Assignemnt6_Q3.R

```
rm(list=ls())
#to load required packages
#3rd solution
#A)
library("aplpack", lib.loc="~/R/win-library/3.2")
```

```
## Loading required package: tcltk
```

```
x = c(576, 635, 558, 578, 666, 580, 555, 661, 651, 605, 653, 575, 545, 572, 5
94)
y = c(339, 330, 281, 303, 344, 307, 300, 343, 336, 313, 312, 274, 276, 288, 2
96)

Data = data.frame(x,y)
n = length(x)
r = 0.77637
mean = 0.5 * log((1 + r)/(1-r),exp(1))
varience = 1/(n-3)
standarderror = sqrt(varience/n)
Z95 = 1.96
ConfidenceIntervel = mean + c(-1,1)*Z95*standarderror

#B
pvcalculate = function(l) {
  n = length(l[[1]])
  RHO = cor(l, method="pearson")[1,2]
  yall = 0.5*log((1+RHO)/(1-RHO))
  Pseudovalues = numeric(n)
  for( i in 1:n) {
    rhoinuse = cor(l[-i,], method="pearson")[1,2]
    yinuse = 0.5*log((1+rhoinuse)/(1- rhoinuse),exp(1))
    Pseudovalues[i] = n*yall - (n-1)*yinuse
  }
  Pseudovalues
}
Allpv = pvcalculate(Data)
JackniefEstimate = mean(Allpv)
print(JackniefEstimate)
```

```
## [1] 0.9170373
```

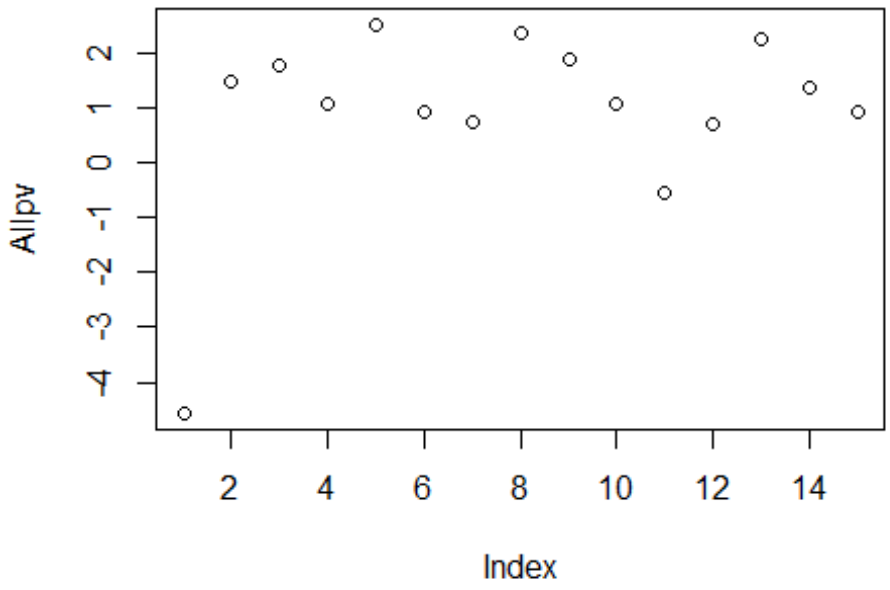
```
variencejackE = sum((Allpv-JackniefEstimate)^2)*15*14
ConfidenceIntervel = JackniefEstimate + c(-1,1)*qt(0.975,df=nrow(Data)-1)*sqr
t(variencejackE)
print(ConfidenceIntervel)
```

```
## [1] -197.5659  199.4000
```

```
#C
stem.leaf(Allpv)
```

```
## 1 | 2: represents 1.2
##  leaf unit: 0.1
##             n: 15
## LO: -4.56529576001235
##    2    -0. | 5
##         -0* |
##          0* |
##    6     0. | 7799
##   (4)    1* | 0034
##    5     1. | 78
##    3     2* | 23
##    1     2. | 5
```

```
plot(Allpv)
```




```
REpv = pvcalculate(Data[-1,])
JackniefEstimatere = mean(REpv)
print (JackniefEstimatere)
```

```
## [1] 1.359238
```

```
variencejackEre = sum((REpv-JackniefEstimatere)^2)*14*13
print (variencejackEre)
```

```
## [1] 3633.143
```

```r
ConfidenceIntervelre = JackniefEstimatere + c(-1,1)*qt(0.975,df=13)*sqrt(vari
encejackEre)
print(ConfidenceIntervel)
```

```
## [1] -197.5659  199.4000
```

```r
#D

bootstrap = function (x,nsim)
{
  # This program is a silly program which will be used to estimate the
  # bootstap error of the sample median statistic
  #  the input data is a vector x of data.
  #  nsim is the number of bootstrap simulations
  n <- length(x[[1]])
  index = 1:n
  #m = median(x)
  stat = numeric(nsim)
  ooberr = numeric(nsim)
  for (i in 1:nsim){
    sampleindex= sample(index,n,replace=TRUE)
    iterpv = pvcalculate(x[sampleindex, ])
    stat[i] <- mean(iterpv)
    #stat[i] = median(x[sampleindex])
    #oobindex = setdiff(index,unique(sampleindex))
    #oobdat = x[oobindex]
    ooberr[i] = sum((iterpv-stat[i])^2)/(n*(n-1))
  }
  lowci <- mean(stat) - 1.96*mean(ooberr)
  uppci <- mean(stat) - 1.96*mean(ooberr)

  variance = var(stat)
  se = sqrt(variance)
  avgooberr = mean(ooberr)
  output = list(meanBS = mean(stat),varBS=mean(ooberr),stat=stat,ooberr=oober
r,lowci= lowci,uppci=uppci)
  output
}
results = bootstrap(Data,10)
print (results)
```

```
## $meanBS
## [1] 0.8283138
##
## $varBS
## [1] 0.3288249
##
## $stat
##  [1] 0.6972280 0.8666596 0.7073870 1.1071414 0.7271348 0.6276371 0.5406096
##  [8] 1.6413402 0.7661660 0.6018344
##
```

```
## $ooberr
##  [1] 0.42663169 0.30845983 0.12286998 0.09944048 1.02115971 0.13732502
##  [7] 0.08986906 0.11898864 0.18277352 0.78073148
##
## $lowci
## [1] 0.1838169
##
## $uppci
## [1] 0.1838169

#E
#Effect of outliers is reduced by using methods like Bootstrapping and jackni
efing
#In this case we can find that boot strapping is performing better that jackn
iefing.
```

Assignment6_Q4.R

venkataprudhviraj

Sat Nov 21 21:14:26 2015

```
source('E:/Study stuff/Subjects and courses/S 670 Exploratory Data Analysis/H
ome work/Assignment 4/run_rrline.R')

bootprog = function (x,nsim)
{
  # This program is a silly program which will be used to estimate the
  # bootstap error of the sample median statistic
  #  the input data is a vector x of data.
  #  nsim is the number of bootstrap simulations
  n = length(x)
  index = 1:n
  m = median(x)
  stat = numeric(nsim)
  ooberr = numeric(nsim)
  for (i in 1:nsim){
    sampleindex= sample(index,n,replace=TRUE)
    stat[i] = median(x[sampleindex])
    oobindex = setdiff(index,unique(sampleindex))
    oobdat = x[oobindex]
    ooberr[i] = sum((oobdat-stat[i])^2)/length(oobindex)
  }
  bias = m - mean(stat)
  variance = var(stat)
  se = sqrt(variance)
  avgooberr = mean(ooberr)
```

```
  output = list(bias=bias,var=variance,se=se,avgooberr=avgooberr)
  output
}

cvprog = function (x,nfold)
{
  # This program is a silly program which will be used to estimate the
  # crossvalidation error of the sample median statistic
  # the input data is a vector x of data.
  #  nfold is the number of folds you want to divide your data up into
  n = length(x)
  m = floor(n/nfold)
  # Generally speaking n/nfold would be an integer, however if it is not
  # and the remainder of n/nfold is k then we will take the extra k datapoint
s
  # and give them to the first k folds.
  folds = rep(1:nfold,m)
  k = n - length(folds)
  if(k>0){folds = c(folds,1:k)}
  # now folds is of length n and we can randomly permute the indicies
  foldindicies = sample(folds,n,replace=FALSE)
  m = median(x)
  stat = numeric(nfold)
  cverr = numeric(nfold)
  for (i in 1:nfold){
    b = foldindicies == i
    stat[i] = median(x[!b])
    cverr[i] = sum((x[b]-stat[i])^2)/length(x[b])
  }
  bias = m - mean(stat)
  variance = var(stat)
  se = sqrt(variance)
  avgcverr = mean(cverr)
  output = list(bias=bias,var=variance,se=se,avgcverr=avgcverr)
  output
}

bsrrline <- function(k,nsim) {
  n= length(k[[1]])
  index = 1:n
  astat = numeric(nsim)
  bstat = numeric(nsim)
  aooberr = numeric(nsim)
  bobberr = numeric(nsim)
  result = run.rrline(l[[1]],k[[2]])
  a = result$a
  b = result$b

  for (i in 1:nsim){
    sampleindex= sample(index,n,replace=TRUE)
```

```
    results = run.rrline(k[[1]][sampleindex], k[[2]][sampleindex])
    astat[i] = results$a
    bstat[i] = results$b

    oobindex = setdiff(index,unique(sampleindex))
    oobResults = getOOBforBootstrap(k[oobindex,])

    aooberr[i] = sum((oobResults$a0-astat[i])^2)/length(oobindex)
    booberr[i] = sum((oobResults$b0-bstat[i])^2)/length(oobindex)
  }

  abias = a - mean(astat)
  avariance = var(astat)
  bbias = b - mean(bstat)
  bvariance = var(bstat)

  ase = sqrt(avariance)
  bse = sqrt(bvariance)
  aavgooberr = mean(aooberr)
  bavgooberr = mean(booberr)

  output = list(a= mean(astat), b = mean(bstat),
                abias=abias,avar=avariance, bbias = bbias, bvar = bvariance,
                ase=ase,bse = bse, aooberr = aooberr, booberr = booberr,
                aavgooberr=aavgooberr, bavgooberr = bavgooberr)
  output
}

Data = data.frame(faithful$waiting, faithful$eruptions)
plot(Data)
```

Assignment6_Q5.R

```
rm(list=ls())
source('E:/Study stuff/Subjects and courses/S 670 Exploratory Data Analysis/H
ome work/Assignment 4/run_rrline.R')
library("DAAG", lib.loc="~/R/win-library/3.2")

## Loading required package: lattice

getOOBforCV = function(oobdata) {
  dataoriginal = oobdata
  n = length(dataoriginal[[1]])
  outofBaga = numeric(n)
  outofBagb = numeric(n)
  for (q in 1: n) {
    results = run.rrline(dataoriginal[[1]], dataoriginal[[2]])
    residuals = results$res
    outofBagb[q] = results$a
    outofBagb[q] = results$b
    shuffledResiduals = sample(residuals)
    dataoriginal[[2]] = oobdata[[2]] + shuffledResiduals
  }
  print(outofBaga)
  print(outofBagb)
  list(a0 = outofBagb, b0 = outofBagb)
}

newcvprog = function (x,nfold)
{
  n = length(x)
  m = floor(n/nfold)

  folds = rep(1:nfold,m)
  k = n - length(folds)
  if(k>0){folds = c(folds,1:k)}
  foldindicies = sample(folds,n,replace=FALSE)
  astat = numeric(nfold)
  bstat = numeric(nfold)

  aooberr = numeric(nfold)
  booberr = numeric(nfold)
  results = run.rrline(x[[1]], x[[2]])
  a = results$a
  b = results$b

  astat = numeric(nfold)
  bstat = numeric(nfold)

  acverr = numeric(nfold)
  bcverr = numeric(nfold)
```

```
  for (i in 1:nfold){
    print(paste("Fold ", i))
    p = foldindicies == i
    resultiter = run.rrline(x[[1]][!p], x[[2]][!p])
    astat[i] = resultiter$a
    bstat[i] = resultiter$b

    print(astat)
    print(bstat)
    oobResults = getOOBforCV(x[p,])
    acverr[i] = sum((oobResults$a0-astat[i])^2)/length(p)
    bcverr[i] = sum((oobResults$b0-bstat[i])^2)/length(p)
  }
  abias = a - mean(astat)
  avariance = var(astat)


  bbias = b - mean(bstat)
  bvariance = var(bstat)

  ase = sqrt(avariance)/sqrt(nfold)
  bse = sqrt(bvariance)/sqrt(nfold)

  avgacverr = mean(acverr)
  avgbcverr = mean(bcverr)

  output = list(abias=abias, avar=avariance,
                bbias = bbias, bvar = bvariance,
                ase=ase, bse=bse,
                avgacverr=avgacverr, avgbcverr = avgbcverr)
  output
}

Data = data.frame(faithful$waiting, faithful$eruptions)
colnames(Data) <- c("Waiting", "Eruptions")
results = newcvprog(Data, 3)
```

```
##          a        b    |res|
## 1 -2.50234  0.08448 112.8501
## 2  0.50420 -0.00679 109.0280
## 3 -0.00958  0.00012 109.0477
## 4  0.00033  0.00000 109.0470
## 5 -0.00001  0.00000 109.0470
##   -2.00740  0.07780 109.0470
## [1] "Fold  1"
##          a        b    |res|
## 1 -2.16687  0.08065 54.94323
## 2  0.20743 -0.00359 54.68808
## 3 -0.02865  0.00041 54.68883
```

```
