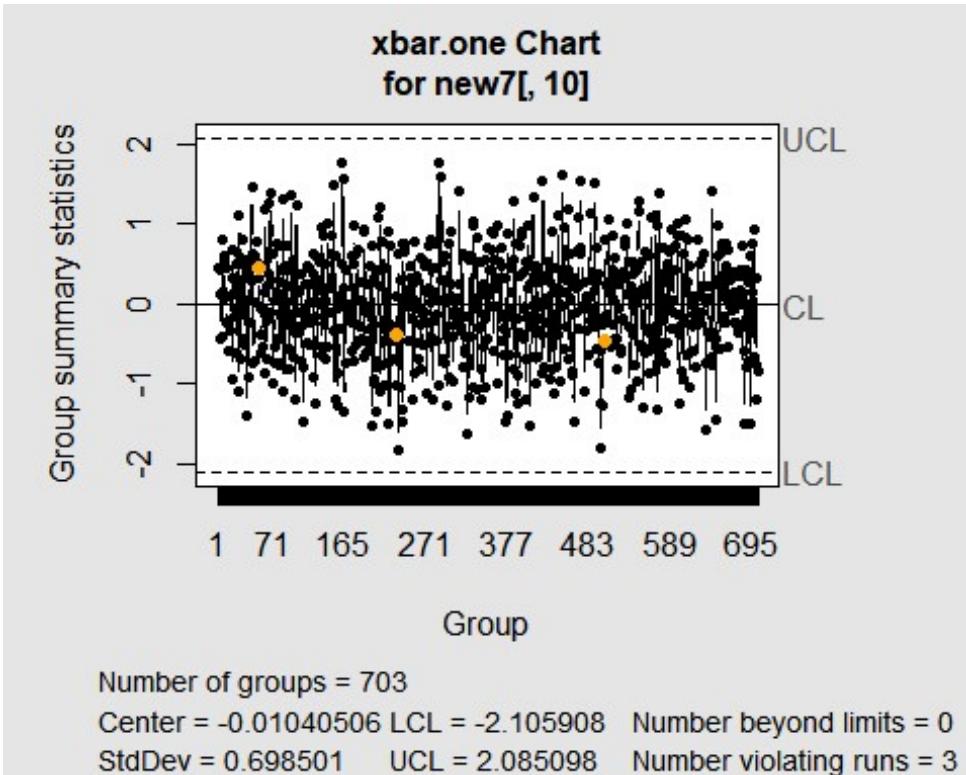


```
xbarViolation7=x7$violations$beyond.limits
```

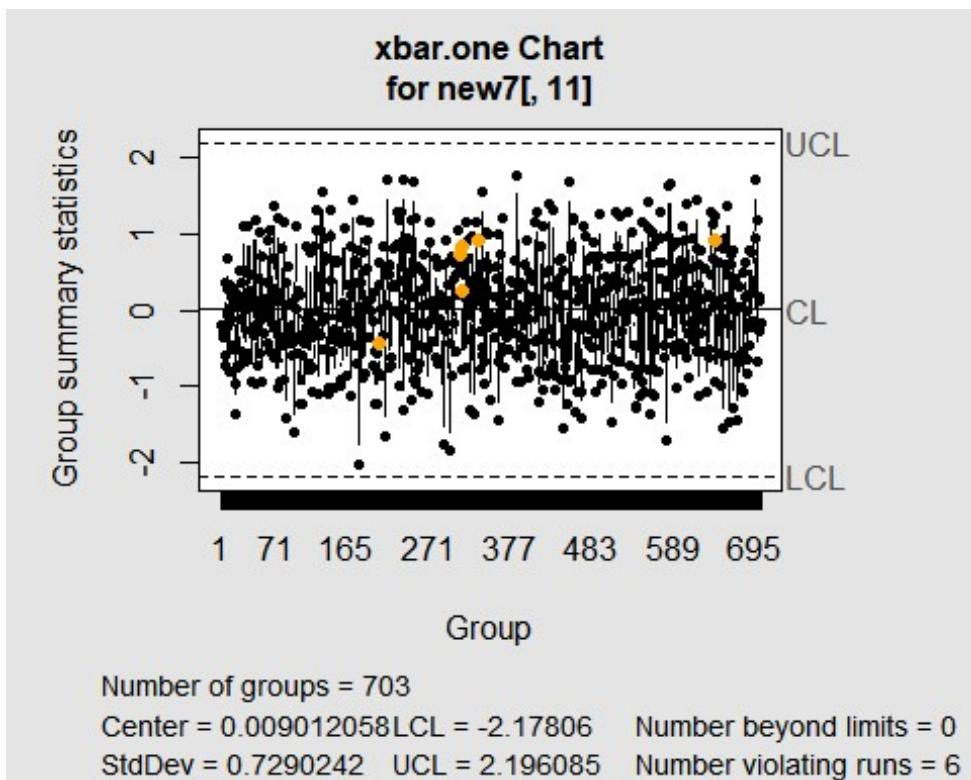
```
x8=qcc(data=new7[, 9], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation8=x8$violations$beyond.limits  
x9=qcc(data=new7[,10],type='xbar.one',sizes = 1, std.dev = "MR")
```

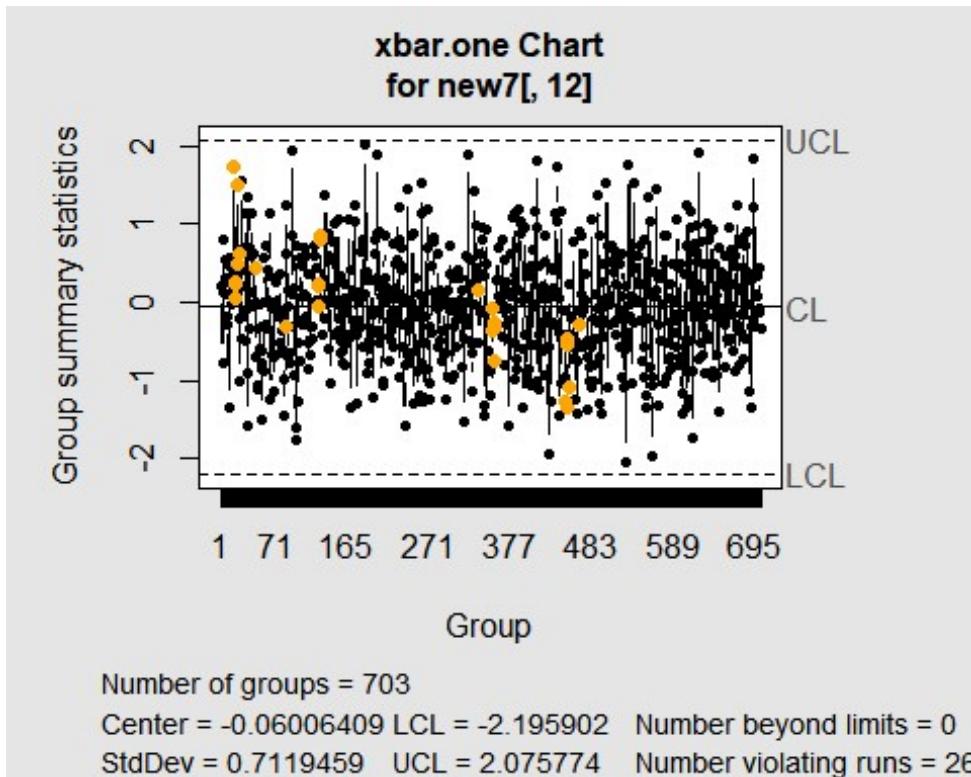


```
xbarViolation9=x9$violations$beyond.limits  
x10=qcc(data=new7[,11],type='xbar.one',sizes = 1, std.dev = "MR")
```

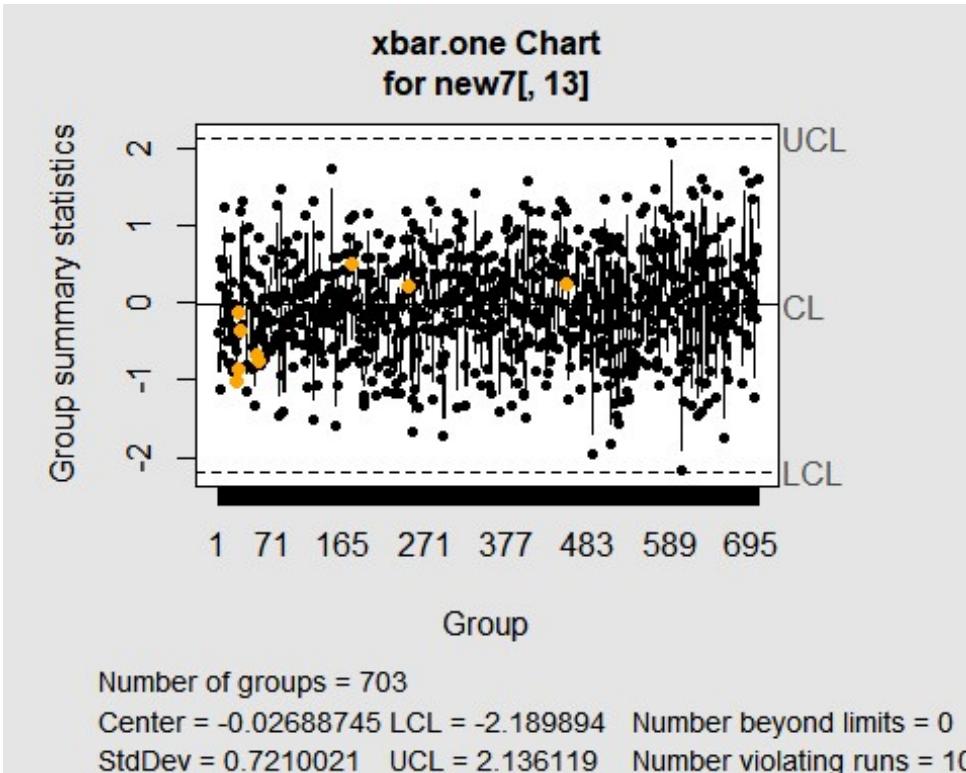


```
xbarViolation10=x10$violations$beyond.limits
```

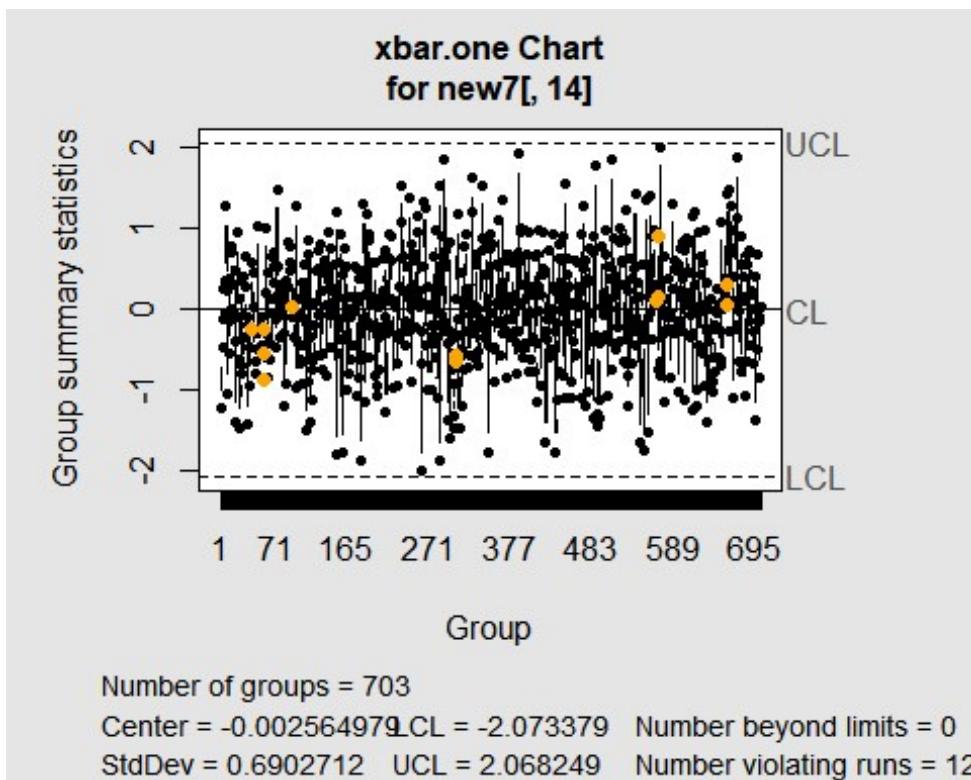
```
x11=qcc(data=new7[, 12], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation11=x11$violations$beyond.limits  
x12=qcc(data=new7[,13],type='xbar.one',sizes = 1, std.dev = "MR")
```