## 4  0.00119 -0.00002 54.68847
## 5 -0.00014  0.00000 54.68850
##   -1.98705  0.07744 54.68850
## [1] -1.987054  0.000000  0.000000
## [1] 0.07744136 0.00000000 0.00000000
##          a        b    |res|
## 1 -2.33907  0.08207 55.48352
## 2  1.09463 -0.01481 55.39633
## 3 -0.18267  0.00286 54.48257
## 4  0.05158 -0.00087 54.71165
## 5 -0.00771  0.00013 54.67702
##   -1.38324  0.06937 54.67702
##          a        b    |res|
## 1 -2.13600  0.07898 75.88265
## 2  0.61865 -0.00880 76.53935
## 3 -0.16076  0.00228 76.16254
## 4  0.03518 -0.00052 76.24852
## 5  0.00391 -0.00006 76.25808
##   -1.63903  0.07189 76.25808
##          a        b    |res|
## 1 -1.78090  0.07435 92.88187
## 2  0.09496 -0.00135 92.88127
## 3  0.00341 -0.00005 92.88281
## 4  0.00013  0.00000 92.88287
## 5  0.00000  0.00000 92.88287
##   -1.68240  0.07296 92.88287
##          a        b    |res|
## 1 -1.89829  0.07611 108.9936
## 2  0.38808 -0.00491 109.1340
## 3  0.00000  0.00000 109.1340
## 4  0.00000  0.00000 109.1340
## 5  0.00000  0.00000 109.1340
##   -1.51020  0.07120 109.1340
##          a        b    |res|
## 1 -3.36597  0.09517 118.4990
## 2  0.96067 -0.01337 118.7790
## 3 -0.11840  0.00149 118.6151
## 4  0.01346 -0.00017 118.6321
## 5 -0.00150  0.00002 118.6302
##   -2.51174  0.08314 118.6302
##          a       b    |res|
## 1 -0.82956 0.06111 123.1152
## 2 -0.84830 0.01042 122.7809
## 3 -0.00670 0.00008 122.7824
## 4  0.00025 0.00000 122.7823
## 5 -0.00001 0.00000 122.7823
##   -1.68433 0.07161 122.7823
##          a        b    |res|
## 1  0.07544  0.05071 135.2055
## 2 -0.80827  0.00992 134.3611
```

```
## 3  0.30110 -0.00369 134.6011
## 4 -0.14493  0.00178 134.4856
## 5  0.06978 -0.00086 134.5412
##   -0.50689  0.05785 134.5412
##          a        b    |res|
## 1 -1.65653  0.07375 146.6618
## 2  0.03521 -0.00047 146.7136
## 3 -0.00522  0.00007 146.7058
## 4  0.00077 -0.00001 146.7069
## 5 -0.00011  0.00000 146.7068
##   -1.62588  0.07334 146.7068
##          a        b    |res|
## 1 -1.24443  0.06570 150.5683
## 2 -0.42376  0.00525 150.7255
## 3  0.15221 -0.00175 150.6617
## 4 -0.05074  0.00058 150.6798
## 5  0.01691 -0.00019 150.6737
##   -1.54981  0.06959 150.6737
##          a        b    |res|
## 1 -2.08515  0.07842 157.1360
## 2  1.67373 -0.02274 158.2116
## 3 -0.97314  0.01319 156.6104
## 4  0.69559 -0.00928 157.3981
## 5 -0.51323  0.00653 156.6666
##   -1.20221  0.06612 156.6666
##          a        b    |res|
## 1 -0.09642  0.05385 170.3816
## 2 -0.77680  0.00979 169.8434
## 3  0.43115 -0.00538 170.1394
## 4 -0.20797  0.00261 169.9958
## 5  0.13208 -0.00164 170.0862
##   -0.51796  0.05922 170.0862
##          a        b    |res|
## 1 -1.55973  0.06950 185.1235
## 2  0.05112 -0.00070 185.1746
## 3 -0.00757  0.00010 185.1670
## 4  0.00112 -0.00002 185.1682
## 5 -0.00017  0.00000 185.1680
##   -1.51523  0.06889 185.1680
##          a        b    |res|
## 1 -1.59474  0.07150 180.4732
## 2 -0.01979  0.00028 180.4565
## 3  0.00953 -0.00014 180.4607
## 4 -0.00459  0.00007 180.4569
## 5  0.00221 -0.00003 180.4578
##   -1.60738  0.07168 180.4578
##          a        b    |res|
## 1 -3.65472  0.09886 183.2565
## 2  0.61116 -0.00807 182.6397
## 3  0.27599 -0.00350 182.7867
```

```
## 4 -0.13360  0.00182 182.6740
## 5  0.07285 -0.00094 182.7072
##   -2.82832  0.08817 182.7072
##         a        b    |res|
## 1 -2.88814  0.09000 187.0359
## 2  0.45906 -0.00575 186.7887
## 3 -0.23530  0.00277 186.9077
## 4  0.11329 -0.00133 186.8504
## 5 -0.05455  0.00064 186.8780
##   -2.60564  0.08632 186.8780
##         a        b    |res|
## 1 -0.60628  0.05726 188.2940
## 2 -0.29662  0.00387 187.7986
## 3  0.12248 -0.00158 187.9476
## 4 -0.04177  0.00064 187.8724
## 5  0.01702 -0.00026 187.8931
##   -0.80518  0.05994 187.8931
##         a        b    |res|
## 1 -2.14259  0.07922 193.3629
## 2  1.00434 -0.01340 192.5376
## 3  0.28895 -0.00391 192.7127
## 4 -0.00903  0.00011 192.7028
## 5  0.00502 -0.00006 192.7083
##   -0.85332  0.06196 192.7083
##         a        b    |res|
## 1 -1.17667  0.06661 198.1701
## 2  0.90633 -0.01320 200.7035
## 3 -0.28408  0.00393 199.7857
## 4  0.17778 -0.00233 200.2819
## 5 -0.10571  0.00138 199.9843
##   -0.48235  0.05639 199.9843
##         a        b    |res|
## 1  0.52156  0.04326 197.4521
## 2  0.12197 -0.00150 197.5194
## 3 -0.02859  0.00035 197.5036
## 4  0.00741 -0.00009 197.5077
## 5 -0.00192  0.00002 197.5067
##    0.62043  0.04205 197.5067
##         a       b    |res|
## 1 -1.79528 0.07434 207.9327
## 2 -0.05985 0.00067 207.9722
## 3 -0.03325 0.00037 207.9941
## 4 -0.01648 0.00021 208.0063
## 5 -0.00889 0.00011 208.0131
##   -1.91374 0.07570 208.0131
##         a        b    |res|
## 1 -1.48132  0.07136 220.0381
## 2  0.95146 -0.01320 222.3251
## 3 -0.03573  0.00050 222.1938
## 4  0.00235 -0.00003 222.2024
```

```
## 5 -0.00009  0.00000 222.2021
##   -0.56332  0.05863 222.2021
##          a        b    |res|
## 1 -0.90029  0.06257 232.2982
## 2 -0.95087  0.01284 230.4914
## 3  0.36477 -0.00483 231.0084
## 4 -0.12491  0.00186 230.7877
## 5  0.05213 -0.00069 230.8575
##   -1.55917  0.07176 230.8575
##          a        b    |res|
## 1  0.04685  0.04937 229.9956
## 2  0.00772 -0.00010 230.0023
## 3 -0.00057  0.00001 230.0018
## 4  0.00004  0.00000 230.0018
## 5  0.00000  0.00000 230.0018
##    0.05403  0.04928 230.0018
##          a        b    |res|
## 1 -2.91242  0.09032 236.0155
## 2  0.35536 -0.00557 235.6972
## 3  0.18989 -0.00260 235.6381
## 4  0.09740 -0.00133 235.6101
## 5  0.04690 -0.00064 235.5966
##   -2.22287  0.08017 235.5966
##          a        b    |res|
## 1 -2.50994  0.08501 243.3664
## 2  1.71815 -0.02165 244.4497
## 3 -1.03678  0.01360 243.2802
## 4  0.71008 -0.00882 243.9799
## 5 -0.47927  0.00603 243.4795
##   -1.59776  0.07416 243.4795
##          a       b    |res|
## 1 -0.29313 0.05170 246.7386
## 2 -0.39565 0.00619 246.3960
## 3 -0.08856 0.00111 246.3573
## 4 -0.04920 0.00061 246.3358
## 5 -0.02733 0.00034 246.3238
##   -0.85387 0.05996 246.3238
##          a        b    |res|
## 1 -0.26700  0.05438 252.8335
## 2  0.78616 -0.01085 252.7583
## 3 -0.20053  0.00281 252.7290
## 4  0.05397 -0.00073 252.7195
## 5 -0.01399  0.00019 252.7220
##    0.35860  0.04580 252.7220
##          a        b    |res|
## 1 -2.39881  0.08238 260.4556
## 2  0.02551 -0.00038 260.4255
## 3 -0.00964  0.00013 260.4355
## 4  0.00283 -0.00004 260.4322
## 5 -0.00107  0.00001 260.4333
```

```
##   -2.38119  0.08210 260.4333
##          a        b    |res|
## 1 -4.07987  0.10505 255.9164
## 2  0.08471 -0.00114 255.8855
## 3  0.05334 -0.00072 255.8772
## 4  0.03358 -0.00045 255.8995
## 5  0.02115 -0.00029 255.9135
##   -3.88709  0.10245 255.9135
##          a        b    |res|
## 1 -0.45489  0.05752 259.7985
## 2  0.75822 -0.01065 260.0010
## 3 -0.15391  0.00197 259.8333
## 4  0.02613 -0.00037 259.8644
## 5 -0.00499  0.00007 259.8586
##    0.17056  0.04854 259.8586
##          a        b    |res|
## 1 -0.68420  0.06089 270.1617
## 2  1.07911 -0.01766 274.5696
## 3 -0.68474  0.01126 271.2499
## 4  0.36369 -0.00675 273.1461
## 5 -0.25495  0.00475 271.8117
##   -0.18110  0.05249 271.8117
##          a        b    |res|
## 1 -2.10296  0.07789 269.1303
## 2  1.59049 -0.02086 268.1874
## 3 -0.20609  0.00253 267.9623
## 4 -0.03817  0.00047 267.9207
## 5 -0.00707  0.00009 267.9130
##   -0.76380  0.06011 267.9130
##          a        b    |res|
## 1 -3.76712  0.10156 275.2994
## 2  1.30895 -0.01872 274.4040
## 3 -0.05850  0.00082 274.3537
## 4  0.01517 -0.00021 274.3668
## 5 -0.00393  0.00006 274.3634
##   -2.50544  0.08351 274.3634
##          a        b    |res|
## 1 -1.57125  0.07106 274.0390
## 2  0.07273 -0.00096 273.9155
## 3  0.04041 -0.00053 273.8469
## 4  0.02245 -0.00030 273.8088
## 5  0.01247 -0.00016 273.7877
##   -1.42319  0.06911 273.7877
##          a        b    |res|
## 1 -1.92436  0.07713 279.2418
## 2  1.06805 -0.01436 277.5912
## 3 -0.36345  0.00452 277.5777
## 4  0.15632 -0.00194 277.5835
## 5 -0.09448  0.00115 277.5800
##   -1.15792  0.06650 277.5800
```

```
##          a        b    |res|
## 1 -2.10563  0.07895 281.6931
## 2  0.75457 -0.01007 281.6365
## 3  0.00805 -0.00012 281.6456
## 4  0.00149 -0.00002 281.6473
## 5  0.00028  0.00000 281.6476
##   -1.34124  0.06873 281.6476
##          a        b    |res|
## 1 -2.23032  0.08244 289.5131
## 2 -0.71889  0.00973 288.5305
## 3  0.08215 -0.00108 288.6397
## 4 -0.00913  0.00012 288.6275
## 5  0.00101 -0.00001 288.6289
##   -2.87518  0.09119 288.6289
##          a        b    |res|
## 1  1.08535  0.03738 296.2663
## 2 -1.06396  0.01402 296.5382
## 3  0.49819 -0.00647 296.3118
## 4 -0.29522  0.00383 296.4460
## 5  0.17495 -0.00227 296.3664
##    0.39930  0.04650 296.3664
##          a        b    |res|
## 1 -4.75179  0.11179 298.4703
## 2  0.73719 -0.00943 297.9767
## 3  0.07061 -0.00105 298.0175
## 4  0.00729 -0.00012 298.0220
## 5  0.00088 -0.00001 298.0226
##   -3.93583  0.10119 298.0226
##          a        b    |res|
## 1 -0.15288  0.05255 304.3368
## 2  0.04000 -0.00045 304.3228
## 3  0.01926 -0.00022 304.3160
## 4  0.00927 -0.00010 304.3128
## 5  0.00446 -0.00005 304.3112
##   -0.07989  0.05172 304.3112
##          a        b    |res|
## 1 -1.68166  0.07293 311.8143
## 2 -1.50196  0.01864 310.4858
## 3  0.22552 -0.00271 310.4625
## 4  0.00000  0.00000 310.4625
## 5  0.00000  0.00000 310.4625
##   -2.95810  0.08885 310.4625
##          a        b    |res|
## 1 -4.51599  0.10991 308.1634
## 2 -0.32702  0.00423 307.7239
## 3  0.19929 -0.00266 307.9770
## 4 -0.13672  0.00168 307.8176
## 5  0.08608 -0.00106 307.9180
##   -4.69435  0.11210 307.9180
##          a        b    |res|
```

```
## 1 -0.19320  0.05237 322.0174
## 2  0.47635 -0.00603 322.7070
## 3  0.17741 -0.00225 322.9652
## 4 -0.01971  0.00025 322.9365
## 5  0.00219 -0.00003 322.9397
##    0.44304  0.04431 322.9397
##         a        b    |res|
## 1 1.25312  0.03586 320.5685
## 2 0.09273 -0.00136 320.5426
## 3 0.00687 -0.00010 320.5407
## 4 0.00051 -0.00001 320.5405
## 5 0.00004  0.00000 320.5405
##   1.35327  0.03439 320.5405
##         a        b    |res|
## 1 1.47414  0.02998 314.2324
## 2 0.23430 -0.00277 314.1464
## 3 0.05740 -0.00072 314.1241
## 4 0.01473 -0.00019 314.1184
## 5 0.00382 -0.00005 314.1168
##   1.78439  0.02626 314.1168
##          a        b    |res|
## 1 -3.82992  0.10272 312.1470
## 2  0.84543 -0.01282 312.5541
## 3 -0.27327  0.00409 312.3177
## 4  0.07757 -0.00106 312.3655
## 5 -0.02119  0.00028 312.3531
##   -3.20137  0.09321 312.3531
##          a        b    |res|
## 1  1.34152  0.03067 320.8553
## 2 -0.03801  0.00047 320.7264
## 3 -0.01267  0.00016 320.6835
## 4  0.00140 -0.00002 320.6882
## 5 -0.00036  0.00000 320.6870
##    1.29188  0.03129 320.6870
##          a       b    |res|
## 1  0.56285 0.04137 322.8549
## 2 -0.70082 0.00901 322.2332
## 3 -0.17288 0.00234 322.0720
## 4 -0.04482 0.00061 322.0302
## 5 -0.01162 0.00016 322.0193
##   -0.36730 0.05348 322.0193
##          a        b    |res|
## 1 -2.60489  0.08599 318.1214
## 2  0.30187 -0.00431 318.5225
## 3 -0.04132  0.00059 318.4676
## 4  0.00459 -0.00007 318.4737
## 5 -0.00051  0.00001 318.4730
##   -2.34026  0.08221 318.4730
##          a        b    |res|
## 1 -0.39885  0.05700 318.2973
```