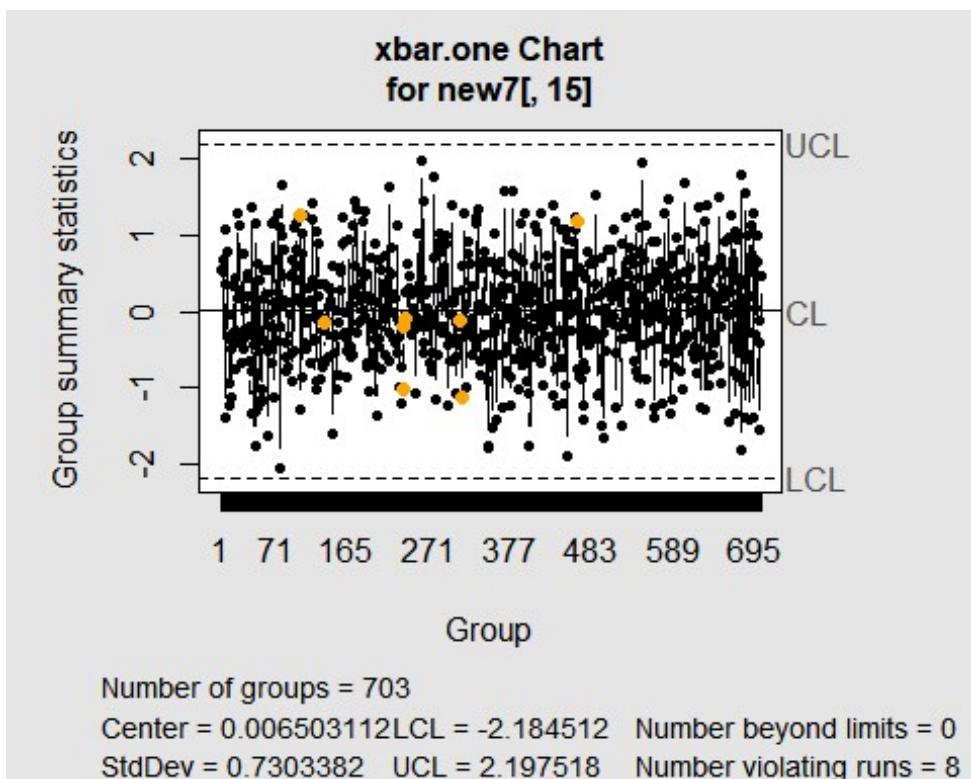


```
xbarViolation12=x12$violations$beyond.limits  
x13=qcc(data=new7[,14],type='xbar.one',sizes = 1, std.dev = "MR")
```

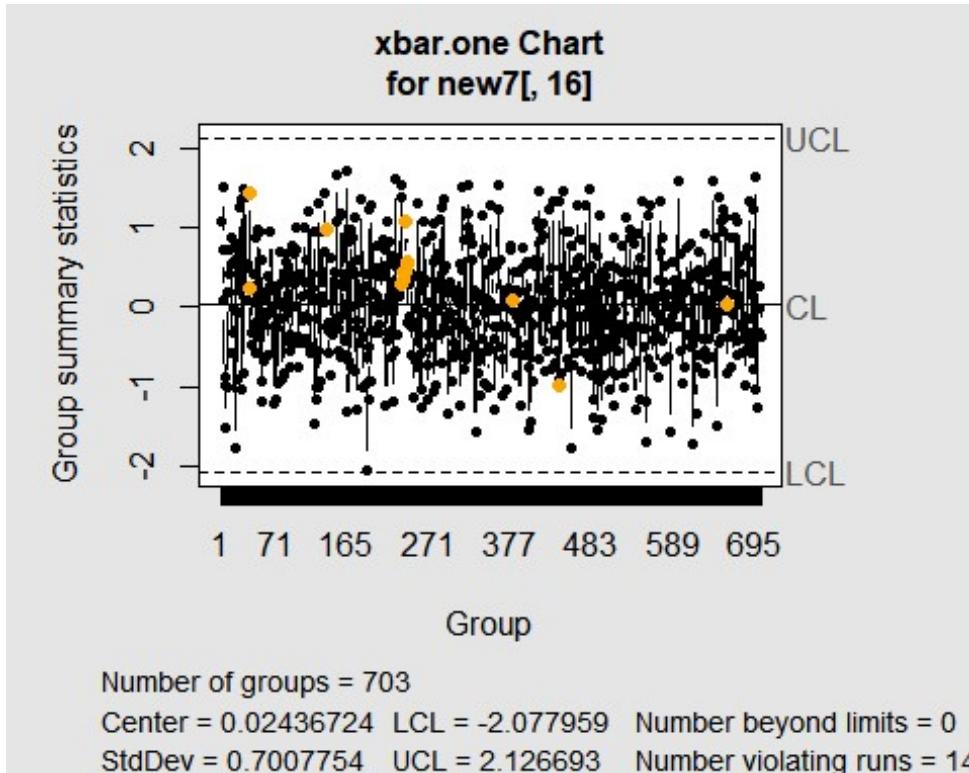


```
xbarViolation13=x13$violations$beyond.limits
```

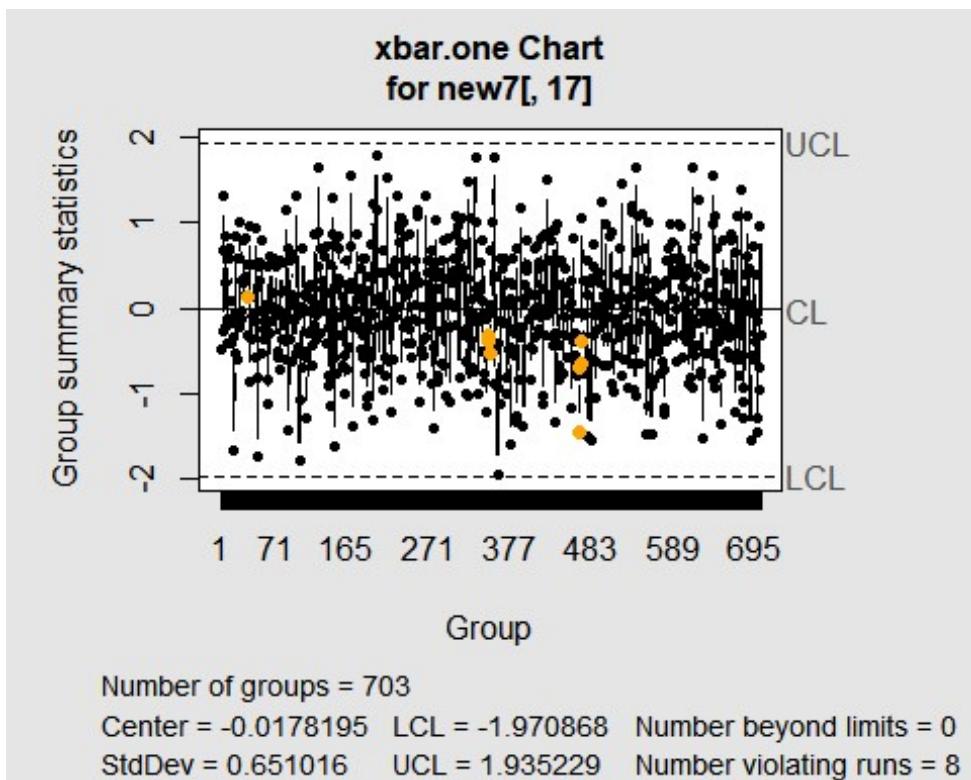
```
x14=qcc(data=new7[,15],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation14=x14$violations$beyond.limits  
x15=qcc(data=new7[,16],type='xbar.one',sizes = 1, std.dev = "MR")
```

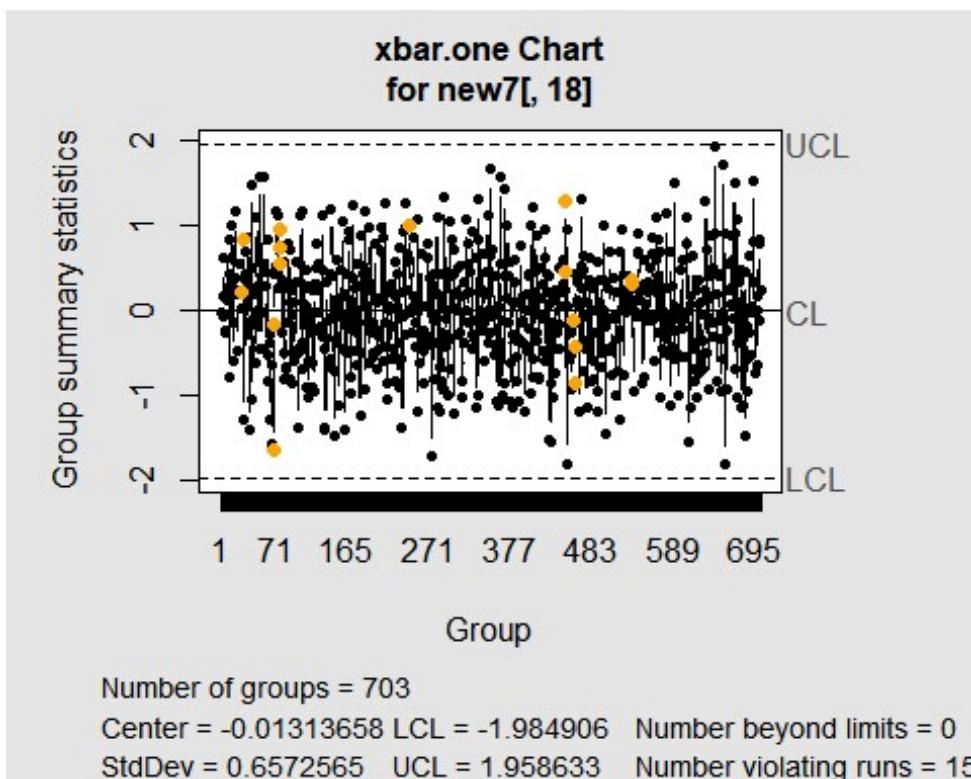


```
xbarViolation15=x15$violations$beyond.limits  
x16=qcc(data=new7[,17],type='xbar.one',sizes = 1, std.dev = "MR")
```

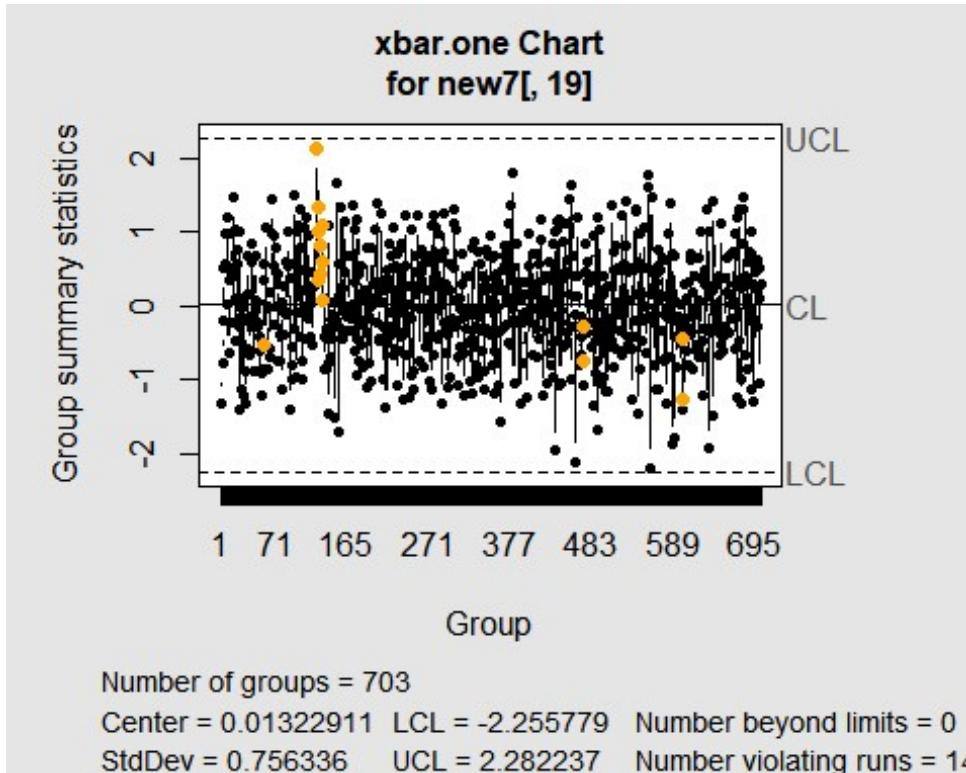


```
xbarViolation16=x16$violations$beyond.limits
```

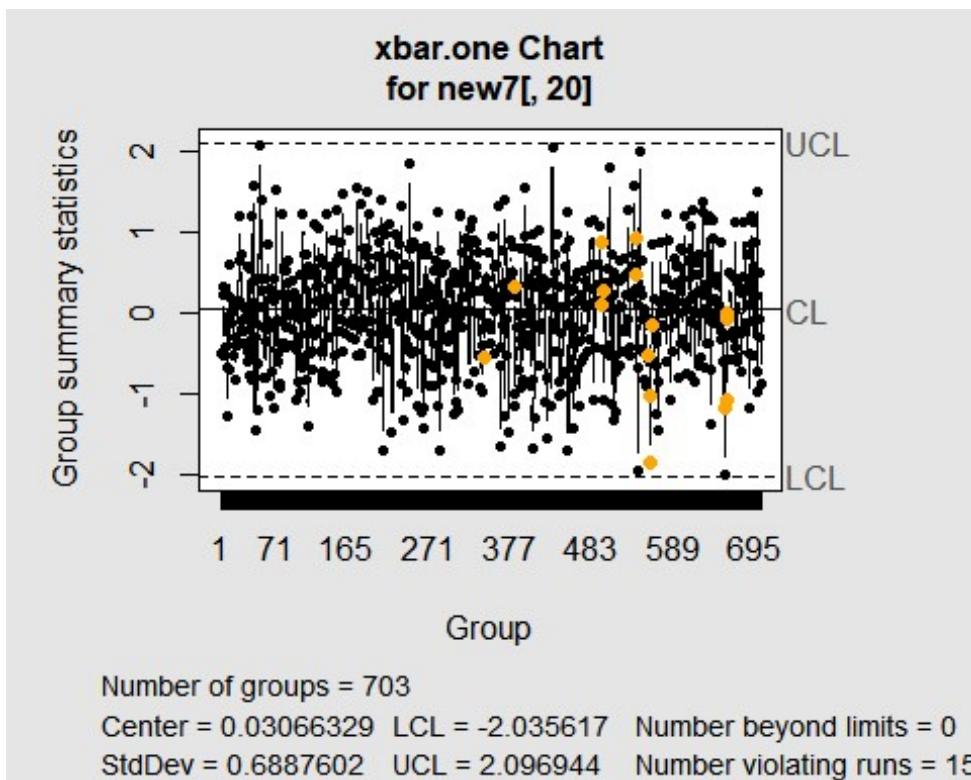
```
x17=qcc(data=new7[,18],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation17=x17$violations$beyond.limits  
x18=qcc(data=new7[,19],type='xbar.one',sizes = 1, std.dev = "MR")
```