```
## 2  0.31464 -0.00388 318.3789
## 3  0.03095 -0.00038 318.3869
## 4  0.01605 -0.00020 318.3911
## 5  0.00832 -0.00010 318.3932
##   -0.02889  0.05243 318.3932
##         a       b    |res|
## 1 -3.83102 0.10270 318.6027
## 2 -0.73422 0.01056 319.0780
## 3 -0.44563 0.00622 319.5810
## 4 -0.07813 0.00109 319.6906
## 5 -0.00579 0.00008 319.6987
##   -5.09479 0.12065 319.6987
##         a        b    |res|
## 1 -4.12947  0.10669 321.4576
## 2  1.55477 -0.02189 320.2500
## 3 -0.47902  0.00645 320.1790
## 4  0.19866 -0.00263 320.2079
## 5 -0.08730  0.00107 320.1961
##   -2.94236  0.08969 320.1961
##         a        b    |res|
## 1 -0.53026  0.05468 331.5294
## 2 -0.09451  0.00117 331.3591
## 3  0.00700 -0.00009 331.3717
## 4 -0.00052  0.00001 331.3708
## 5  0.00004  0.00000 331.3709
##   -0.61825  0.05577 331.3709
##         a        b    |res|
## 1 -0.53611  0.06274 333.5972
## 2 -0.60832  0.00790 332.5681
## 3 -0.32491  0.00406 332.0847
## 4  0.01203 -0.00015 332.1026
## 5 -0.00045  0.00001 332.1020
##   -1.45774  0.07456 332.1020
##         a        b    |res|
## 1 -0.63538  0.05796 339.1288
## 2  0.35922 -0.00489 339.2413
## 3 -0.04511  0.00054 339.2288
## 4  0.00501 -0.00006 339.2302
## 5 -0.00056  0.00001 339.2300
##   -0.31682  0.05356 339.2300
##         a        b    |res|
## 1 -2.06807  0.07786 358.8825
## 2  2.21814 -0.02897 357.6612
## 3 -0.36656  0.00434 357.0431
## 4  0.13597 -0.00163 357.2330
## 5 -0.07469  0.00085 357.1206
##   -0.15521  0.05245 357.1206
##         a       b    |res|
## 1  0.74650 0.04016 358.0759
## 2 -0.19992 0.00255 358.0121
```

```
## 3 -0.08757 0.00113 357.9837
## 4 -0.03376 0.00050 357.9711
## 5 -0.01500 0.00022 357.9655
##    0.41024 0.04458 357.9655
##          a        b    |res|
## 1 -7.58071  0.15222 350.2135
## 2  0.46771 -0.00663 350.4855
## 3 -0.16827  0.00210 350.3995
## 4  0.04123 -0.00058 350.4235
## 5 -0.01550  0.00019 350.4155
##   -7.25553  0.14730 350.4155
##         a        b    |res|
## 1 0.00047  0.04982 354.7990
## 2 0.66836 -0.00870 354.7001
## 3 0.10880 -0.00161 354.8048
## 4 0.02015 -0.00030 354.8243
## 5 0.00373 -0.00006 354.8278
##   0.80150  0.03915 354.8278
##          a        b    |res|
## 1 -2.25492  0.08222 359.9197
## 2  1.13905 -0.01607 360.7633
## 3  0.13742 -0.00183 361.0072
## 4 -0.02037  0.00034 360.9620
## 5  0.00377 -0.00006 360.9704
##   -0.99505  0.06459 360.9704
##          a        b    |res|
## 1 -0.66357  0.06100 366.5043
## 2  0.08060 -0.00099 366.5013
## 3 -0.01791  0.00022 366.5020
## 4  0.00398 -0.00005 366.5018
## 5 -0.00088  0.00001 366.5018
##   -0.59778  0.06019 366.5018
##          a        b    |res|
## 1 -2.04469  0.07486 378.4417
## 2  0.12033 -0.00150 378.4492
## 3  0.00000  0.00000 378.4492
## 4  0.00000  0.00000 378.4492
## 5  0.00000  0.00000 378.4492
##   -1.92436  0.07336 378.4492
##          a        b    |res|
## 1 -5.08538  0.12085 384.3141
## 2 -1.13498  0.01423 384.2594
## 3  0.18445 -0.00211 384.2151
## 4 -0.02733  0.00031 384.2217
## 5  0.00405 -0.00005 384.2207
##   -6.05919  0.13323 384.2207
##          a        b    |res|
## 1 -1.38490  0.06583 382.7365
## 2 -0.21836  0.00264 382.5225
## 3  0.05754 -0.00068 382.5780
```

```
## 4 -0.01492  0.00018 382.5636
## 5  0.00387 -0.00005 382.5673
##   -1.55677  0.06792 382.5673
##          a        b    |res|
## 1 -3.80228  0.10305 378.7661
## 2  0.33584 -0.00453 378.5587
## 3  0.10196 -0.00129 378.5512
## 4 -0.00755  0.00010 378.5511
## 5  0.00056 -0.00001 378.5511
##   -3.37147  0.09732 378.5511
##          a       b    |res|
## 1 -0.85176 0.05951 377.0696
## 2 -0.31411 0.00436 377.0850
## 3 -0.16071 0.00194 377.2070
## 4 -0.07617 0.00086 377.2612
## 5 -0.03385 0.00038 377.2853
##   -1.43659 0.06705 377.2853
##          a        b    |res|
## 1 -2.50447  0.08629 368.6382
## 2  0.60818 -0.00889 368.2421
## 3  0.21487 -0.00296 368.1147
## 4  0.07162 -0.00099 368.0734
## 5  0.02387 -0.00033 368.0704
##   -1.58593  0.07311 368.0704
##          a       b    |res|
## 1 -1.18372 0.06732 378.3307
## 2 -0.97347 0.01247 377.7303
## 3 -0.17678 0.00231 377.7742
## 4 -0.03527 0.00043 377.7823
## 5 -0.00653 0.00008 377.7838
##   -2.37578 0.08260 377.7838
##          a        b    |res|
## 1 -3.85571  0.10294 389.6216
## 2  1.13819 -0.01565 388.0478
## 3 -0.15420  0.00232 388.1216
## 4  0.02284 -0.00034 388.0945
## 5 -0.00338  0.00005 388.0985
##   -2.85226  0.08932 388.0985
##          a        b    |res|
## 1 -3.43847  0.09416 392.8999
## 2  1.70352 -0.02354 391.0686
## 3 -0.66503  0.00943 391.4366
## 4  0.26135 -0.00384 391.2867
## 5 -0.10648  0.00157 391.3477
##   -2.24511  0.07778 391.3477
##          a        b    |res|
## 1  1.27613  0.03820 397.1221
## 2 -1.18402  0.01556 397.0441
## 3 -0.48936  0.00604 397.0533
## 4  0.19937 -0.00246 397.0262
```

```
## 5 -0.08122  0.00100 397.0373
##   -0.27910  0.05835 397.0373
##          a        b    |res|
## 1 -1.07769  0.06656 399.6465
## 2  0.77206 -0.01036 398.6064
## 3 -0.14037  0.00178 398.7610
## 4  0.02600 -0.00033 398.7323
## 5 -0.00481  0.00006 398.7376
##   -0.42483  0.05770 398.7376
##          a       b    |res|
## 1  0.80702 0.03493 403.4520
## 2 -0.50403 0.00681 402.7230
## 3 -0.19089 0.00252 402.5439
## 4 -0.06448 0.00093 402.4775
## 5 -0.02809 0.00041 402.4486
##    0.01954 0.04561 402.4486
##          a        b    |res|
## 1 -2.51006  0.08498 409.4736
## 2 -0.34889  0.00433 409.6426
## 3  0.02584 -0.00032 409.6301
## 4 -0.00191  0.00002 409.6310
## 5  0.00014  0.00000 409.6310
##   -2.83488  0.08901 409.6310
##          a        b    |res|
## 1 -1.47208  0.07231 413.3295
## 2  0.60203 -0.00800 413.7064
## 3 -0.07022  0.00089 413.6495
## 4  0.00780 -0.00010 413.6551
## 5 -0.00087  0.00001 413.6544
##   -0.93334  0.06511 413.6544
##          a        b    |res|
## 1 -1.68991  0.06999 415.3264
## 2  1.33188 -0.01656 415.7023
## 3 -0.58051  0.00728 415.4912
## 4  0.31441 -0.00350 415.5929
## 5 -0.15085  0.00169 415.5439
##   -0.77498  0.05889 415.5439
##          a       b    |res|
## 1  2.97342 0.01010 414.0130
## 2 -0.48546 0.00588 412.8891
## 3 -0.28768 0.00349 412.2231
## 4 -0.17048 0.00207 411.8284
## 5 -0.10102 0.00122 411.5945
##    1.92878 0.02277 411.5945
##          a        b    |res|
## 1 -3.32340  0.09806 412.5251
## 2  2.26494 -0.03016 411.4201
## 3 -0.07567  0.00114 411.3415
## 4  0.02242 -0.00034 411.3648
## 5 -0.00664  0.00010 411.3579
```

```
##   -1.11835  0.06880 411.3579
##          a        b    |res|
## 1 -0.08758  0.04931 411.3810
## 2  1.09924 -0.01629 409.5887
## 3 -0.36718  0.00528 409.9846
## 4  0.12966 -0.00176 409.8526
## 5 -0.04110  0.00059 409.8966
##    0.73304  0.03713 409.8966
##          a        b    |res|
## 1 -4.10354  0.10863 414.3220
## 2  1.34336 -0.01781 414.6559
## 3  0.03313 -0.00041 414.6712
## 4 -0.00368  0.00005 414.6695
## 5  0.00041 -0.00001 414.6697
##   -2.73032  0.09044 414.6697
##          a       b    |res|
## 1 -0.31643 0.05482 416.1927
## 2 -0.21147 0.00318 415.8524
## 3 -0.02350 0.00035 415.8146
## 4 -0.00261 0.00004 415.8104
## 5 -0.00029 0.00000 415.8100
##   -0.55430 0.05840 415.8100
##          a        b    |res|
## 1 -0.19305  0.05120 405.9853
## 2  1.11077 -0.01627 404.2718
## 3 -0.47439  0.00663 404.9146
## 4  0.20090 -0.00270 404.6528
## 5 -0.08690  0.00110 404.7594
##    0.55733  0.03996 404.7594
##          a       b    |res|
## 1  1.01280 0.03655 402.6314
## 2 -0.64287 0.00833 402.5301
## 3 -0.31212 0.00385 402.6417
## 4 -0.09391 0.00113 402.6745
## 5 -0.04522 0.00054 402.6903
##   -0.08131 0.05040 402.6903
##          a        b    |res|
## 1 -4.51896  0.11096 397.8176
## 2  0.43095 -0.00618 398.2742
## 3 -0.05289  0.00069 398.2034
## 4  0.00588 -0.00008 398.2113
## 5 -0.00065  0.00001 398.2104
##   -4.13568  0.10540 398.2104
##          a        b    |res|
## 1 -0.18035  0.05792 399.5573
## 2  0.32574 -0.00466 399.0969
## 3 -0.00166  0.00002 399.0980
## 4  0.00025  0.00000 399.0976
## 5 -0.00004  0.00000 399.0977
##    0.14393  0.05328 399.0977
```

```
##          a        b    |res|
## 1 -1.08994  0.06496 403.1260
## 2 -0.88221  0.01167 404.0097
## 3  0.14369 -0.00189 403.7809
## 4 -0.03725  0.00049 403.8206
## 5  0.00966 -0.00013 403.8052
##   -1.85605  0.07509 403.8052
##          a        b    |res|
## 1 -2.42801  0.08163 395.0780
## 2 -0.84035  0.01142 395.0083
## 3 -0.26403  0.00382 395.1344
## 4  0.00948 -0.00014 395.1297
## 5 -0.00035  0.00001 395.1299
##   -3.52326  0.09673 395.1299
##          a       b    |res|
## 1 -1.87011 0.07528 401.6289
## 2 -0.55463 0.00836 401.1135
## 3 -0.09970 0.00140 401.0479
## 4 -0.05440 0.00073 401.0399
## 5 -0.03058 0.00038 401.0357
##   -2.60942 0.08615 401.0357
##          a        b    |res|
## 1 -5.99431  0.13276 411.5859
## 2  2.04226 -0.02843 408.4701
## 3 -0.50119  0.00705 408.6105
## 4  0.35187 -0.00470 408.4301
## 5 -0.22731  0.00314 408.4926
##   -4.32868  0.10982 408.4926
##          a        b    |res|
## 1 -2.00382  0.07593 407.0488
## 2 -0.10709  0.00130 407.0241
## 3  0.02662 -0.00034 407.0305
## 4 -0.00690  0.00009 407.0289
## 5  0.00179 -0.00002 407.0293
##   -2.08940  0.07696 407.0293
##          a        b    |res|
## 1 -4.18655  0.10553 410.2396
## 2  0.98328 -0.01253 408.5483
## 3 -0.17516  0.00232 408.8615
## 4  0.03244 -0.00043 408.8035
## 5 -0.00601  0.00008 408.8143
##   -3.35201  0.09497 408.8143
##          a        b    |res|
## 1  3.67090 -0.00036 429.1354
## 2 -0.00218  0.00003 429.1280
## 3  0.00016  0.00000 429.1286
## 4 -0.00001  0.00000 429.1285
## 5  0.00000  0.00000 429.1285
##    3.66887 -0.00033 429.1285
##          a       b    |res|
```

```
## 1 -3.17842 0.09202 434.9478
## 2 -0.12452 0.00186 434.9311
## 3 -0.08301 0.00124 434.9475
## 4 -0.05534 0.00083 434.9731
## 5 -0.03689 0.00055 434.9902
##   -3.47819 0.09649 434.9902
##          a        b    |res|
## 1 -2.72599  0.08916 432.0408
## 2  0.06688 -0.00089 432.0913
## 3  0.03468 -0.00046 432.1174
## 4  0.01798 -0.00024 432.1310
## 5  0.00932 -0.00012 432.1381
##   -2.59713  0.08745 432.1381
##          a       b    |res|
## 1  0.09250 0.04828 426.7643
## 2 -0.37821 0.00476 426.8728
## 3 -0.04202 0.00053 426.8860
## 4 -0.00467 0.00006 426.8875
## 5 -0.00052 0.00001 426.8877
##   -0.33292 0.05363 426.8877
##          a        b    |res|
## 1 -3.72589  0.10336 430.6896
## 2 -0.10156  0.00135 430.5880
## 3  0.01505 -0.00020 430.6030
## 4 -0.00223  0.00003 430.6008
## 5  0.00033  0.00000 430.6012
##   -3.81430  0.10454 430.6012
##          a       b    |res|
## 1  2.40166 0.01747 437.1031
## 2 -0.10470 0.00127 436.8937
## 3 -0.00776 0.00009 436.8782
## 4 -0.00057 0.00001 436.8770
## 5 -0.00004 0.00000 436.8769
##    2.28859 0.01884 436.8769
##          a       b    |res|
## 1 -2.10313 0.07702 439.0208
## 2 -0.32766 0.00458 438.5311
## 3  0.00000 0.00000 438.5311
## 4  0.00000 0.00000 438.5311
## 5  0.00000 0.00000 438.5311
##   -2.43079 0.08160 438.5311
##          a        b    |res|
## 1 -0.70830  0.06041 439.0826
## 2 -0.81631  0.01143 438.4962
## 3 -0.20549  0.00255 438.5191
## 4  0.07360 -0.00085 438.5115
## 5 -0.02453  0.00028 438.5140
##   -1.68103  0.07382 438.5140
##          a        b    |res|
## 1 -2.10298  0.08049 437.6027
```

```
## 2  0.51570 -0.00670 438.6140
## 3 -0.09428  0.00122 438.4291
## 4  0.02444 -0.00032 438.4771
## 5 -0.00634  0.00008 438.4646
##   -1.66346  0.07478 438.4646
##         a       b    |res|
## 1 -4.72161 0.11382 434.6838
## 2 -0.16765 0.00208 434.6901
## 3 -0.01242 0.00015 434.6905
## 4 -0.00092 0.00001 434.6906
## 5 -0.00007 0.00000 434.6906
##   -4.90266 0.11607 434.6906
##         a        b    |res|
## 1 -2.53246  0.08286 438.4250
## 2  0.23154 -0.00279 439.2480
## 3  0.03430 -0.00041 439.3699
## 4  0.00508 -0.00006 439.3880
## 5  0.00075 -0.00001 439.3906
##   -2.26078  0.07958 439.3906
##         a        b    |res|
## 1  0.75223  0.04197 432.6129
## 2 -0.09769  0.00114 432.5615
## 3  0.00307 -0.00004 432.5634
## 4 -0.00013  0.00000 432.5633
## 5  0.00000  0.00000 432.5633
##    0.65748  0.04307 432.5633
##         a        b    |res|
## 1 -1.31459  0.06738 439.2238
## 2 -1.44144  0.01867 438.2917
## 3  0.38714 -0.00549 438.3161
## 4 -0.10569  0.00151 438.2724
## 5  0.04306 -0.00062 438.2902
##   -2.43152  0.08146 438.2902
##        a       b    |res|
## 1 0.74115 0.03904 430.2257
## 2 0.00000 0.00000 430.2257
## 3 0.00000 0.00000 430.2257
## 4 0.00000 0.00000 430.2257
## 5 0.00000 0.00000 430.2257
##   0.74115 0.03904 430.2257
##         a       b    |res|
## 1 -1.40968 0.06727 439.8709
## 2 -0.03463 0.00056 439.8794
## 3 -0.00218 0.00004 439.8800
## 4 -0.00016 0.00000 439.8800
## 5 -0.00001 0.00000 439.8800
##   -1.44667 0.06788 439.8800
##         a        b    |res|
## 1  0.84089  0.03983 448.6741
## 2  0.42375 -0.00590 448.9515
```

```
## 3 -0.05945  0.00087 448.9104
## 4  0.00881 -0.00013 448.9165
## 5 -0.00130  0.00002 448.9156
##    1.21269  0.03469 448.9156
##          a       b    |res|
## 1 -0.47845 0.05756 461.1681
## 2 -0.81455 0.01101 461.7298
## 3 -0.13732 0.00168 461.8157
## 4 -0.02543 0.00031 461.8316
## 5 -0.00471 0.00006 461.8345
##   -1.46046 0.07063 461.8345
##          a       b    |res|
## 1  0.14168 0.04457 456.0518
## 2 -0.38862 0.00535 455.6572
## 3 -0.06683 0.00099 455.6245
## 4 -0.01238 0.00018 455.6185
## 5 -0.00229 0.00003 455.6174
##   -0.32844 0.05112 455.6174
##          a        b    |res|
## 1 -6.44015  0.14409 445.9211
## 2 -0.56716  0.00777 446.4574
## 3  0.21417 -0.00317 446.1369
## 4 -0.11105  0.00165 446.2603
## 5  0.05758 -0.00085 446.1742
##   -6.84661  0.14947 446.1742
##          a        b    |res|
## 1 -4.35163  0.10906 454.3874
## 2 -0.01678  0.00029 454.4056
## 3  0.00646 -0.00010 454.3995
## 4 -0.00186  0.00003 454.4016
## 5  0.00072 -0.00001 454.4009
##   -4.36310  0.10927 454.4009
##          a        b    |res|
## 1 -0.59802  0.05789 450.5408
## 2  1.27454 -0.01743 453.1843
## 3 -0.39089  0.00544 452.2366
## 4  0.12663 -0.00161 452.5087
## 5 -0.03597  0.00048 452.4281
##    0.37629  0.04477 452.4281
##          a        b    |res|
## 1 -0.07748  0.04808 456.7983
## 2  0.14546 -0.00199 456.9637
## 3  0.03978 -0.00052 457.0065
## 4  0.00938 -0.00013 457.0177
## 5  0.00243 -0.00003 457.0205
##    0.11957  0.04541 457.0205
##          a        b    |res|
## 1 -2.49612  0.08540 462.4525
## 2 -2.24779  0.03250 459.5078
## 3  0.49317 -0.00722 460.0350
```

```
## 4 -0.09156  0.00160 459.9179
## 5  0.02042 -0.00036 459.9439
##   -4.32189  0.11193 459.9439
##         a        b    |res|
## 1 5.11134 -0.01814 446.5552
## 2 0.34458 -0.00538 446.7437
## 3 0.02299 -0.00040 446.7576
## 4 0.00164 -0.00003 446.7586
## 5 0.00012  0.00000 446.7587
##   5.48067 -0.02395 446.7587
##          a        b    |res|
## 1 -3.34440  0.09442 448.3618
## 2  0.08922 -0.00121 448.1797
## 3  0.00330 -0.00004 448.1730
## 4  0.00012  0.00000 448.1727
## 5  0.00000  0.00000 448.1727
##   -3.25174  0.09317 448.1727
##          a        b    |res|
## 1 -0.76118  0.06022 458.4493
## 2 -0.72662  0.00938 456.7014
## 3  0.24956 -0.00322 457.2070
## 4 -0.03754  0.00048 457.1309
## 5  0.01668 -0.00022 457.1647
##   -1.25910  0.06664 457.1647
##          a       b    |res|
## 1 -1.14583 0.06189 443.7875
## 2 -0.17084 0.00207 443.8558
## 3 -0.06327 0.00077 443.8811
## 4 -0.02343 0.00028 443.8905
## 5 -0.00868 0.00011 443.8940
##   -1.41206 0.06511 443.8940
##          a        b    |res|
## 1 -1.49429  0.06826 447.0516
## 2 -0.53535  0.00704 446.0584
## 3  0.27759 -0.00365 446.5734
## 4 -0.14394  0.00189 446.3064
## 5  0.07463 -0.00098 446.4448
##   -1.82135  0.07257 446.4448
##         a     b    |res|
## 1 2.96948 0.013 434.7309
## 2 0.00000 0.000 434.7309
## 3 0.00000 0.000 434.7309
## 4 0.00000 0.000 434.7309
## 5 0.00000 0.000 434.7309
##   2.96948 0.013 434.7309
##          a        b    |res|
## 1 -2.06540  0.07867 444.7901
## 2  0.59574 -0.00787 445.4480
## 3 -0.05643  0.00087 445.3430
## 4  0.00627 -0.00010 445.3506
```

```
## 5 -0.00070  0.00001 445.3498
##   -1.52051  0.07158 445.3498
##          a        b    |res|
## 1 -3.22761  0.09532 440.0431
## 2 -0.06906  0.00095 439.9892
## 3  0.03581 -0.00049 440.0171
## 4 -0.01857  0.00025 440.0026
## 5  0.00963 -0.00013 440.0101
##   -3.26980  0.09590 440.0101
##          a        b    |res|
## 1  0.07970  0.04917 442.6249
## 2 -0.33671  0.00479 442.3614
## 3  0.05437 -0.00070 442.3998
## 4 -0.00655  0.00009 442.3948
## 5  0.00113 -0.00001 442.3955
##   -0.20806  0.05334 442.3955
##          a        b    |res|
## 1  0.62147  0.04308 440.6871
## 2  0.43366 -0.00638 440.9273
## 3 -0.06240  0.00095 440.8791
## 4  0.00924 -0.00014 440.8862
## 5 -0.00137  0.00002 440.8851
##    1.00061  0.03752 440.8851
##          a        b    |res|
## 1 -0.90069  0.06371 445.6783
## 2  0.95827 -0.01324 445.8740
## 3 -0.53935  0.00734 445.4995
## 4  0.30608 -0.00385 445.6958
## 5 -0.18138  0.00228 445.5795
##   -0.35707  0.05624 445.5795
##          a        b    |res|
## 1 -3.27718  0.09698 450.5482
## 2  1.74535 -0.02510 452.8224
## 3 -0.29632  0.00446 452.1317
## 4  0.10975 -0.00165 452.3875
## 5 -0.04065  0.00061 452.2928
##   -1.75905  0.07530 452.2928
##          a        b    |res|
## 1 -6.46094  0.13908 455.4818
## 2  0.20214 -0.00295 454.7588
## 3  0.06831 -0.00109 454.5216
## 4  0.02768 -0.00040 454.4653
## 5  0.00892 -0.00015 454.4445
##   -6.15389  0.13448 454.4445
##          a        b    |res|
## 1 -4.10323  0.10604 454.4265
## 2  2.37427 -0.03167 451.8726
## 3 -0.27851  0.00352 451.9043
## 4  0.03303 -0.00039 451.9008
## 5 -0.00367  0.00004 451.9011
```

```
##   -1.97810  0.07755 451.9011
##         a        b    |res|
## 1 1.02282  0.03636 454.2250
## 2 0.24093 -0.00391 454.5180
## 3 0.00767 -0.00014 454.5289
## 4 0.00028 -0.00001 454.5293
## 5 0.00001  0.00000 454.5293
##   1.27171  0.03230 454.5293
##          a        b    |res|
## 1  0.82044  0.03930 465.7610
## 2 -0.36223  0.00467 465.6628
## 3  0.04025 -0.00052 465.6737
## 4 -0.00447  0.00006 465.6725
## 5  0.00050 -0.00001 465.6727
##    0.49449  0.04351 465.6727
##          a       b    |res|
## 1  1.35121 0.03762 462.3374
## 2 -0.41042 0.00491 462.5018
## 3 -0.10128 0.00127 462.5642
## 4 -0.02626 0.00033 462.5804
## 5 -0.00681 0.00009 462.5846
##    0.80644 0.04423 462.5846
##          a        b    |res|
## 1 -3.83879  0.10297 473.9820
## 2  0.92550 -0.01277 473.8475
## 3 -0.31942  0.00426 473.7278
## 4  0.11634 -0.00142 473.7405
## 5 -0.03878  0.00047 473.7363
##   -3.15516  0.09352 473.7363
##          a        b    |res|
## 1 -0.51557  0.06004 487.3768
## 2  0.44713 -0.00650 487.1624
## 3 -0.04728  0.00072 487.1862
## 4  0.00525 -0.00008 487.1836
## 5 -0.00058  0.00001 487.1839
##   -0.11106  0.05420 487.1839
##          a        b    |res|
## 1 -3.74157  0.10045 487.0621
## 2  0.65851 -0.01044 487.4694
## 3 -0.31156  0.00542 487.2582
## 4  0.16556 -0.00281 487.3677
## 5 -0.08153  0.00146 487.3109
##   -3.31060  0.09407 487.3109
##          a        b    |res|
## 1 -5.80155  0.12469 486.5784
## 2  0.22788 -0.00370 486.2413
## 3 -0.11769  0.00178 486.3537
## 4  0.05667 -0.00086 486.2756
## 5 -0.02728  0.00041 486.3016
##   -5.66198  0.12232 486.3016
```

```