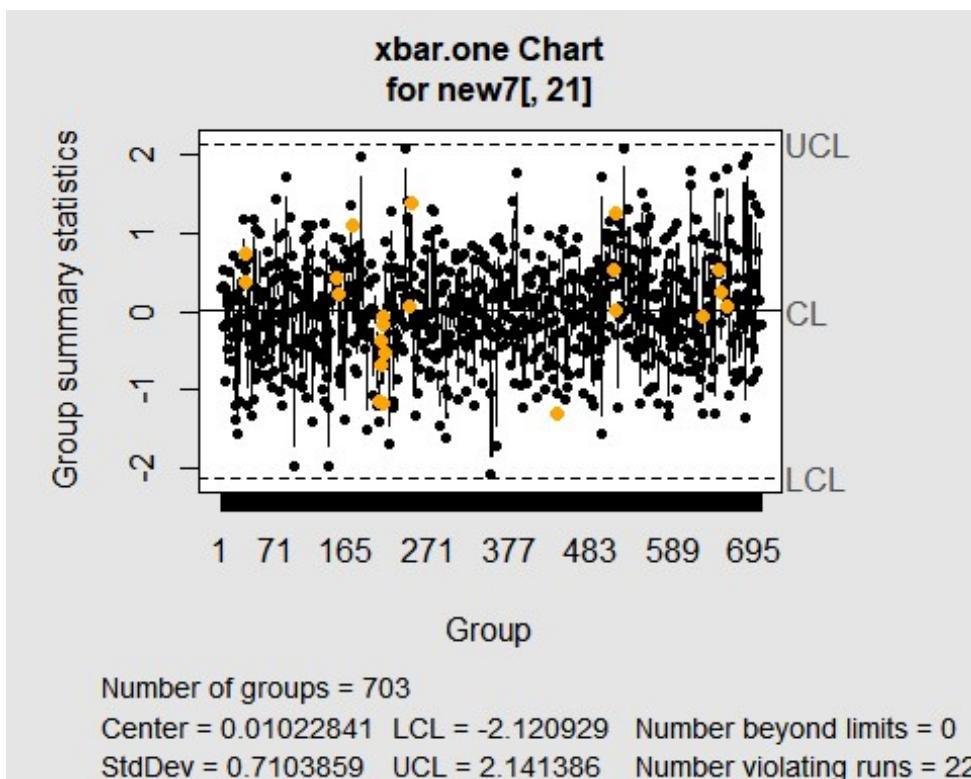


```
xbarViolation18=x18$violations$beyond.limits  
x19=qcc(data=new7[,20],type='xbar.one',sizes = 1, std.dev = "MR")
```

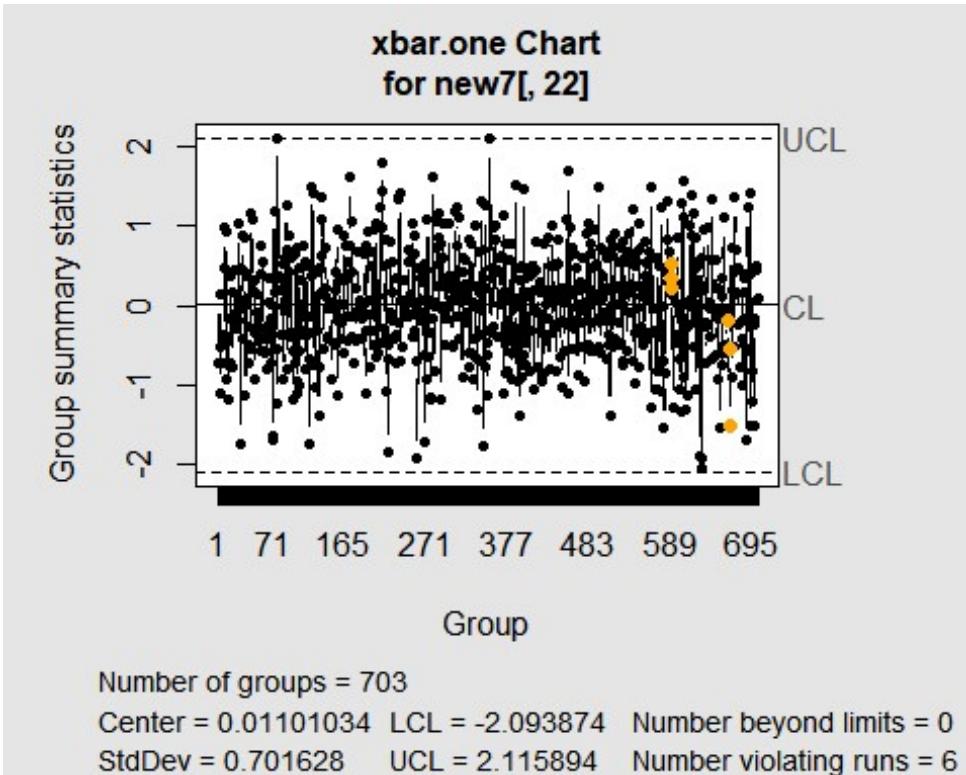


```
xbarViolation19=x19$violations$beyond.limits
```

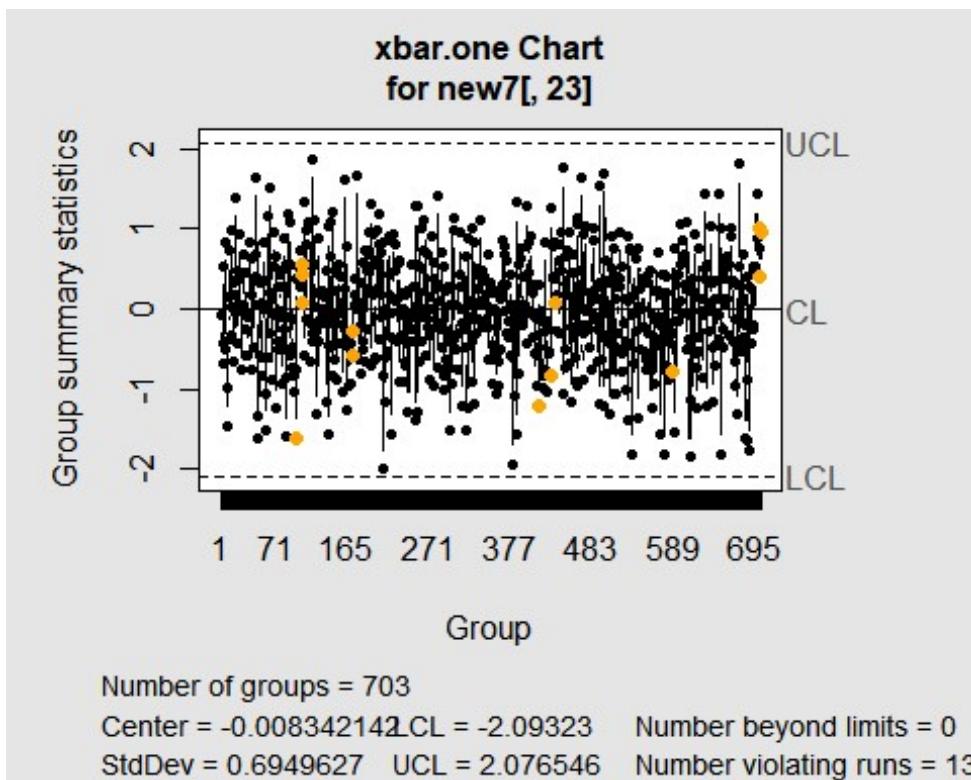
```
x20=qcc(data=new7[, 21], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation20=x20$violations$beyond.limits  
x21=qcc(data=new7[,22],type='xbar.one',sizes = 1, std.dev = "MR")
```

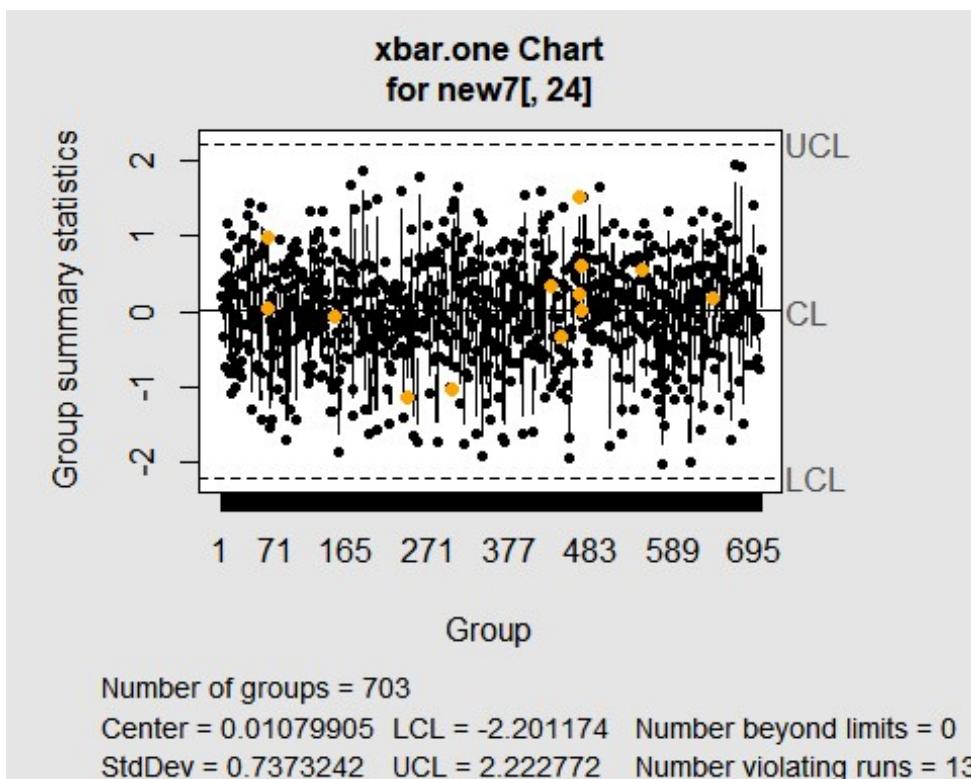


```
xbarViolation21=x21$violations$beyond.limits  
x22=qcc(data=new7[,23],type='xbar.one',sizes = 1, std.dev = "MR")
```

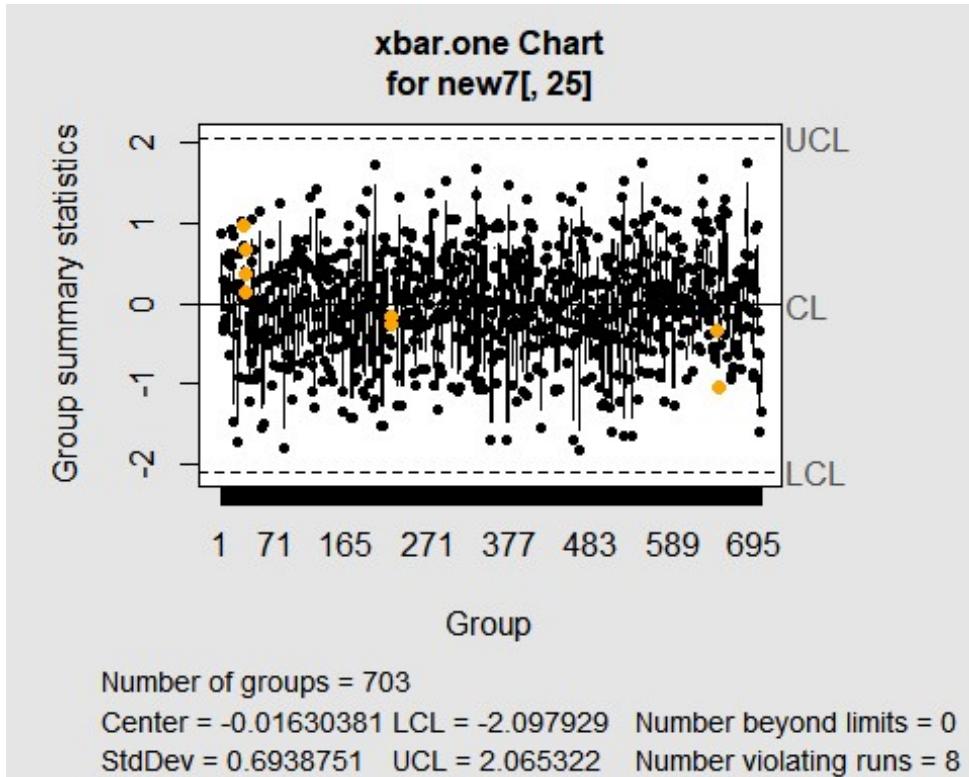


```
xbarViolation22=x22$violations$beyond.limits
```