##          a        b    |res|
## 1  0.05822  0.05017 489.3243
## 2  1.40210 -0.01936 489.9357
## 3 -0.27017  0.00351 489.8058
## 4  0.10079 -0.00130 489.8539
## 5 -0.03733  0.00048 489.8361
##    1.25361  0.03349 489.8361
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
##  [36] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
##  [71] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
## [106] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##   [1]  0.0693715577  0.0718870161  0.0729571731  0.0711993146  0.083135172
4
##   [6]  0.0716051677  0.0578516471  0.0733427951  0.0695858686  0.066118129
1
##  [11]  0.0592189728  0.0688859463  0.0716806895  0.0881684694  0.086324239
3
##  [16]  0.0599362271  0.0619628836  0.0563919879  0.0420473030  0.075701941
1
##  [21]  0.0586299928  0.0717601441  0.0492803941  0.0801716478  0.074160182
4
##  [26]  0.0599577659  0.0457999134  0.0821014468  0.1024460195  0.048544542
9
##  [31]  0.0524898868  0.0601074205  0.0835105863  0.0691106693  0.066501099
7
##  [36]  0.0687295897  0.0911928127  0.0465000477  0.1011927098  0.051721331
3
##  [41]  0.0888526448  0.1121022253  0.0443141423  0.0343865276  0.026256257
6
##  [46]  0.0932147886  0.0312907844  0.0534758452  0.0822086767  0.052434676
4
##  [51]  0.1206500934  0.0896876739  0.0557731009  0.0745625248  0.053555703
7
##  [56]  0.0524471429  0.0445760007  0.1472958418  0.0391459902  0.064587816
8
##  [61]  0.0601930856  0.0733580320  0.1332347781  0.0679179627  0.097321221
2
##  [66]  0.0670508681  0.0731139116  0.0826012708  0.0893185876  0.077780073
3
##  [71]  0.0583474335  0.0577040433  0.0456095487  0.0890133325  0.065108251
5
##  [76]  0.0588944166  0.0227653222  0.0688018406  0.0371270981  0.090444778
6
##  [81]  0.0583987932  0.0399634826  0.0504032494  0.1054010311  0.053279127
1
##  [86]  0.0750941857  0.0967308266  0.0861503213  0.1098184921  0.076959749
1
```

```
##  [91]  0.0949744352 -0.0003322725  0.0964945518  0.0874511737  0.053634527
4
##  [96]  0.1045433187  0.0188420241  0.0815957482  0.0738189117  0.074777030
4
## [101]  0.1160674928  0.0795836746  0.0430735746  0.0814623966  0.039036340
9
## [106]  0.0678805357  0.0346947656  0.0706266299  0.0511221264  0.149471931
3
## [111]  0.1092729856  0.0447679735  0.0454051862  0.1119279224 -0.023954345
7
## [116]  0.0931661763  0.0666432105  0.0651143852  0.0725667012  0.013002001
2
## [121]  0.0715836103  0.0959010338  0.0533395252  0.0375198869  0.056241504
6
## [126]  0.0753008923  0.1344777971  0.0775501551  0.0323012872  0.043505138
2
## [131]  0.0442253752  0.0935163120  0.0541959472  0.0940662376  0.122323574
9
## [136]  0.0334934929
## [1] "Fold  2"
##          a        b    |res|
## 1 -2.33907  0.08207 55.48352
## 2  1.09463 -0.01481 55.39633
## 3 -0.18267  0.00286 54.48257
## 4  0.05158 -0.00087 54.71165
## 5 -0.00771  0.00013 54.67702
##   -1.38324  0.06937 54.67702
## [1] -1.987054 -1.383236  0.000000
## [1] 0.07744136 0.06937156 0.00000000
##          a        b    |res|
## 1 -2.16687  0.08065 54.94323
## 2  0.20743 -0.00359 54.68808
## 3 -0.02865  0.00041 54.68883
## 4  0.00119 -0.00002 54.68847
## 5 -0.00014  0.00000 54.68850
##   -1.98705  0.07744 54.68850
##          a        b    |res|
## 1 -1.60468  0.07109 81.03799
## 2 -0.35225  0.00508 80.25166
## 3  0.00578 -0.00009 80.25988
## 4  0.00075 -0.00001 80.26094
## 5  0.00010  0.00000 80.26108
##   -1.95030  0.07606 80.26108
##          a       b    |res|
## 1 -2.44489 0.08475 105.9556
## 2 -0.10231 0.00139 105.7513
## 3 -0.00287 0.00004 105.7447
## 4 -0.00009 0.00000 105.7445
## 5  0.00000 0.00000 105.7445
##   -2.55017 0.08618 105.7445
```

```
##          a        b    |res|
## 1 -1.65185  0.07240 116.5896
## 2 -0.18516  0.00290 116.2916
## 3  0.01323 -0.00020 116.3021
## 4 -0.00085  0.00001 116.3014
## 5  0.00006  0.00000 116.3014
##   -1.82458  0.07511 116.3014
##          a        b    |res|
## 1 -1.43690  0.06925 130.2923
## 2 -0.18238  0.00218 130.3425
## 3  0.00884 -0.00011 130.3400
## 4  0.00285 -0.00004 130.3392
## 5  0.00092 -0.00001 130.3389
##   -1.60666  0.07128 130.3389
##          a        b    |res|
## 1 -3.26567  0.09595 138.6281
## 2  0.73466 -0.00939 138.8717
## 3  0.04515 -0.00056 138.9146
## 4  0.01165 -0.00014 138.9257
## 5  0.00301 -0.00004 138.9286
##   -2.47119  0.08581 138.9286
##          a       b    |res|
## 1 -1.64589 0.07067 144.2571
## 2 -0.15607 0.00257 144.2010
## 3 -0.04560 0.00091 144.1946
## 4 -0.01618 0.00032 144.1924
## 5 -0.00574 0.00011 144.1916
##   -1.86947 0.07459 144.1916
##          a        b    |res|
## 1 -1.63696  0.07342 156.0059
## 2  0.06124 -0.00088 156.0349
## 3  0.00790 -0.00011 156.0387
## 4  0.00102 -0.00001 156.0392
## 5  0.00013  0.00000 156.0392
##   -1.56667  0.07240 156.0392
##          a       b    |res|
## 1 -0.76382 0.05935 159.1169
## 2 -0.36646 0.00495 158.8049
## 3 -0.05509 0.00074 158.7580
## 4 -0.01599 0.00022 158.7444
## 5 -0.00464 0.00006 158.7405
##   -1.20601 0.06533 158.7405
##          a        b    |res|
## 1 -1.12002  0.06436 169.6974
## 2  0.55525 -0.00740 170.0402
## 3 -0.08308  0.00119 169.8769
## 4  0.01268 -0.00019 169.9033
## 5 -0.00205  0.00003 169.8990
##   -0.63721  0.05799 169.8990
##          a        b    |res|
```

```
## 1 -3.41728  0.09861 178.2142
## 2  0.38165 -0.00570 177.6273
## 3  0.00797 -0.00013 177.6169
## 4 -0.00077  0.00001 177.6179
## 5  0.00007  0.00000 177.6178
##   -3.02836  0.09279 177.6178
##          a        b    |res|
## 1 -1.44241  0.06676 187.5904
## 2 -0.08657  0.00147 187.5390
## 3  0.01675 -0.00028 187.5490
## 4 -0.00324  0.00005 187.5470
## 5  0.00063 -0.00001 187.5474
##   -1.51484  0.06798 187.5474
##          a        b    |res|
## 1 -3.11065  0.09551 187.6193
## 2  0.26998 -0.00433 187.4332
## 3 -0.03937  0.00056 187.4270
## 4  0.00508 -0.00007 187.4239
## 5 -0.00066  0.00001 187.4238
##   -2.87562  0.09167 187.4238
##          a       b    |res|
## 1 -2.19996 0.08045 196.7988
## 2 -0.03053 0.00046 196.8231
## 3 -0.00591 0.00009 196.8278
## 4 -0.00114 0.00002 196.8287
## 5 -0.00022 0.00000 196.8289
##   -2.23777 0.08102 196.8289
##          a        b    |res|
## 1 -2.84156  0.08818 204.4074
## 2  1.08983 -0.01732 201.5023
## 3  0.13867 -0.00194 201.3452
## 4  0.01789 -0.00025 201.3249
## 5  0.00231 -0.00003 201.3223
##   -1.59285  0.06865 201.3223
##          a        b    |res|
## 1 -1.83205  0.07501 207.5343
## 2  0.25254 -0.00334 207.4373
## 3 -0.03795  0.00054 207.4529
## 4  0.00666 -0.00009 207.4504
## 5 -0.00107  0.00001 207.4508
##   -1.61188  0.07213 207.4508
##          a        b    |res|
## 1 -3.06502  0.09441 208.0249
## 2  0.17114 -0.00284 207.7265
## 3  0.02911 -0.00046 207.6783
## 4  0.00469 -0.00007 207.6706
## 5  0.00076 -0.00001 207.6693
##   -2.85932  0.09102 207.6693
##          a        b    |res|
## 1 -3.10316  0.09561 208.0127
```

```
## 2  1.17748 -0.01740 207.4071
## 3 -0.14798  0.00270 207.2588
## 4  0.05699 -0.00087 207.2701
## 5 -0.01838  0.00028 207.2546
##   -2.03506  0.08031 207.2546
##         a        b    |res|
## 1 -1.22189  0.06664 211.3837
## 2 -1.05444  0.01439 210.3821
## 3  0.05521 -0.00079 210.3855
## 4 -0.00576  0.00008 210.3851
## 5  0.00056 -0.00001 210.3852
##   -2.22633  0.08031 210.3852
##         a        b    |res|
## 1 -3.19079  0.09479 207.3687
## 2 -0.03916  0.00062 207.3705
## 3  0.00126 -0.00002 207.3705
## 4 -0.00004  0.00000 207.3705
## 5  0.00000  0.00000 207.3705
##   -3.22873  0.09539 207.3705
##         a        b    |res|
## 1 -1.78468  0.07142 228.1997
## 2  0.27711 -0.00417 228.5362
## 3  0.01380 -0.00017 228.5576
## 4 -0.00090  0.00001 228.5562
## 5  0.00006  0.00000 228.5563
##   -1.49461  0.06709 228.5563
##         a        b    |res|
## 1 -1.73001  0.07545 233.1593
## 2  0.43520 -0.00624 233.1972
## 3  0.02283 -0.00035 233.2117
## 4 -0.00269  0.00003 233.2103
## 5  0.00021  0.00000 233.2105
##   -1.27445  0.06889 233.2105
##         a       b    |res|
## 1  0.23593 0.04456 235.2510
## 2 -0.19624 0.00255 235.0908
## 3 -0.04931 0.00066 235.0599
## 4 -0.01043 0.00017 235.0519
## 5 -0.00269 0.00004 235.0498
##   -0.02273 0.04798 235.0498
##         a        b    |res|
## 1 -2.79843  0.08953 231.1252
## 2  0.06783 -0.00088 231.1235
## 3  0.02188 -0.00028 231.1278
## 4  0.00706 -0.00009 231.1291
## 5  0.00228 -0.00003 231.1296
##   -2.69939  0.08825 231.1296
##         a        b    |res|
## 1 -0.07282  0.05079 233.8083
## 2  0.07185 -0.00112 233.8428
```

```
## 3  0.00744 -0.00011 233.8462
## 4  0.00073 -0.00001 233.8465
## 5  0.00007  0.00000 233.8465
##    0.00727  0.04955 233.8465
##          a        b    |res|
## 1 -2.26315  0.08134 238.3294
## 2 -0.20547  0.00350 238.0946
## 3  0.00740 -0.00011 238.1022
## 4 -0.00024  0.00000 238.1019
## 5  0.00001  0.00000 238.1020
##   -2.46144  0.08474 238.1020
##          a        b    |res|
## 1 -3.42771  0.09702 244.4434
## 2  0.73784 -0.01094 244.0879
## 3  0.02295 -0.00035 244.1052
## 4  0.00074 -0.00001 244.1058
## 5  0.00002  0.00000 244.1058
##   -2.66616  0.08572 244.1058
##          a        b    |res|
## 1 -4.61733  0.11519 248.0450
## 2  0.90726 -0.01325 247.9236
## 3 -0.22755  0.00342 247.7346
## 4  0.06263 -0.00088 247.7584
## 5 -0.01537  0.00023 247.7523
##   -3.89037  0.10471 247.7523
##          a       b    |res|
## 1 -1.76348 0.07328 249.6234
## 2 -0.35105 0.00554 249.2944
## 3 -0.05808 0.00089 249.2619
## 4 -0.00937 0.00014 249.2585
## 5 -0.00151 0.00002 249.2580
##   -2.18349 0.07988 249.2580
##          a        b    |res|
## 1 -0.15180  0.05078 255.8679
## 2 -0.25372  0.00384 255.5618
## 3  0.01685 -0.00025 255.5759
## 4 -0.00109  0.00002 255.5750
## 5  0.00007  0.00000 255.5750
##   -0.38968  0.05439 255.5750
##          a        b    |res|
## 1 -2.04657  0.07817 262.9318
## 2  0.23664 -0.00433 263.4411
## 3  0.04279 -0.00069 263.5424
## 4 -0.01935  0.00031 263.4966
## 5  0.00872 -0.00014 263.5173
##   -1.77777  0.07332 263.5173
##          a       b    |res|
## 1 -0.37591 0.05307 260.5077
## 2 -0.06857 0.00115 260.3984
## 3 -0.00382 0.00007 260.3914
```

```
## 4 -0.00025 0.00000 260.3909
## 5 -0.00002 0.00000 260.3909
##   -0.44856 0.05430 260.3909
##          a        b    |res|
## 1 -0.38975  0.05414 263.9780
## 2  0.33973 -0.00526 264.1361
## 3  0.04925 -0.00068 264.1721
## 4 -0.00396  0.00005 264.1693
## 5  0.00115 -0.00002 264.1701
##   -0.00358  0.04824 264.1701
##          a        b    |res|
## 1 -4.24657  0.11292 272.7957
## 2  1.17381 -0.01945 273.0188
## 3 -0.10755  0.00145 272.9075
## 4  0.04135 -0.00051 272.9470
## 5 -0.01292  0.00018 272.9330
##   -3.15189  0.09458 272.9330
##          a        b    |res|
## 1 -2.34200  0.08586 287.8617
## 2 -0.31212  0.00459 287.8978
## 3  0.04629 -0.00074 287.8719
## 4 -0.00747  0.00012 287.8761
## 5  0.00120 -0.00002 287.8754
##   -2.61409  0.08981 287.8754
##          a        b    |res|
## 1 -0.57865  0.05548 300.1184
## 2 -0.09941  0.00205 299.9237
## 3  0.00962 -0.00020 299.9425
## 4 -0.00093  0.00002 299.9407
## 5  0.00009  0.00000 299.9409
##   -0.66928  0.05735 299.9409
##          a       b    |res|
## 1 -3.71728 0.09980 307.8397
## 2 -0.48531 0.00704 308.2974
## 3 -0.06241 0.00101 308.3845
## 4 -0.00604 0.00010 308.3963
## 5 -0.00058 0.00001 308.3974
##   -4.27162 0.10796 308.3974
##          a       b    |res|
## 1 -1.53453 0.07045 316.7875
## 2 -0.23145 0.00332 316.4264
## 3 -0.01252 0.00021 316.4052
## 4 -0.00081 0.00001 316.4039
## 5 -0.00005 0.00000 316.4038
##   -1.77936 0.07400 316.4038
##          a       b    |res|
## 1 -0.30626 0.05278 328.0639
## 2 -0.32838 0.00501 327.7933
## 3 -0.02300 0.00032 327.7774
## 4 -0.00137 0.00002 327.7764
```

```
## 5 -0.00009 0.00000 327.7764
##   -0.65909 0.05814 327.7764
##          a        b    |res|
## 1 -0.16908  0.05113 328.6616
## 2  0.14871 -0.00239 328.3586
## 3  0.00931 -0.00015 328.3391
## 4  0.00060 -0.00001 328.3378
## 5  0.00004  0.00000 328.3377
##   -0.01042  0.04858 328.3377
##          a        b    |res|
## 1 -3.08453  0.09386 337.3691
## 2 -0.91734  0.01497 337.5462
## 3 -0.04416  0.00084 337.6009
## 4  0.00364 -0.00005 337.5974
## 5 -0.00018  0.00000 337.5976
##   -4.04257  0.10962 337.5976
##          a        b    |res|
## 1 -1.82107  0.07110 338.1340
## 2  0.08001 -0.00125 338.0230
## 3  0.00300 -0.00004 338.0194
## 4  0.00010  0.00000 338.0193
## 5  0.00000  0.00000 338.0193
##   -1.73796  0.06982 338.0193
##          a        b    |res|
## 1 -3.24109  0.09619 343.5511
## 2  0.83439 -0.01324 344.8071
## 3 -0.06173  0.00089 344.6978
## 4 -0.00597  0.00009 344.6873
## 5 -0.00058  0.00001 344.6862
##   -2.47498  0.08394 344.6862
##          a        b    |res|
## 1 -1.63594  0.07531 352.4728
## 2  0.85247 -0.01252 353.5498
## 3 -0.05366  0.00062 353.4573
## 4  0.00692 -0.00008 353.4692
## 5 -0.00089  0.00001 353.4677
##   -0.83111  0.06334 353.4677
##          a       b    |res|
## 1  0.63907 0.03707 359.8527
## 2 -0.06034 0.00109 359.8756
## 3 -0.00447 0.00007 359.8771
## 4 -0.00029 0.00000 359.8771
## 5 -0.00002 0.00000 359.8772
##    0.57395 0.03823 359.8772
##          a       b    |res|
## 1 -0.13482 0.05040 361.5893
## 2 -0.10632 0.00156 361.4716
## 3 -0.01715 0.00025 361.4552
## 4 -0.00277 0.00004 361.4525
## 5 -0.00045 0.00001 361.4521
```

```
##   -0.26149 0.05226 361.4521
##          a       b    |res|
## 1 -5.55462 0.13492 356.8979
## 2 -0.05222 0.00104 356.9094
## 3 -0.00168 0.00003 356.9098
## 4 -0.00005 0.00000 356.9098
## 5  0.00000 0.00000 356.9098
##   -5.60858 0.13599 356.9098
##          a        b    |res|
## 1 -0.60331  0.05988 357.2594
## 2  0.40351 -0.00560 357.3546
## 3 -0.02185  0.00036 357.3484
## 4  0.00141 -0.00002 357.3488
## 5 -0.00009  0.00000 357.3488
##   -0.22033  0.05462 357.3488
##          a        b    |res|
## 1 -2.34001  0.08247 348.3515
## 2 -1.04704  0.01521 347.4748
## 3  0.36152 -0.00540 347.6627
## 4 -0.14559  0.00192 347.5803
## 5  0.04840 -0.00068 347.6095
##   -3.12271  0.09352 347.6095
##          a       b    |res|
## 1 -0.25894 0.04879 355.8508
## 2 -0.36122 0.00520 355.6771
## 3 -0.02330 0.00034 355.6755
## 4 -0.00150 0.00002 355.6754
## 5 -0.00010 0.00000 355.6754
##   -0.64507 0.05435 355.6754
##          a        b    |res|
## 1 -4.28936  0.10871 357.1060
## 2  0.83772 -0.01096 357.7706
## 3  0.02244 -0.00035 357.7971
## 4  0.00072 -0.00001 357.7979
## 5  0.00002  0.00000 357.7979
##   -3.42845  0.09739 357.7979
##          a       b    |res|
## 1 -2.60766 0.08566 361.3391
## 2 -0.50069 0.00796 361.2564
## 3 -0.05544 0.00103 361.2636
## 4 -0.00715 0.00013 361.2645
## 5 -0.00092 0.00002 361.2646
##   -3.17187 0.09479 361.2646
##          a       b    |res|
## 1 -1.30871 0.06621 367.8278
## 2 -0.47641 0.00714 367.4327
## 3  0.00000 0.00000 367.4327
## 4  0.00000 0.00000 367.4327
## 5  0.00000 0.00000 367.4327
##   -1.78512 0.07335 367.4327
```

```
##          a        b    |res|
## 1 -2.05071  0.08000 364.7293
## 2  1.41141 -0.02239 366.6590
## 3  0.16352 -0.00344 367.3716
## 4 -0.02110  0.00044 367.2797
## 5  0.00272 -0.00006 367.2915
##   -0.49415  0.05456 367.2915
##          a        b    |res|
## 1 -1.22395  0.06721 367.5120
## 2  0.26793 -0.00389 366.9726
## 3  0.00836 -0.00013 366.9640
## 4  0.00054 -0.00001 366.9635
## 5  0.00003  0.00000 366.9634
##   -0.94709  0.06319 366.9634
##          a       b    |res|
## 1  1.27341 0.03087 367.7074
## 2 -0.40738 0.00537 367.4788
## 3 -0.03480 0.00052 367.4751
## 4 -0.00337 0.00005 367.4748
## 5 -0.00033 0.00000 367.4747
##    0.82753 0.03681 367.4747
##         a        b    |res|
## 1 0.13010  0.04682 363.9905
## 2 0.12510 -0.00180 363.9060
## 3 0.04698 -0.00070 363.8733
## 4 0.01819 -0.00027 363.8606
## 5 0.00704 -0.00010 363.8557
##   0.32741  0.04395 363.8557
##         a        b    |res|
## 1 0.00132  0.04819 367.8997
## 2 0.01895 -0.00034 367.9362
## 3 0.00061 -0.00001 367.9374
## 4 0.00002  0.00000 367.9375
## 5 0.00000  0.00000 367.9375
##   0.02091  0.04784 367.9375
##          a        b    |res|
## 1  0.87534  0.03122 366.7201
## 2 -0.20242  0.00324 366.7557
## 3  0.03176 -0.00042 366.7511
## 4 -0.00337  0.00005 366.7517
## 5  0.00053 -0.00001 366.7516
##    0.70185  0.03409 366.7516
##          a       b    |res|
## 1 -1.93156 0.08028 364.5829
## 2 -0.90762 0.01174 365.2973
## 3 -0.15240 0.00189 365.4923
## 4 -0.02458 0.00031 365.5238
## 5 -0.00396 0.00005 365.5289
##   -3.02012 0.09427 365.5289
##          a        b    |res|
```

```
## 1 -2.19936  0.08027 377.0608
## 2  0.67358 -0.00957 377.2101
## 3  0.02316 -0.00031 377.2210
## 4  0.00075 -0.00001 377.2213
## 5  0.00002  0.00000 377.2213
##   -1.50185  0.07038 377.2213
##          a        b    |res|
## 1 -2.50842  0.08543 375.1978
## 2  0.81481 -0.01192 375.9443
## 3  0.08651 -0.00115 376.0608
## 4  0.00837 -0.00011 376.0721
## 5  0.00081 -0.00001 376.0732
##   -1.59792  0.07223 376.0732
##          a       b    |res|
## 1 -2.68175 0.08457 383.5667
## 2 -0.14367 0.00202 383.5802
## 3  0.00000 0.00000 383.5802
## 4  0.00000 0.00000 383.5802
## 5  0.00000 0.00000 383.5802
##   -2.82541 0.08659 383.5802
##          a        b    |res|
## 1 -1.20528  0.06551 381.3884
## 2  0.23805 -0.00341 381.1483
## 3  0.06133 -0.00077 381.0954
## 4  0.01781 -0.00022 381.0800
## 5  0.00517 -0.00006 381.0756
##   -0.88293  0.06104 381.0756
##          a        b    |res|
## 1 -1.91118  0.07877 377.8577
## 2  0.35875 -0.00573 377.6266
## 3 -0.08280  0.00129 377.6071
## 4  0.01870 -0.00029 377.5975
## 5 -0.00422  0.00007 377.5965
##   -1.62075  0.07411 377.5965
##          a        b    |res|
## 1 -0.72746  0.05804 381.8457
## 2  0.72746 -0.00968 382.4060
## 3 -0.02154  0.00031 382.3807
## 4  0.00069 -0.00001 382.3815
## 5 -0.00002  0.00000 382.3815
##   -0.02086  0.04867 382.3815
##          a        b    |res|
## 1 -2.59873  0.08427 393.3045
## 2  0.60923 -0.00964 393.5111
## 3 -0.22905  0.00354 393.2953
## 4  0.08096 -0.00126 393.3719
## 5 -0.02873  0.00045 393.3447
##   -2.16632  0.07736 393.3447
##          a        b    |res|
## 1 -1.07863  0.06119 396.3629
```

```
## 2  0.73061 -0.01073 397.3057
## 3 -0.12879  0.00192 397.1192
## 4  0.03739 -0.00056 397.1734
## 5 -0.01086  0.00016 397.1576
##   -0.45028  0.05198 397.1576
##         a        b    |res|
## 1 0.73208  0.03843 399.7427
## 2 0.14792 -0.00203 399.8798
## 3 0.04160 -0.00052 399.9243
## 4 0.00817 -0.00014 399.9357
## 5 0.00204 -0.00003 399.9387
##   0.93182  0.03571 399.9387
##         a      b    |res|
## 1 1.14326 0.0326 408.4716
## 2 0.00000 0.0000 408.4716
## 3 0.00000 0.0000 408.4716
## 4 0.00000 0.0000 408.4716
## 5 0.00000 0.0000 408.4716
##   1.14326 0.0326 408.4716
##          a       b    |res|
## 1 -1.60436 0.06799 415.3338
## 2 -0.15513 0.00257 415.3929
## 3 -0.04273 0.00066 415.4081
## 4 -0.01103 0.00017 415.4121
## 5 -0.00285 0.00004 415.4131
##   -1.81610 0.07143 415.4131
##          a        b    |res|
## 1 -1.57726  0.07256 421.2031
## 2 -0.07426  0.00114 421.0969
## 3  0.01058 -0.00015 421.1106
## 4 -0.00122  0.00002 421.1088
## 5  0.00016  0.00000 421.1090
##   -1.64200  0.07357 421.1090
##          a        b    |res|
## 1 -0.98837  0.06734 429.1399
## 2  0.45871 -0.00898 429.9928
## 3  0.01853 -0.00029 430.0203
## 4  0.00060 -0.00001 430.0212
## 5  0.00002  0.00000 430.0212
##   -0.51051  0.05806 430.0212
##          a       b    |res|
## 1 -1.03229 0.05873 428.5243
## 2 -0.75351 0.01115 428.3794
## 3 -0.17874 0.00252 428.4372
## 4 -0.04036 0.00057 428.4571
## 5 -0.00911 0.00013 428.4616
##   -2.01401 0.07310 428.4616
##          a        b    |res|
## 1 -3.32248  0.10139 432.7246
## 2  0.01485 -0.00020 432.7059
```

```