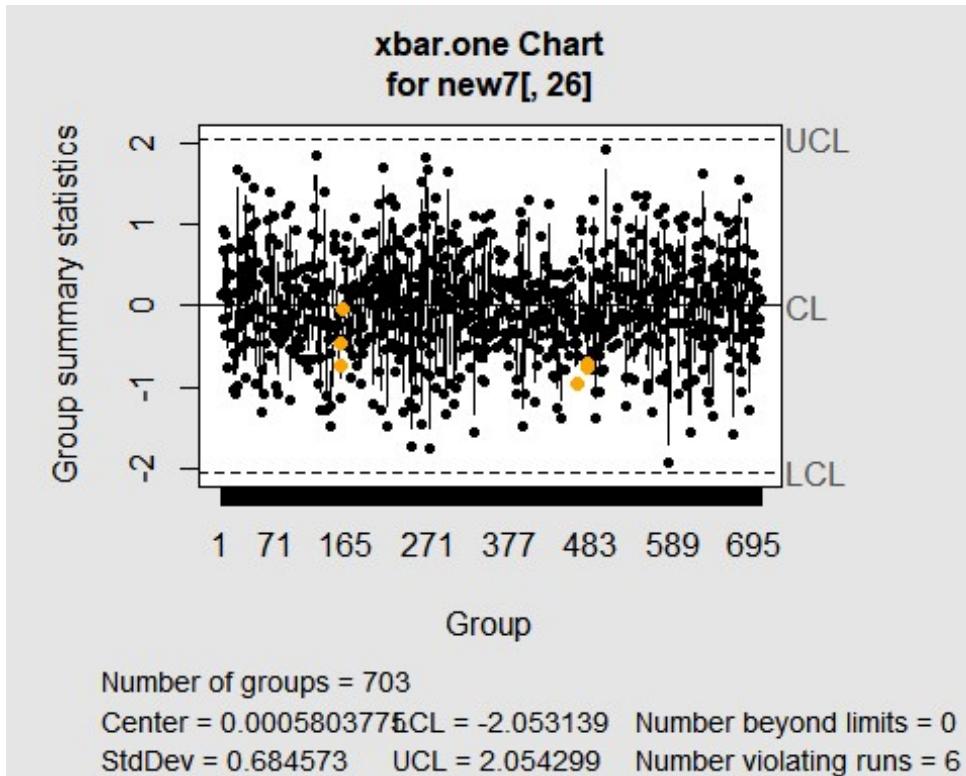
```
x23=qcc(data=new7[, 24], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation23=x23$violations$beyond.limits  
x24=qcc(data=new7[,25],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation24=x24$violations$beyond.limits  
x25=qcc(data=new7[,26],type='xbar.one',sizes = 1, std.dev = "MR")
```

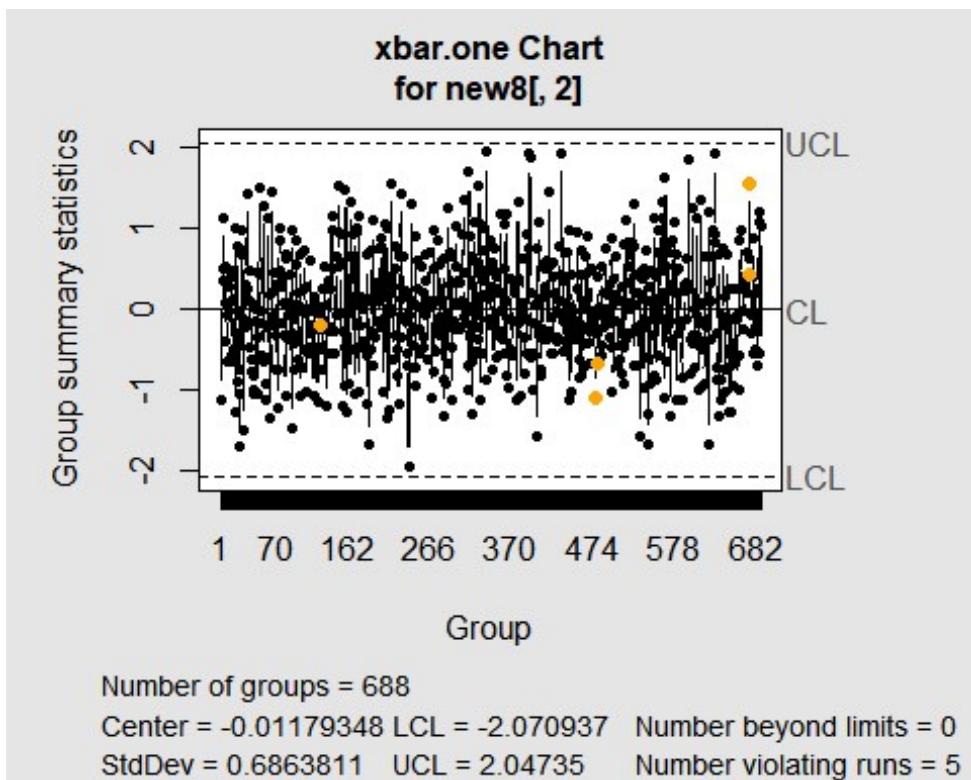


```
xbarViolation25=x25$violations$beyond.limits
```

```
xbarv3=c( 142, 157, 168, 175, 177, 188, 195, 196, 202, 205, 242, 254,
7,
507,
160)
```

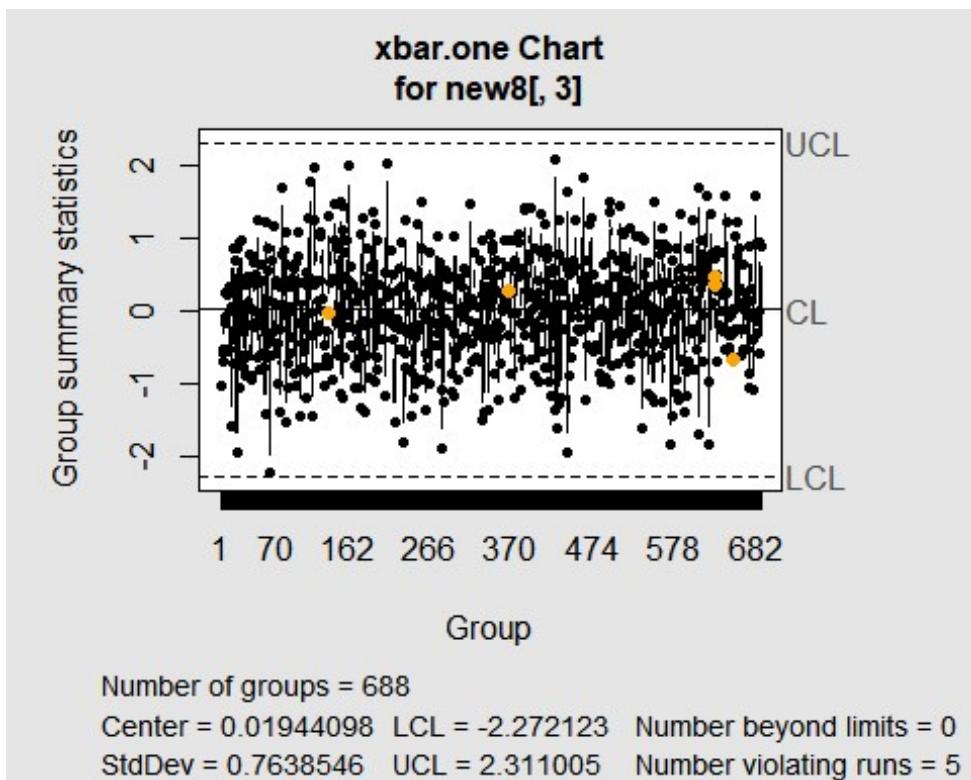
```
new8=new7[-xbarv3, ]
```

```
x1=qcc(data=new8[,2], type='xbar.one', sizes = 1, std.dev = "MR")
```



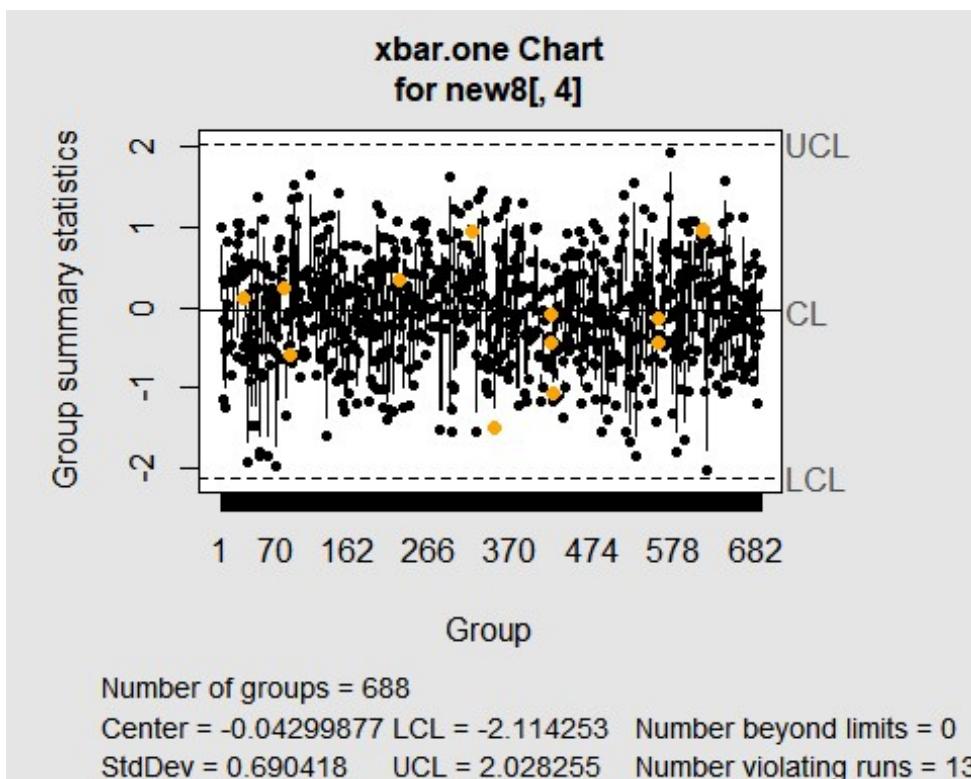
```
xbarViolation1=x1$violations$beyond.limits
```

```
x2=qcc(data=new8[,3],type='xbar.one',sizes = 1, std.dev = "MR")
```



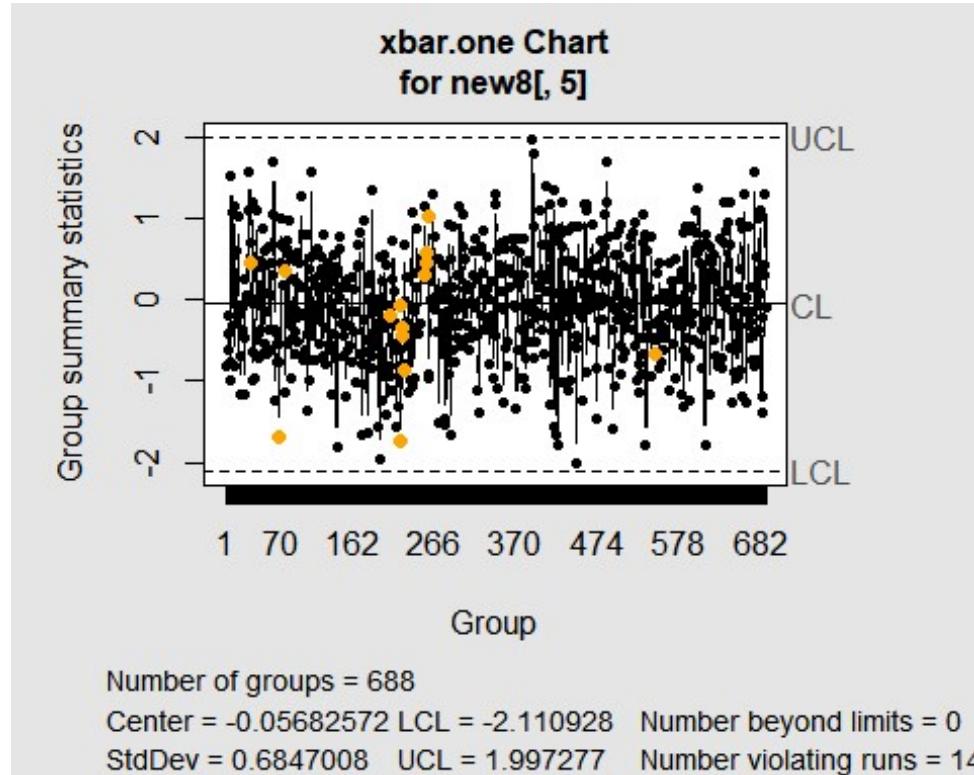
```
xbarViolation2=x2$violations$beyond.limits
```

```
x3=qcc(data=new8[,4],type='xbar.one',sizes = 1, std.dev = "MR")
```