## 3  0.00048 -0.00001 432.7053
## 4  0.00002  0.00000 432.7053
## 5  0.00000  0.00000 432.7053
##   -3.30714  0.10119 432.7053
##          a       b    |res|
## 1  0.27944 0.04008 436.4670
## 2 -0.32134 0.00542 436.3282
## 3 -0.06727 0.00122 436.3270
## 4 -0.01671 0.00028 436.3338
## 5 -0.00377 0.00006 436.3361
##   -0.12965 0.04706 436.3361
##          a        b    |res|
## 1 -2.80307  0.09025 439.7153
## 2 -0.65550  0.00906 439.0594
## 3 -0.11783  0.00213 439.0229
## 4  0.02265 -0.00034 439.0260
## 5 -0.00293  0.00006 439.0255
##   -3.55668  0.10115 439.0255
##          a        b    |res|
## 1 -4.83901  0.11774 442.0290
## 2  0.33366 -0.00473 442.0163
## 3 -0.01923  0.00031 442.0129
## 4  0.00124 -0.00002 442.0131
## 5 -0.00008  0.00000 442.0131
##   -4.52341  0.11330 442.0131
##          a        b    |res|
## 1  3.65111  0.00011 447.0994
## 2  0.00109 -0.00001 447.1022
## 3 -0.00014  0.00000 447.1019
## 4  0.00002  0.00000 447.1019
## 5  0.00000  0.00000 447.1019
##    3.65207  0.00009 447.1019
##          a        b   |res|
## 1 -5.53629  0.12796 446.818
## 2  0.02453 -0.00039 446.802
## 3  0.00000  0.00000 446.802
## 4  0.00000  0.00000 446.802
## 5  0.00000  0.00000 446.802
##   -5.51176  0.12757 446.802
##          a       b    |res|
## 1 -2.73422 0.08821 450.4481
## 2 -0.22674 0.00282 450.3155
## 3 -0.04097 0.00055 450.2898
## 4 -0.00793 0.00011 450.2848
## 5 -0.00153 0.00002 450.2839
##   -3.01140 0.09170 450.2839
##          a       b    |res|
## 1 -1.08457 0.06575 462.9359
## 2 -0.90002 0.01216 461.8094
## 3 -0.28466 0.00409 461.5274
```

```
## 4 -0.05838 0.00085 461.4686
## 5 -0.01130 0.00016 461.4572
##   -2.33893 0.08301 461.4572
##          a        b    |res|
## 1  0.51075  0.03945 466.8056
## 2 -0.71826  0.01018 466.1642
## 3 -0.17649  0.00263 465.9987
## 4 -0.04085  0.00056 465.9677
## 5  0.00527 -0.00007 465.9678
##   -0.41958  0.05275 465.9678
##          a        b    |res|
## 1 -2.60749  0.08648 468.3941
## 2 -0.91892  0.01191 467.4820
## 3  0.09337 -0.00134 467.5803
## 4 -0.00301  0.00004 467.5770
## 5  0.00010  0.00000 467.5771
##   -3.43595  0.09709 467.5771
##          a       b    |res|
## 1  2.66608 0.01334 458.2688
## 2 -0.05640 0.00087 458.3046
## 3  0.00000 0.00000 458.3046
## 4  0.00000 0.00000 458.3046
## 5  0.00000 0.00000 458.3046
##    2.60968 0.01421 458.3046
##          a        b    |res|
## 1 -1.36424  0.06830 459.6587
## 2 -0.49466  0.00770 458.8504
## 3  0.06129 -0.00098 458.9534
## 4 -0.00989  0.00016 458.9368
## 5  0.00159 -0.00003 458.9395
##   -1.80591  0.07515 458.9395
##          a        b    |res|
## 1  0.14271  0.04830 459.4465
## 2  0.39429 -0.00636 458.7403
## 3 -0.01518  0.00021 458.7540
## 4  0.00049 -0.00001 458.7536
## 5 -0.00002  0.00000 458.7536
##    0.52230  0.04214 458.7536
##          a        b    |res|
## 1 -0.52775  0.05596 463.0640
## 2  0.36835 -0.00478 463.3940
## 3 -0.16994  0.00246 463.2241
## 4  0.09034 -0.00119 463.3062
## 5 -0.04437  0.00065 463.2612
##   -0.28337  0.05310 463.2612
##          a        b    |res|
## 1 -2.34937  0.08106 469.6543
## 2 -0.47018  0.00710 469.8410
## 3  0.25385 -0.00349 469.6807
## 4 -0.09646  0.00151 469.7184
```

```
## 5  0.05868 -0.00083 469.6977
##   -2.60347  0.08535 469.6977
##          a        b    |res|
## 1 -4.23623  0.11060 491.2782
## 2  1.11444 -0.01904 487.6646
## 3  0.04509 -0.00061 487.6009
## 4 -0.02201  0.00027 487.6287
## 5  0.00892 -0.00012 487.6162
##   -3.08980  0.09109 487.6162
##          a        b    |res|
## 1 -1.24566  0.06741 490.9294
## 2  0.31839 -0.00571 490.4324
## 3 -0.06035  0.00092 490.5126
## 4  0.00780 -0.00015 490.4997
## 5 -0.00157  0.00002 490.5018
##   -0.98139  0.06250 490.5018
##          a       b    |res|
## 1 -4.54637 0.11203 486.3851
## 2 -0.01071 0.00014 486.3955
## 3 -0.00138 0.00002 486.3968
## 4 -0.00017 0.00000 486.3970
## 5 -0.00002 0.00000 486.3970
##   -4.55866 0.11219 486.3970
##          a        b    |res|
## 1 -4.01548  0.10670 488.6231
## 2  0.54838 -0.00805 488.1721
## 3  0.02195 -0.00026 488.1714
## 4  0.00071 -0.00001 488.1713
## 5  0.00002  0.00000 488.1713
##   -3.44442  0.09838 488.1713
##          a        b    |res|
## 1 -1.48242  0.07191 486.1683
## 2  0.05573 -0.00073 486.2395
## 3 -0.00539  0.00007 486.2326
## 4  0.00052 -0.00001 486.2333
## 5 -0.00005  0.00000 486.2332
##   -1.43161  0.07124 486.2332
##          a       b    |res|
## 1  0.43988 0.04409 485.4025
## 2 -0.33265 0.00421 484.7733
## 3 -0.03219 0.00041 484.7207
## 4 -0.00312 0.00004 484.7156
## 5 -0.00030 0.00000 484.7151
##    0.07162 0.04875 484.7151
##          a        b    |res|
## 1 -0.13554  0.04953 483.2575
## 2  0.02566 -0.00042 483.2846
## 3 -0.00745  0.00012 483.2767
## 4  0.00216 -0.00004 483.2790
## 5 -0.00063  0.00001 483.2784
```

```
##   -0.11579  0.04921 483.2784
##          a        b    |res|
## 1 -3.68724  0.10014 492.0630
## 2  1.18519 -0.01763 491.4381
## 3 -0.06731  0.00102 491.4676
## 4  0.00000  0.00000 491.4676
## 5  0.00000  0.00000 491.4676
##   -2.56936  0.08353 491.4676
##          a       b    |res|
## 1 -1.69935 0.07508 498.4424
## 2 -0.95510 0.01441 497.8031
## 3 -0.18544 0.00279 497.6832
## 4 -0.03589 0.00054 497.6600
## 5 -0.00695 0.00010 497.6555
##   -2.88273 0.09292 497.6555
##          a        b    |res|
## 1 -3.84472  0.10481 499.2385
## 2  0.54440 -0.00801 499.2305
## 3  0.03512 -0.00052 499.2300
## 4  0.00227 -0.00003 499.2300
## 5  0.00015  0.00000 499.2300
##   -3.26278  0.09625 499.2300
##          a        b    |res|
## 1 -3.41852  0.09964 498.1484
## 2  0.53241 -0.00819 497.9798
## 3  0.01717 -0.00026 497.9785
## 4  0.00055 -0.00001 497.9784
## 5  0.00002  0.00000 497.9784
##   -2.86836  0.09117 497.9784
##          a        b    |res|
## 1 -3.82232  0.10104 497.0152
## 2  0.38339 -0.00506 497.2334
## 3 -0.04236  0.00049 497.1976
## 4  0.00410 -0.00005 497.2011
## 5 -0.00040  0.00000 497.2007
##   -3.47759  0.09642 497.2007
##          a        b    |res|
## 1 -2.86130  0.09192 488.5280
## 2  2.04171 -0.02701 487.4203
## 3 -0.15071  0.00228 487.2628
## 4  0.06806 -0.00103 487.3340
## 5 -0.03074  0.00047 487.3018
##   -0.93297  0.06663 487.3018
##          a       b    |res|
## 1 -1.84759 0.07821 487.1660
## 2 -0.00197 0.00003 487.1691
## 3  0.00019 0.00000 487.1688
## 4 -0.00002 0.00000 487.1689
## 5  0.00000 0.00000 487.1689
##   -1.84939 0.07824 487.1689
```

```
##          a        b    |res|
## 1 -4.97525  0.11333 488.1181
## 2 -1.22874  0.02193 485.3255
## 3 -0.06779  0.00096 485.2553
## 4  0.00527 -0.00006 485.2598
## 5 -0.00028  0.00000 485.2595
##   -6.26679  0.13617 485.2595
##          a        b    |res|
## 1 -1.97515  0.07627 484.3189
## 2  1.57325 -0.02015 486.8283
## 3 -0.02551  0.00033 486.7862
## 4  0.00905 -0.00012 486.8012
## 5 -0.00321  0.00004 486.7959
##   -0.42156  0.05638 486.7959
##          a        b    |res|
## 1 -5.95557  0.13377 481.0001
## 2  0.08174 -0.00120 480.9556
## 3 -0.01264  0.00016 480.9614
## 4  0.00136 -0.00002 480.9606
## 5 -0.00021  0.00000 480.9607
##   -5.88532  0.13271 480.9607
##          a        b    |res|
## 1 -1.36811  0.06827 488.5392
## 2  1.33070 -0.01852 488.7023
## 3 -0.08005  0.00119 488.6394
## 4  0.00628 -0.00008 488.6430
## 5 -0.00033  0.00000 488.6427
##   -0.11151  0.05088 488.6427
##          a        b    |res|
## 1  1.25169  0.02783 481.1286
## 2 -0.24742  0.00381 480.8745
## 3  0.09577 -0.00147 480.9320
## 4 -0.03707  0.00057 480.9097
## 5  0.01435 -0.00022 480.9183
##    1.07733  0.03052 480.9183
##          a        b    |res|
## 1 -5.70951  0.12936 487.4532
## 2  0.13947 -0.00204 487.3819
## 3  0.02699 -0.00039 487.3780
## 4  0.00522 -0.00008 487.3782
## 5  0.00101 -0.00001 487.3782
##   -5.53681  0.12684 487.3782
##         a        b    |res|
## 1 1.22730  0.03419 493.1310
## 2 0.16145 -0.00267 493.3369
## 3 0.02328 -0.00034 493.3634
## 4 0.00300 -0.00004 493.3669
## 5 0.00039 -0.00001 493.3673
##   1.41542  0.03112 493.3673
##          a        b    |res|
```

```
## 1 -0.74871  0.05580 495.5231
## 2 -0.28760  0.00400 495.3880
## 3 -0.00710  0.00011 495.3872
## 4  0.00046 -0.00001 495.3872
## 5 -0.00003  0.00000 495.3872
##   -1.04298  0.05990 495.3872
##          a       b    |res|
## 1  1.49716 0.02733 496.0376
## 2 -0.07947 0.00125 495.8624
## 3 -0.01025 0.00016 495.8477
## 4 -0.00108 0.00002 495.8458
## 5 -0.00013 0.00000 495.8455
##    1.40622 0.02877 495.8455
##          a        b    |res|
## 1 -2.58055  0.08231 493.8562
## 2  0.92833 -0.01230 493.5979
## 3 -0.43609  0.00556 493.5257
## 4  0.17562 -0.00251 493.4987
## 5 -0.08894  0.00113 493.4998
##   -2.00163  0.07419 493.4998
##          a       b    |res|
## 1 -3.82723 0.11141 498.9599
## 2 -0.33620 0.00549 498.7203
## 3 -0.09670 0.00124 498.7466
## 4 -0.02183 0.00028 498.7530
## 5 -0.00493 0.00006 498.7545
##   -4.28689 0.11848 498.7545
##          a       b    |res|
## 1 -0.12805 0.04457 503.4738
## 2 -0.41446 0.00709 503.1830
## 3 -0.09816 0.00160 503.1173
## 4 -0.02405 0.00036 503.1025
## 5 -0.00543 0.00008 503.0991
##   -0.67015 0.05371 503.0991
##          a        b    |res|
## 1 -6.35370  0.14442 511.8963
## 2  0.85577 -0.01285 511.5334
## 3 -0.39421  0.00580 511.6321
## 4  0.17303 -0.00262 511.5875
## 5 -0.07889  0.00118 511.6077
##   -5.79799  0.13593 511.6077
##          a        b    |res|
## 1 -5.49597  0.12849 522.2116
## 2  0.25790 -0.00386 522.3080
## 3 -0.00977  0.00012 522.3049
## 4  0.00025  0.00000 522.3050
## 5 -0.00001  0.00000 522.3050
##   -5.24759  0.12476 522.3050
##          a        b    |res|
## 1 -2.76106  0.08860 527.1715
```

```