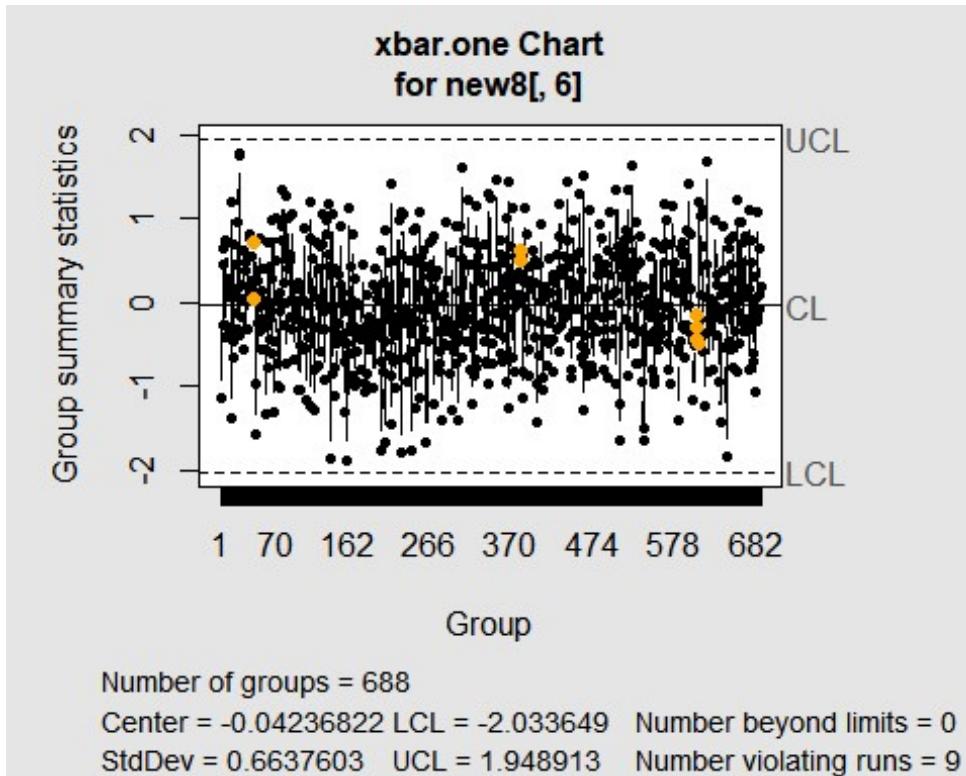
```
xbarViolation3=x3$violations$beyond.limits
```

```
x4=qcc(data=new8[,5],type='xbar.one',sizes = 1, std.dev = "MR")
```



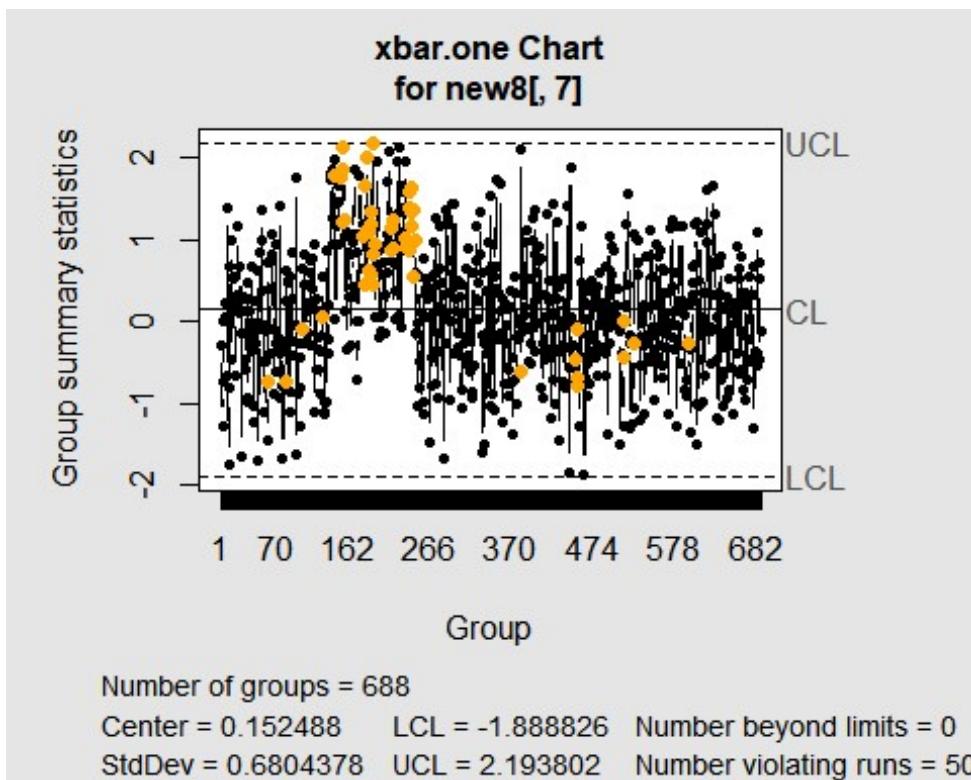
```
xbarViolation4=x4$violations$beyond.limits
```

```
x5=qcc(data=new8[,6],type='xbar.one',sizes = 1, std.dev = "MR")
```



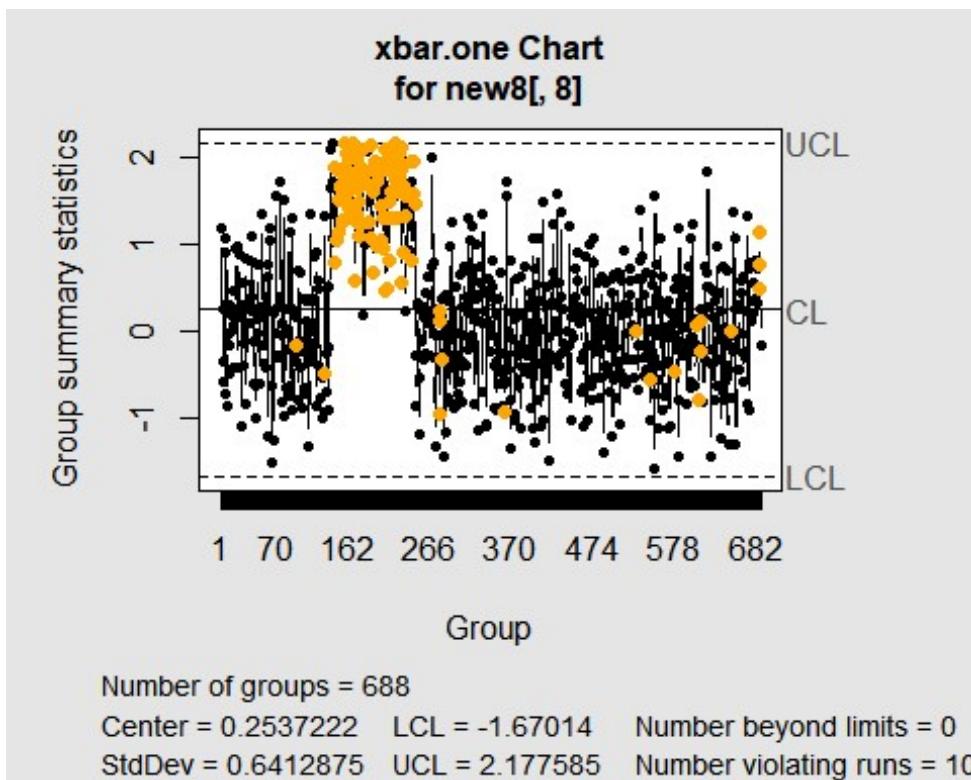
```
xbarViolation5=x5$violations$beyond.limits
```

```
x6=qcc(data=new8[,7],type='xbar.one',sizes = 1, std.dev = "MR")
```



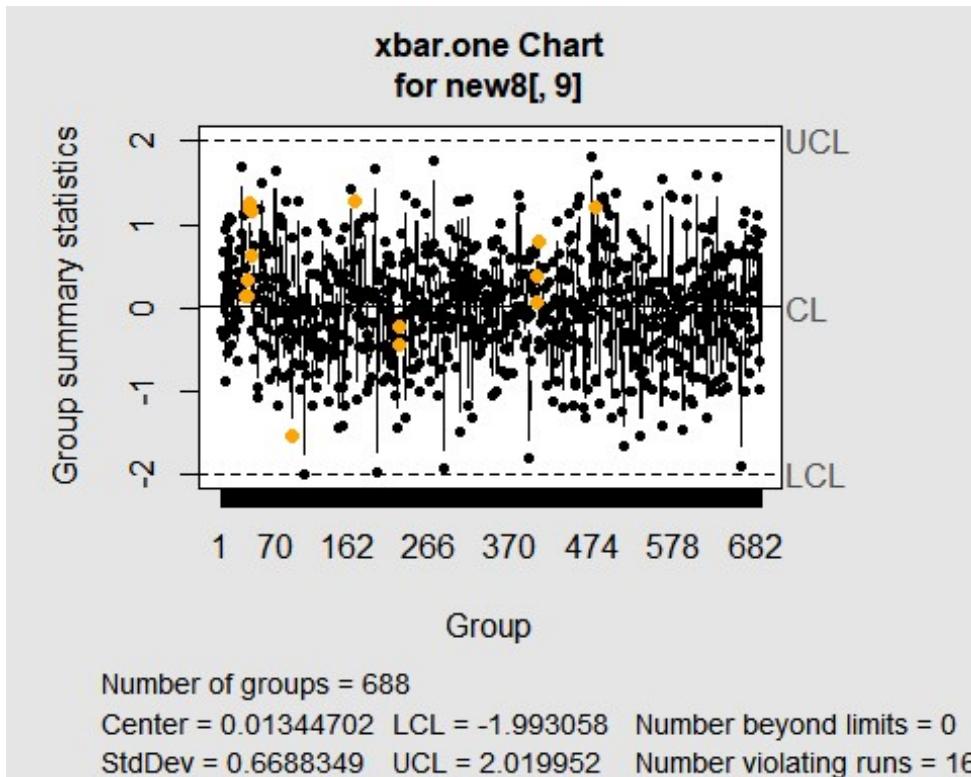
```
xbarViolation6=x6$violations$beyond.limits
```

```
x7=qcc(data=new8[,8],type='xbar.one',sizes = 1, std.dev = "MR")
```

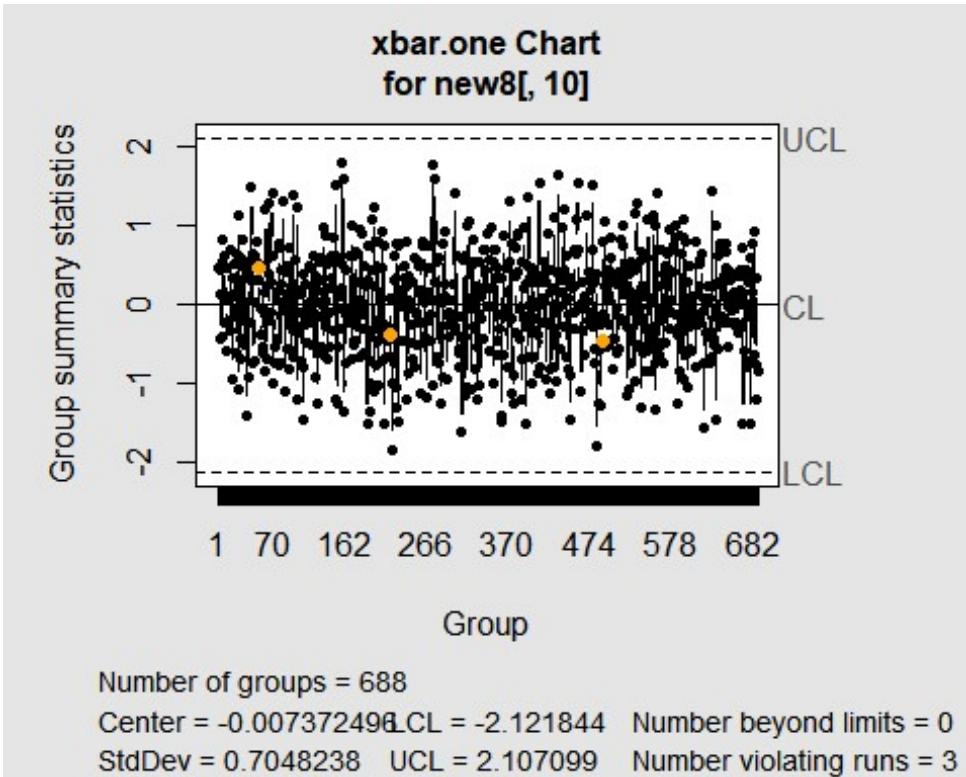


```
xbarViolation7=x7$violations$beyond.limits
```

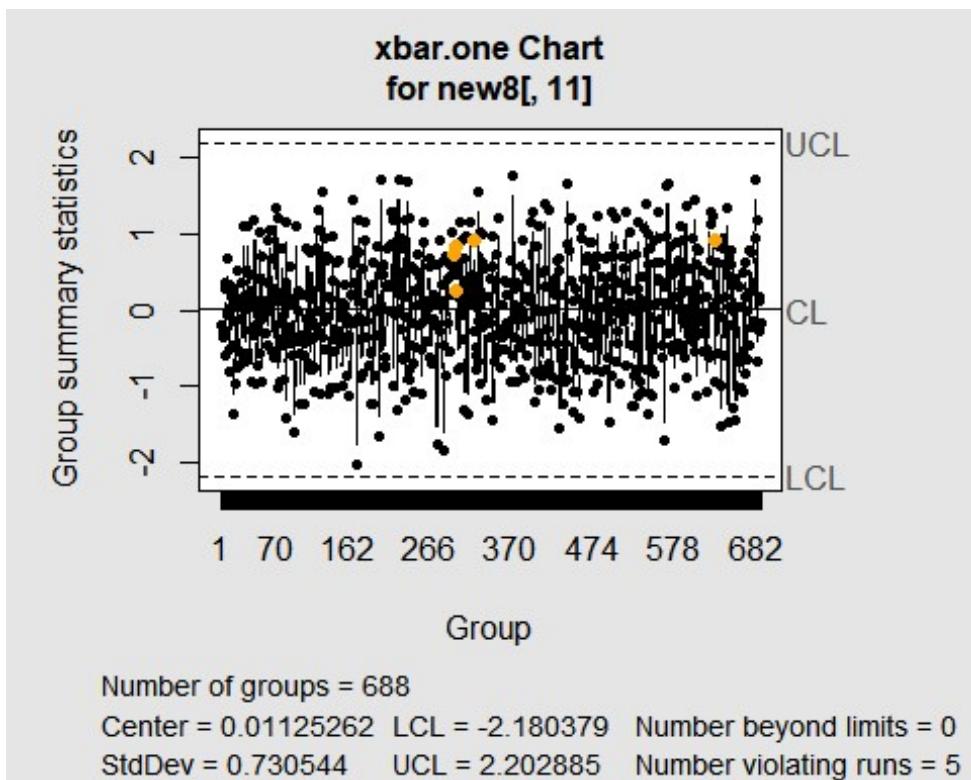
```
x8=qcc(data=new8[, 9], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation8=x8$violations$beyond.limits  
x9=qcc(data=new8[,10],type='xbar.one',sizes = 1, std.dev = "MR")
```

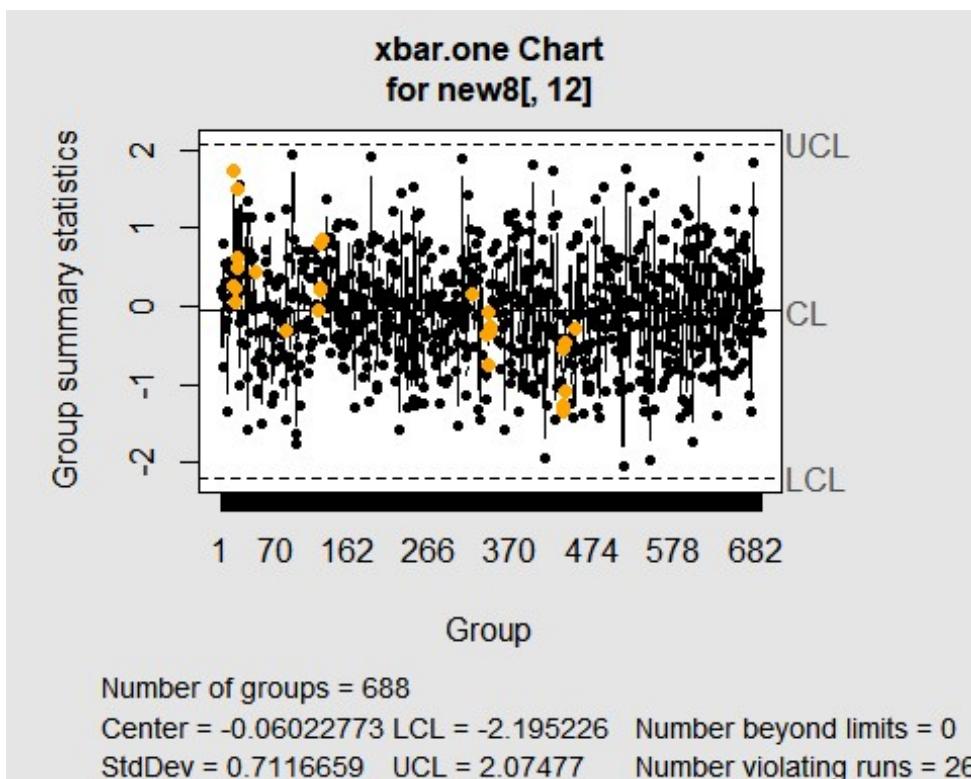


```
xbarViolation9=x9$violations$beyond.limits  
x10=qcc(data=new8[,11],type='xbar.one',sizes = 1, std.dev = "MR")
```

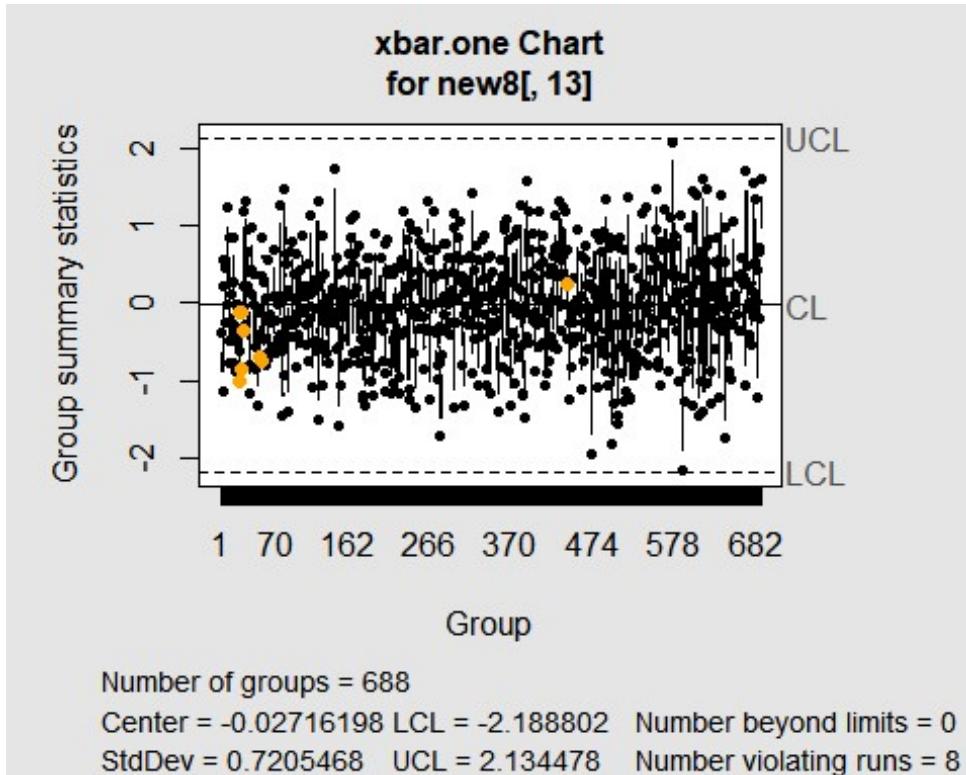


```
xbarViolation10=x10$violations$beyond.limits
```

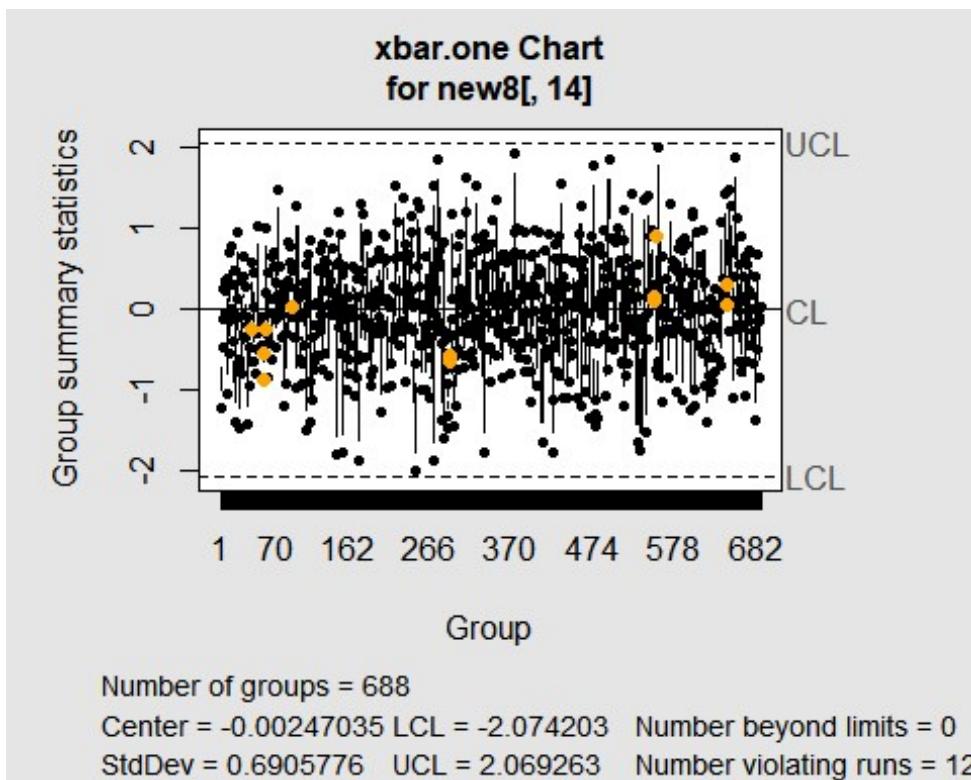
```
x11=qcc(data=new8[, 12], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation11=x11$violations$beyond.limits  
x12=qcc(data=new8[,13],type='xbar.one',sizes = 1, std.dev = "MR")
```

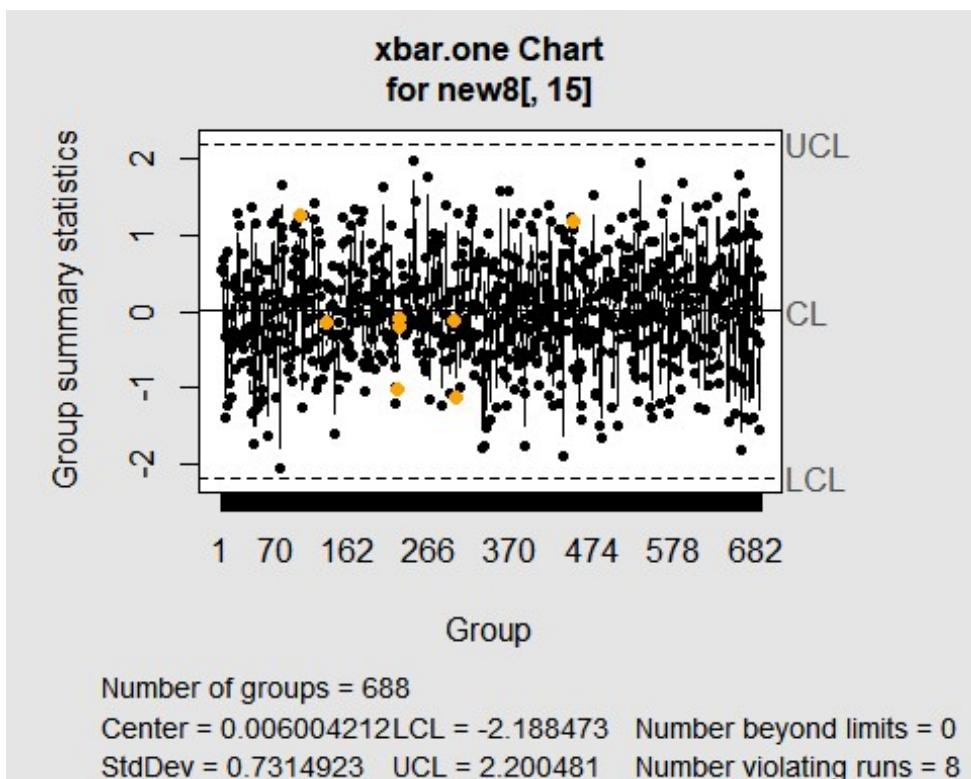


```
xbarViolation12=x12$violations$beyond.limits  
x13=qcc(data=new8[,14],type='xbar.one',sizes = 1, std.dev = "MR")
```

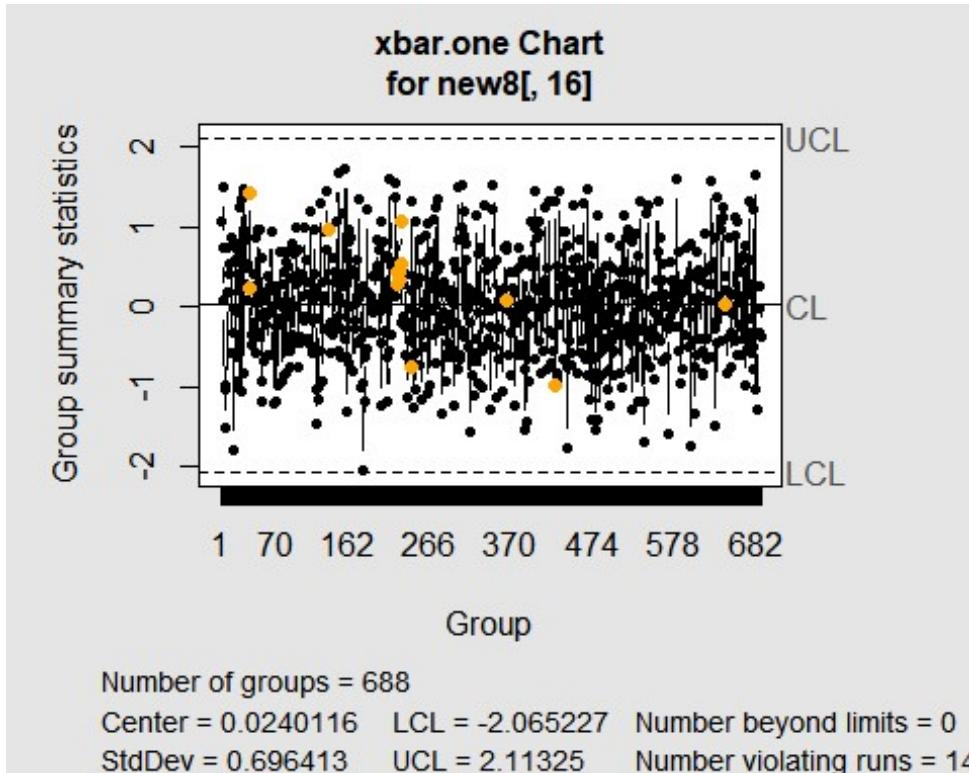


```
xbarViolation13=x13$violations$beyond.limits
```

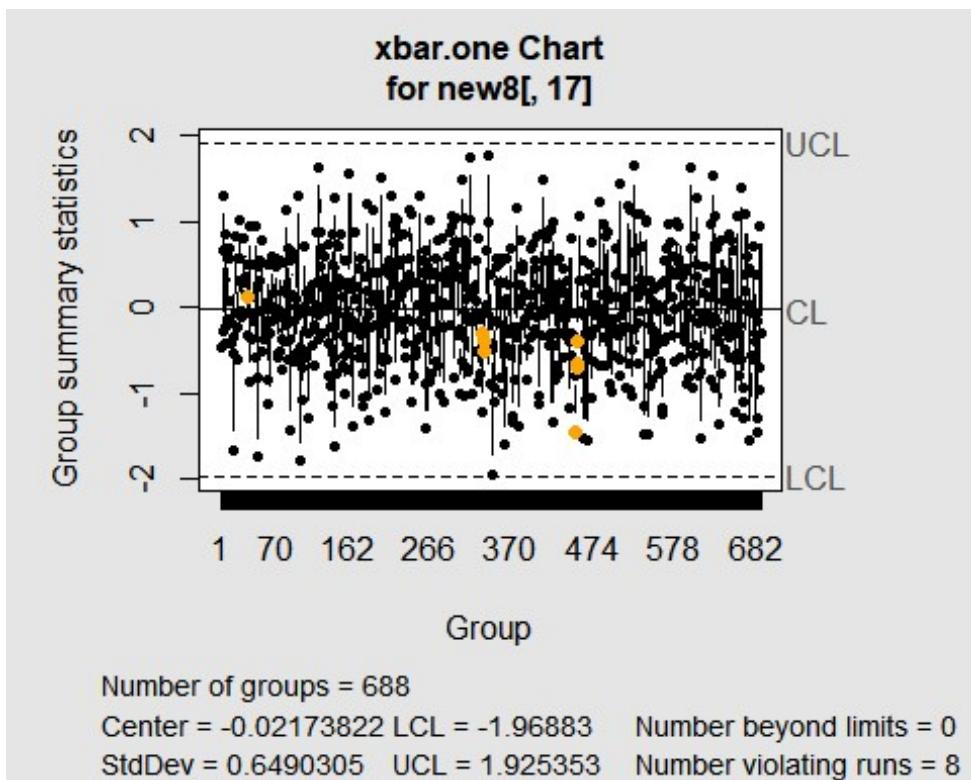
```
x14=qcc(data=new8[, 15], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation14=x14$violations$beyond.limits  
x15=qcc(data=new8[,16],type='xbar.one',sizes = 1, std.dev = "MR")
```

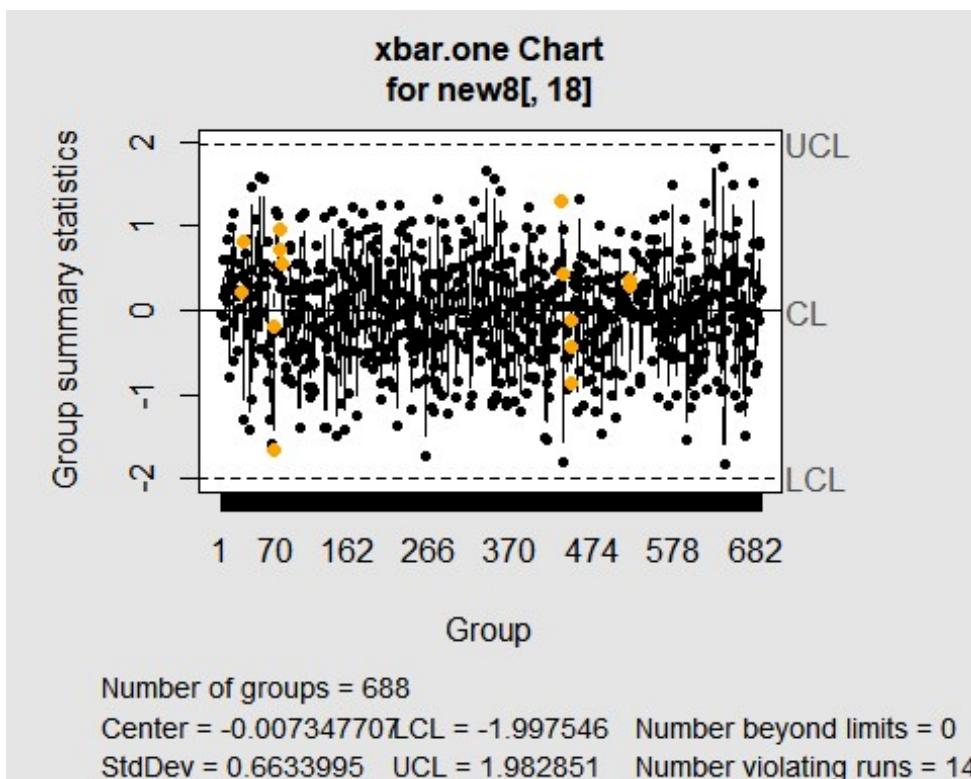


```
xbarViolation15=x15$violations$beyond.limits  
x16=qcc(data=new8[,17],type='xbar.one',sizes = 1, std.dev = "MR")
```

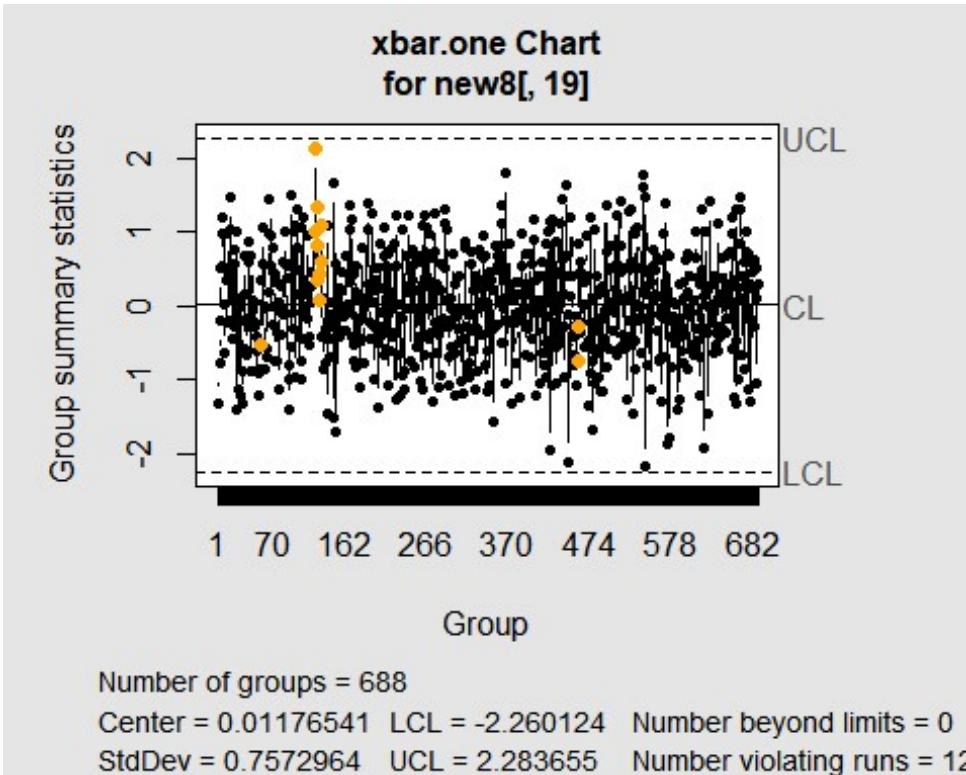


```
xbarViolation16=x16$violations$beyond.limits
```

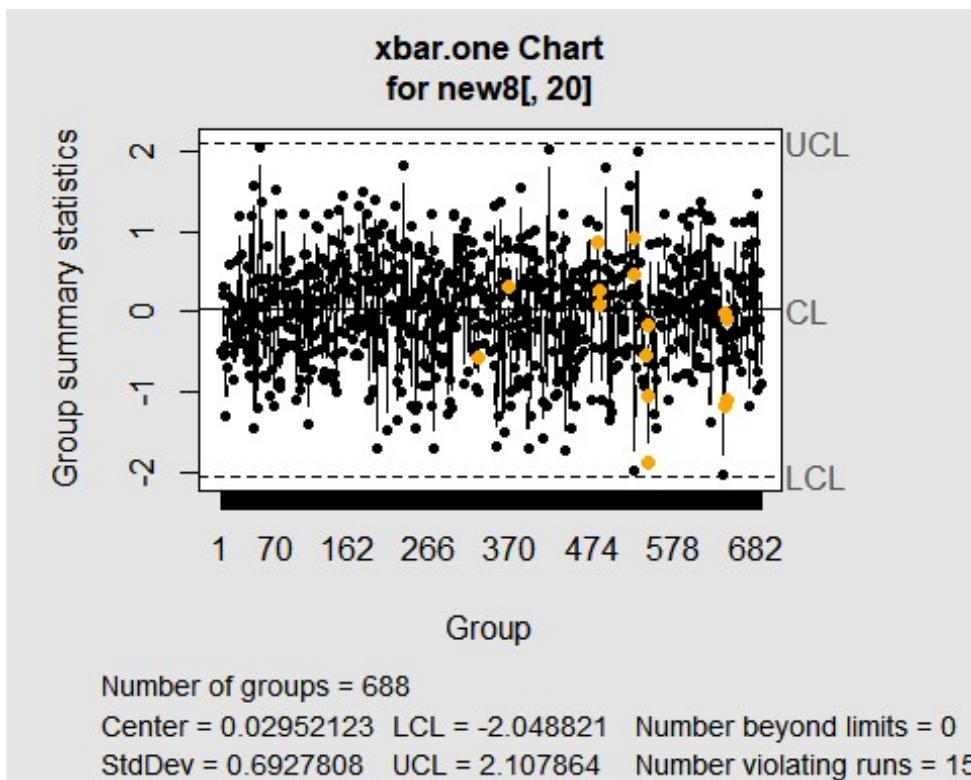
```
x17=qcc(data=new8[,18],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation17=x17$violations$beyond.limits  
x18=qcc(data=new8[,19],type='xbar.one',sizes = 1, std.dev = "MR")
```

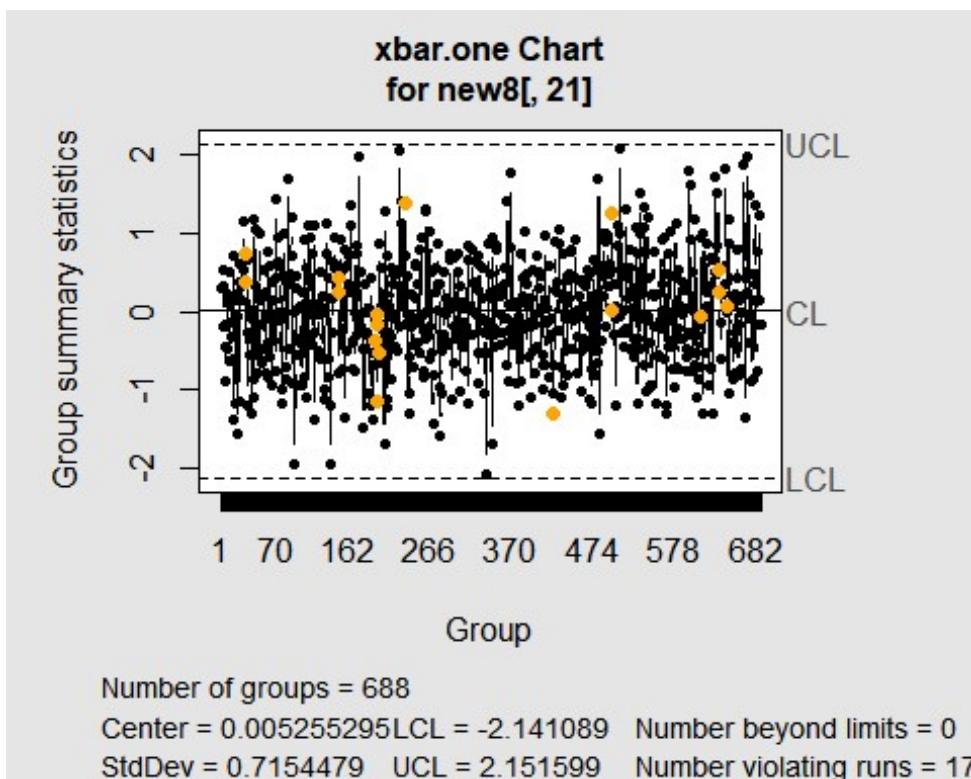


```
xbarViolation18=x18$violations$beyond.limits  
x19=qcc(data=new8[,20],type='xbar.one',sizes = 1, std.dev = "MR")
```

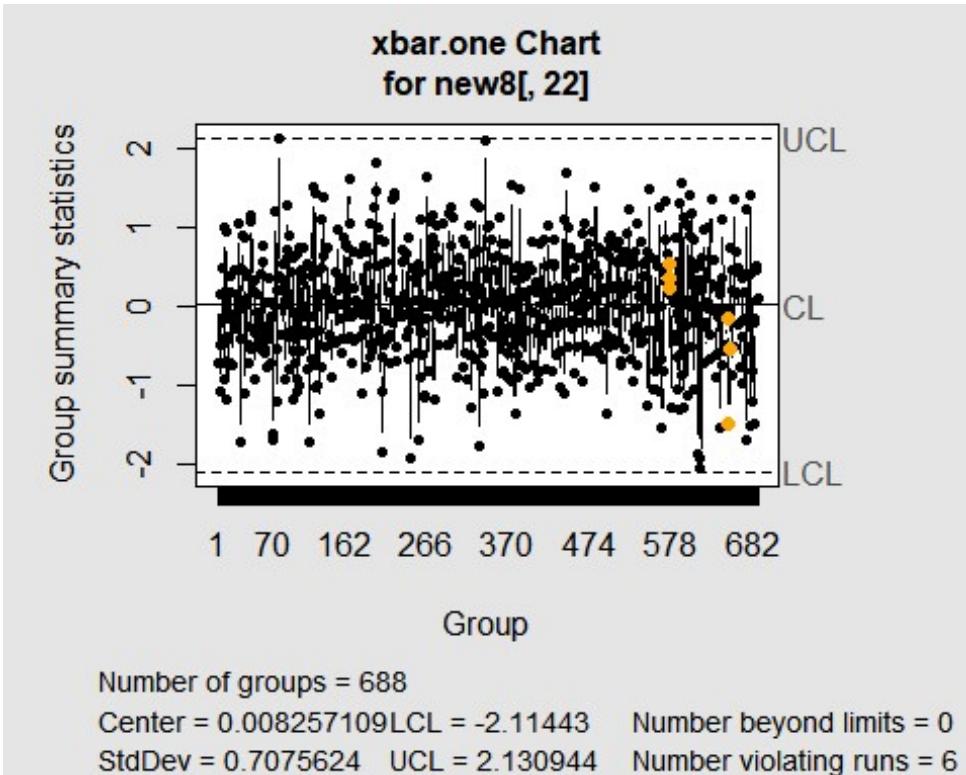


```
xbarViolation19=x19$violations$beyond.limits
```

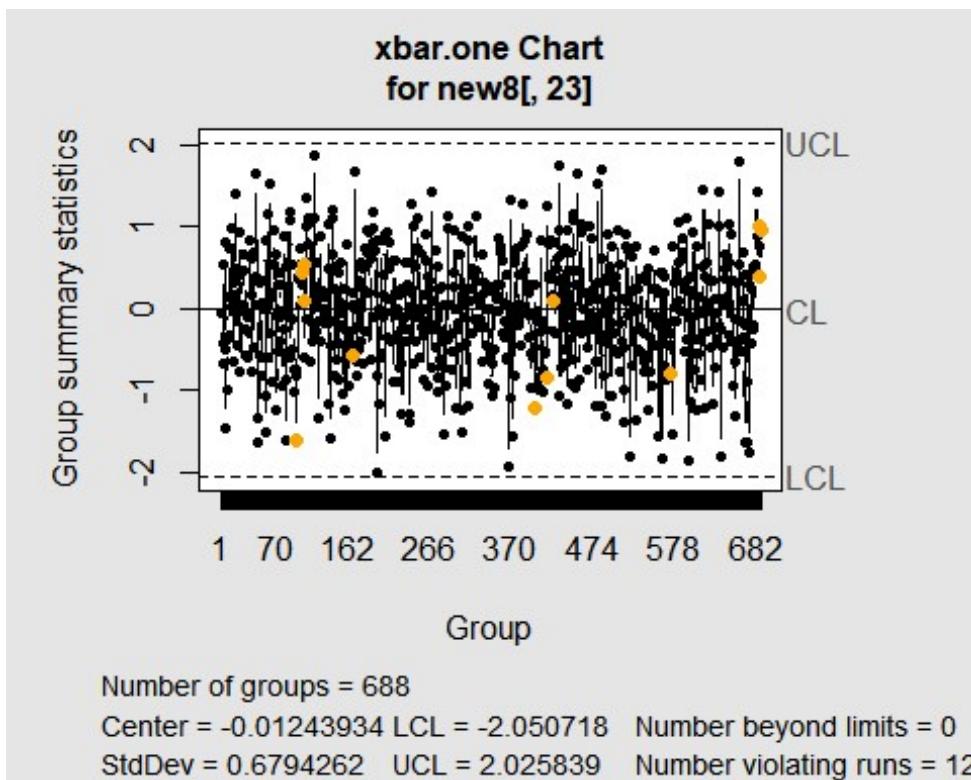
```
x20=qcc(data=new8[, 21], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation20=x20$violations$beyond.limits  
x21=qcc(data=new8[,22],type='xbar.one',sizes = 1, std.dev = "MR")
```

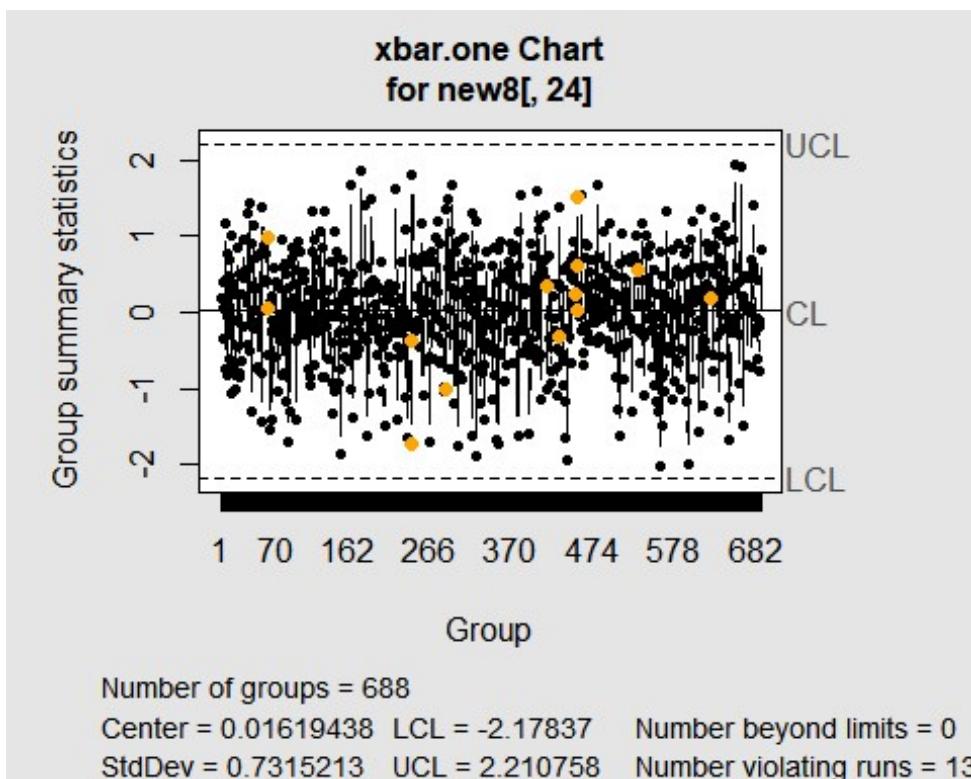


```
xbarViolation21=x21$violations$beyond.limits  
x22=qcc(data=new8[,23],type='xbar.one',sizes = 1, std.dev = "MR")
```

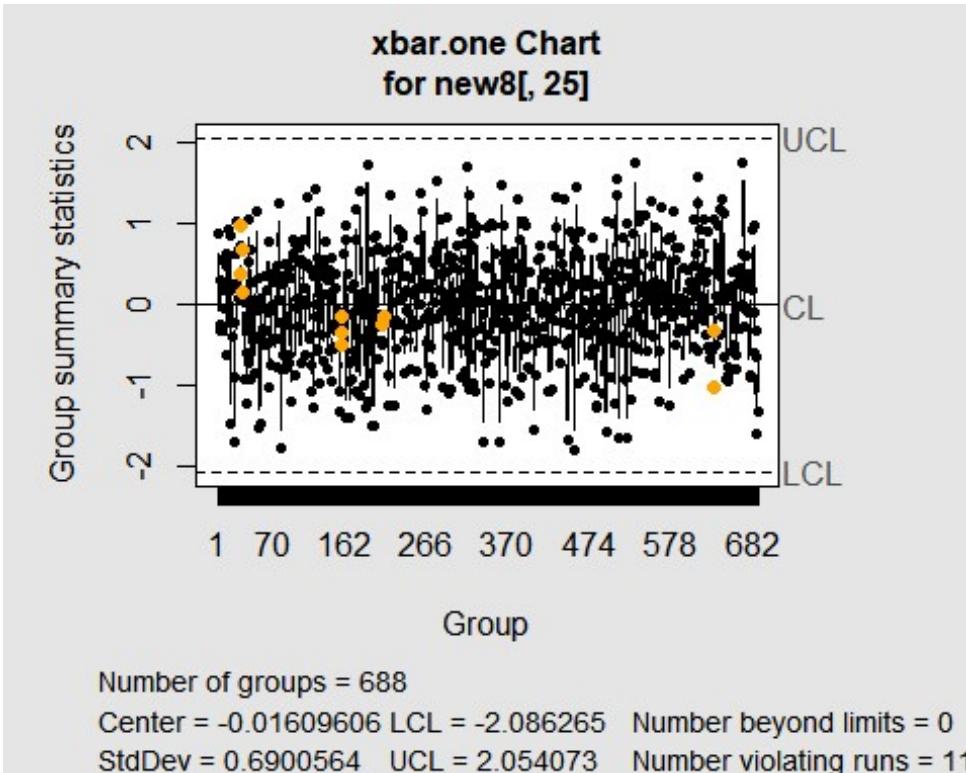


```
xbarViolation22=x22$violations$beyond.limits
```

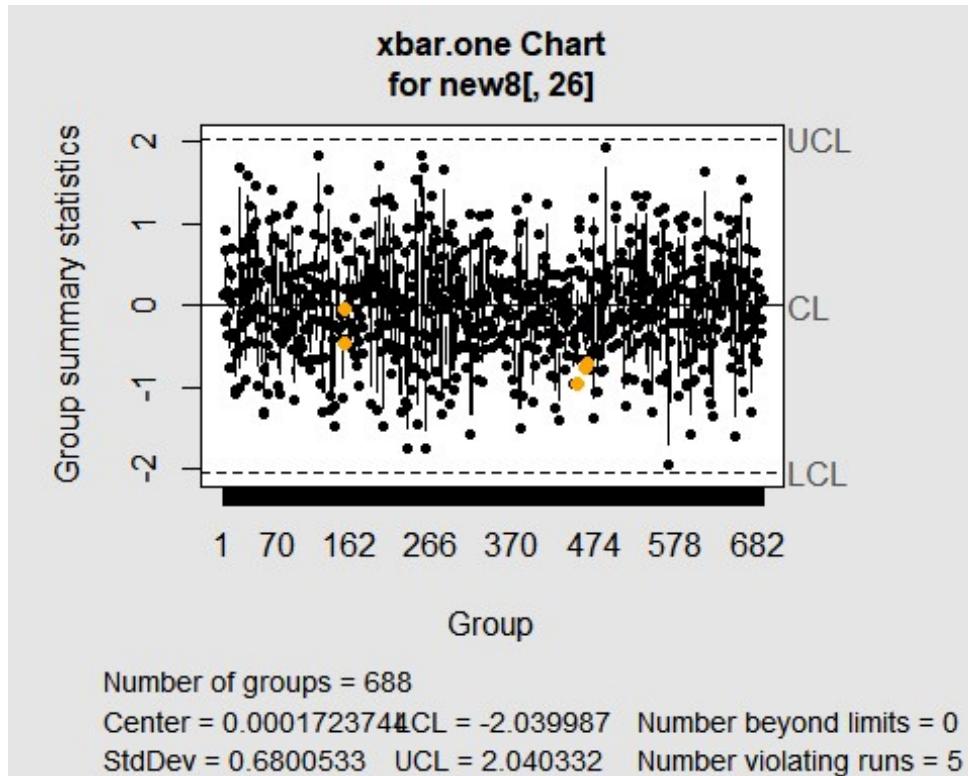
```
x23=qcc(data=new8[, 24], type='xbar.one', sizes = 1, std.dev = "MR")
```



```
xbarViolation23=x23$violations$beyond.limits  
x24=qcc(data=new8[,25],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation24=x24$violations$beyond.limits  
x25=qcc(data=new8[,26],type='xbar.one',sizes = 1, std.dev = "MR")
```



```
xbarViolation25=x25$violations$beyond.limits
```

```
inc=new8[,1]
```

```
doc=c(1:1000)
ooc=doc[-c(inc)]
#Out of Control Points
ooc
```

```
## [1] 7 8 28 43 44 68 97 102 112 122 123 134 153 158 160 167 170
## [18] 172 174 175 177 178 179 183 185 186 188 189 191 192 193 194 196 197
## [35] 200 201 202 203 205 206 208 210 211 213 214 216 217 218 219 226 231
## [52] 232 233 239 241 242 243 244 246 248 250 251 254 256 258 259 260 269
## [69] 274 276 279 282 283 286 288 295 296 298 307 308 310 312 313 316 320
## [86] 325 327 329 330 331 332 333 334 335 336 337 339 340 342 344 347 348
## [103] 350 368 371 399 409 428 435 436 441 442 453 499 504 512 516 533 545
## [120] 548 570 614 616 625 626 636 645 649 655 663 706 709 710 714 727 742
## [137] 749 751 752 754 756 757 758 759 760 761 762 763 764 765 766 767 768
## [154] 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785
## [171] 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802
## [188] 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819
## [205] 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836
## [222] 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853
## [239] 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870
## [256] 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887
## [273] 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904
```

```
## [290] 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921  
## [307] 922 924 939 950 968 990
```