## 2  0.33436 -0.00564 526.6302
## 3  0.04801 -0.00073 526.5829
## 4  0.00620 -0.00009 526.5768
## 5  0.00080 -0.00001 526.5760
##   -2.37169  0.08213 526.5760
##         a        b    |res|
## 1 -5.88219  0.13346 522.7052
## 2 -2.27613  0.03353 525.7080
## 3 -0.08986  0.00132 525.8626
## 4  0.00580 -0.00009 525.8526
## 5 -0.00037  0.00001 525.8532
##   -8.24276  0.16824 525.8532
##         a       b    |res|
## 1 -3.97223 0.10342 521.5088
## 2 -0.11688 0.00180 521.5421
## 3 -0.00754 0.00012 521.5462
## 4 -0.00049 0.00001 521.5465
## 5 -0.00003 0.00000 521.5465
##   -4.09717 0.10534 521.5465
##         a        b    |res|
## 1  1.82067  0.02822 506.5426
## 2  0.32677 -0.00424 506.8100
## 3 -0.07379  0.00096 506.7496
## 4  0.01666 -0.00022 506.7632
## 5 -0.00376  0.00005 506.7601
##    2.08655  0.02477 506.7601
##         a        b    |res|
## 1 -2.83705  0.08569 517.1732
## 2 -1.49859  0.02091 516.6279
## 3  0.05025 -0.00067 516.6056
## 4 -0.00162  0.00002 516.6064
## 5  0.00005  0.00000 516.6063
##   -4.28697  0.10595 516.6063
##        a        b    |res|
## 1 0.65183  0.04086 519.8875
## 2 0.48320 -0.00628 520.1197
## 3 0.00525 -0.00006 520.1220
## 4 0.00017  0.00000 520.1220
## 5 0.00001  0.00000 520.1220
##   1.14046  0.03453 520.1220
##         a        b    |res|
## 1 -4.33412  0.11112 531.2516
## 2  0.41507 -0.00629 531.2272
## 3  0.05356 -0.00081 531.2556
## 4  0.00691 -0.00010 531.2593
## 5  0.00089 -0.00001 531.2598
##   -3.85769  0.10390 531.2598
##         a        b    |res|
## 1 -2.58726  0.08614 533.8228
## 2 -0.11828  0.00252 533.5938
```

```
## 3  0.00382 -0.00008 533.6012
## 4 -0.00012  0.00000 533.6009
## 5  0.00000  0.00000 533.6009
##   -2.70185  0.08858 533.6009
##          a       b    |res|
## 1 -2.55977 0.08636 537.0262
## 2 -0.34727 0.00438 536.9342
## 3 -0.05898 0.00071 536.9194
## 4 -0.00951 0.00011 536.9170
## 5 -0.00153 0.00002 536.9166
##   -2.97707 0.09157 536.9166
##          a       b    |res|
## 1 -2.19453 0.08017 534.8586
## 2 -0.36985 0.00568 534.4190
## 3 -0.03626 0.00055 534.3932
## 4 -0.00351 0.00005 534.3907
## 5 -0.00034 0.00001 534.3905
##   -2.60450 0.08645 534.3905
##          a        b    |res|
## 1 -0.64431  0.05679 541.1582
## 2 -0.46067  0.00695 540.9429
## 3  0.02285 -0.00045 540.9568
## 4 -0.00147  0.00003 540.9559
## 5  0.00010  0.00000 540.9559
##   -1.08351  0.06331 540.9559
##          a        b    |res|
## 1 -3.09109  0.09411 540.9485
## 2 -0.64567  0.01127 542.0416
## 3  0.06669 -0.00122 541.9229
## 4  0.00000  0.00000 541.9229
## 5  0.00000  0.00000 541.9229
##   -3.67006  0.10416 541.9229
##          a        b    |res|
## 1 -6.76545  0.14398 543.8583
## 2 -0.36117  0.00578 543.8592
## 3  0.02613 -0.00042 543.8538
## 4 -0.00337  0.00005 543.8545
## 5  0.00044 -0.00001 543.8544
##   -7.10342  0.14939 543.8544
##          a        b    |res|
## 1 -0.08067  0.05273 546.4242
## 2 -0.10080  0.00150 546.4377
## 3  0.00650 -0.00010 546.4368
## 4 -0.00042  0.00001 546.4369
## 5  0.00003  0.00000 546.4369
##   -0.17536  0.05414 546.4369
##          a        b    |res|
## 1 -6.61852  0.14275 543.3606
## 2 -1.18698  0.01672 542.7002
## 3  0.02764 -0.00041 542.6843
```

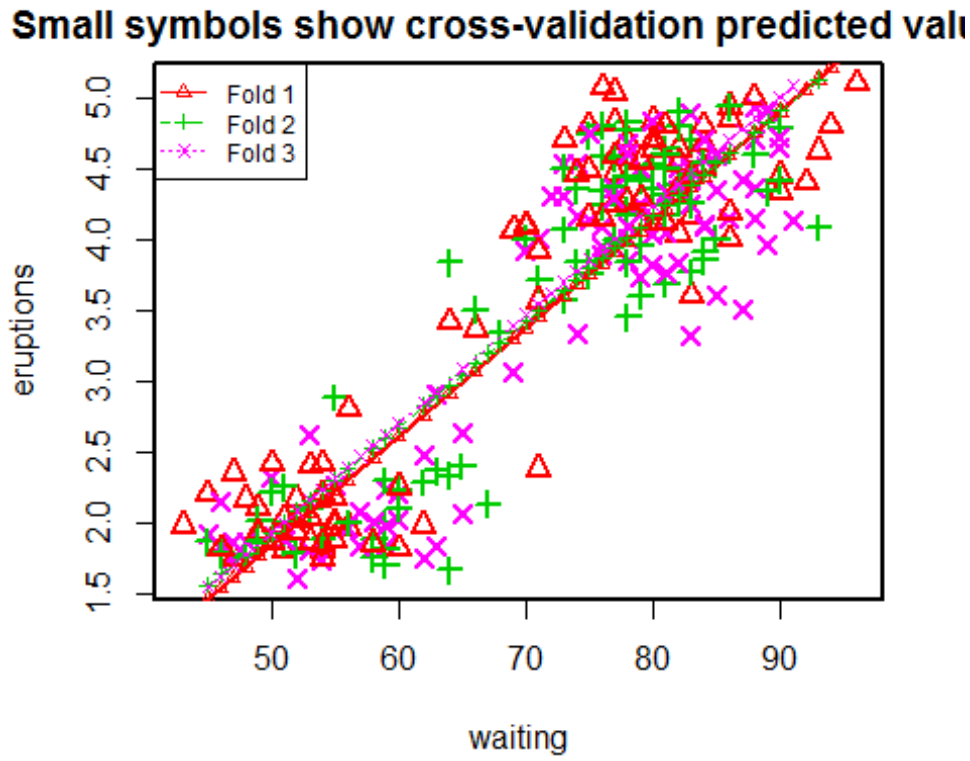
```
## 4 -0.00178  0.00003 542.6837
## 5  0.00012  0.00000 542.6837
##   -7.77953  0.15909 542.6837
##          a        b    |res|
## 1 -4.77517  0.12101 540.6218
## 2  2.21631 -0.03114 537.9782
## 3 -0.16699  0.00192 537.9878
## 4  0.01616 -0.00019 537.9869
## 5 -0.00156  0.00002 537.9869
##   -2.71125  0.09163 537.9869
##          a        b    |res|
## 1 -4.50728  0.11247 544.0592
## 2  0.73928 -0.00997 543.5706
## 3 -0.16550  0.00225 543.6810
## 4  0.03737 -0.00051 543.6560
## 5 -0.00844  0.00011 543.6617
##   -3.90457  0.10435 543.6617
##          a        b    |res|
## 1 -6.92773  0.15169 538.0289
## 2 -1.08984  0.01698 539.7270
## 3 -0.07601  0.00115 539.8964
## 4  0.00820 -0.00011 539.8800
## 5 -0.00079  0.00001 539.8816
##   -8.08618  0.16972 539.8816
##          a        b    |res|
## 1 -2.80353  0.08621 542.4819
## 2 -0.07692  0.00114 542.5332
## 3  0.00993 -0.00015 542.5186
## 4 -0.00128  0.00002 542.5195
## 5  0.00017  0.00000 542.5192
##   -2.87164  0.08722 542.5192
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
##  [36] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
##  [71] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
## [106] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##   [1] 7.744136e-02 7.606355e-02 8.618380e-02 7.511436e-02 7.127514e-02
##   [6] 8.581269e-02 7.459448e-02 7.240369e-02 6.533033e-02 5.799043e-02
##  [11] 9.279425e-02 6.798381e-02 9.167276e-02 8.101677e-02 6.864560e-02
##  [16] 7.213159e-02 9.102303e-02 8.031451e-02 8.031327e-02 9.538945e-02
##  [21] 6.709018e-02 6.888547e-02 4.797739e-02 8.824831e-02 4.955083e-02
##  [26] 8.473618e-02 8.571542e-02 1.047100e-01 7.988015e-02 5.438610e-02
##  [31] 7.332493e-02 5.429950e-02 4.823947e-02 9.458041e-02 8.981308e-02
##  [36] 5.734537e-02 1.079584e-01 7.400203e-02 5.814324e-02 4.858123e-02
##  [41] 1.096221e-01 6.981546e-02 8.393516e-02 6.334314e-02 3.823322e-02
##  [46] 5.225824e-02 1.359945e-01 5.462127e-02 9.352475e-02 5.434574e-02
##  [51] 9.739233e-02 9.479446e-02 7.334988e-02 5.455564e-02 6.319231e-02
##  [56] 3.681005e-02 4.394973e-02 4.783574e-02 3.408848e-02 9.426667e-02
```

```
##  [61] 7.038139e-02 7.222982e-02 8.659198e-02 6.104187e-02 7.410867e-02
##  [66] 4.866918e-02 7.735921e-02 5.198194e-02 3.570555e-02 3.259786e-02
##  [71] 7.143454e-02 7.357156e-02 5.805940e-02 7.309704e-02 1.011891e-01
##  [76] 4.705644e-02 1.011491e-01 1.132997e-01 9.351009e-05 1.275706e-01
##  [81] 9.170287e-02 8.301009e-02 5.274908e-02 9.708918e-02 1.421297e-02
##  [86] 7.514654e-02 4.214463e-02 5.310409e-02 8.535109e-02 9.109496e-02
##  [91] 6.249834e-02 1.121883e-01 9.837557e-02 7.124289e-02 4.875111e-02
##  [96] 4.921116e-02 8.353293e-02 9.292107e-02 9.624986e-02 9.117249e-02
## [101] 9.642409e-02 6.662631e-02 7.823749e-02 1.361675e-01 5.638017e-02
## [106] 1.327075e-01 5.087520e-02 3.051743e-02 1.268392e-01 3.111856e-02
## [111] 5.990269e-02 2.876698e-02 7.418854e-02 1.184778e-01 5.370552e-02
## [116] 1.359318e-01 1.247556e-01 8.213057e-02 1.682367e-01 1.053447e-01
## [121] 2.477070e-02 1.059465e-01 3.452632e-02 1.039013e-01 8.857871e-02
## [126] 9.157479e-02 8.645042e-02 6.331255e-02 1.041593e-01 1.493884e-01
## [131] 5.413942e-02 1.590916e-01 9.162646e-02 1.043525e-01 1.697210e-01
## [136] 8.721892e-02
## [1] "Fold  3"
##          a        b    |res|
## 1 -2.50234  0.08448 112.8501
## 2  0.50420 -0.00679 109.0280
## 3 -0.00958  0.00012 109.0477
## 4  0.00033  0.00000 109.0470
## 5 -0.00001  0.00000 109.0470
##   -2.00740  0.07780 109.0470
## [1] -1.987054 -1.383236 -2.007400
## [1] 0.07744136 0.06937156 0.07780000
##    a  b |res|
## 1 NA NA     0
## 2 NA NA     0
## 3 NA NA     0
## 4 NA NA     0
## 5 NA NA     0
##   NA NA     0
##    a  b |res|
## 1 NA NA     0
## 2 NA NA     0
## 3 NA NA     0
## 4 NA NA     0
## 5 NA NA     0
##   NA NA     0
## numeric(0)
## [1] NA
```

```
data<-as.data.frame(faithful)
fit<-lm(eruptions~waiting,data)
cv.lm(data, fit, m=3)
```

```
## Analysis of Variance Table
##
## Response: eruptions
```

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## waiting      1  286.5   286.5    1162 <2e-16 ***
## Residuals  270   66.6     0.2
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 90
##                 2     11    16     18    21     22     26     27     32
## waiting     54.00 54.000 52.00 84.000 51.00 47.000 83.000 55.000 77.000
## cvpred       2.15  2.150  2.00  4.443  1.92  1.615  4.367  2.226  3.908
## eruptions    1.80  1.833  2.17  4.800  1.80  1.750  3.600  1.967  4.467
## CV residual -0.35 -0.317  0.17  0.357 -0.12  0.135 -0.767 -0.259  0.559
##                33      36     38     49    51     53      62     65     66
## waiting     66.00 52.0000 80.000 82.000 75.00 54.000 84.0000 60.000 92.000
## cvpred       3.07  1.9968  4.137  4.290  3.76  2.150  4.4432  2.608  5.055
## eruptions    3.37  2.0170  4.833  4.633  4.80  1.833  4.5000  1.817  4.400
## CV residual  0.30  0.0202  0.696  0.343  1.04 -0.317  0.0568 -0.791 -0.655
##                68   70     71     72     75    76     78     80     83
## waiting     78.000 73.0 82.000 56.000 62.000 76.00 78.000 83.000 70.000
## cvpred       3.984  3.6  4.290  2.303  2.761  3.83  3.984  4.367  3.373
## eruptions    4.700  4.7  4.033  1.967  1.983  5.07  4.567  3.600  4.100
## CV residual  0.716  1.1 -0.257 -0.336 -0.778  1.24  0.583 -0.767  0.727
##                89     90     92      93     97    103    109    122
## waiting     48.000 86.000 90.000 50.0000 84.000 49.000 86.000 69.000
## cvpred       1.691  4.596  4.902  1.8439  4.443  1.767  4.596  3.296
```

```
## eruptions    2.167  4.000  4.333  1.8670  4.667  2.100  4.850  4.067
## CV residual  0.476 -0.596 -0.569  0.0231  0.224  0.333  0.254  0.771
##                123    132    133    138     139    143    144    147    149
## waiting     77.000 83.00 56.000 86.000 53.0000 82.000 77.000 80.000 96.000
## cvpred       3.908  4.37  2.303  4.596  2.0732  4.290  3.908  4.137  5.361
## eruptions    4.250  4.17  2.800  4.933  2.0330  4.533  4.817  4.633  5.100
## CV residual  0.342 -0.20  0.497  0.337 -0.0402  0.243  0.909  0.496 -0.261
##                151    155    161    168     169    170    171    178    181
## waiting     77.00 71.000 45.000 88.000 52.0000 93.000 49.00 50.000 55.000
## cvpred       3.91  3.449  1.462  4.749  1.9968  5.131  1.77  1.844  2.226
## eruptions    5.03  3.567  2.200  5.000  1.9330  4.617  1.92  2.417  1.883
## CV residual  1.12  0.118  0.738  0.251 -0.0638 -0.514  0.15  0.573 -0.343
##                182    185     190    191    204    209    211    212    215
## waiting     77.000 51.000 55.0000 81.000 53.000 49.000 71.00 80.000 64.000
## cvpred       3.908  1.920  2.2261  4.214  2.073  1.767  3.45  4.137  2.914
## eruptions    4.583  2.033  2.1830  4.800  1.867  1.933  2.38  4.700  3.417
## CV residual  0.675  0.113 -0.0431  0.586 -0.206  0.166 -1.07  0.563  0.503
##                217    218    219    220     221   223    224     226
## waiting     53.000 94.000 55.000 76.000 50.0000 54.00 75.000 79.0000
## cvpred       2.073  5.208  2.226  3.832  1.8439  2.15  3.755  4.0609
## eruptions    2.400  4.800  2.000  4.150  1.8670  1.75  4.483  4.1170
## CV residual  0.327 -0.408 -0.226  0.318  0.0231 -0.40  0.728  0.0561
##                228    230   231    232    233    235   237    241    242
## waiting     78.000 79.000 70.00 54.000 86.000 90.000 54.00 75.000 47.000
## cvpred       3.984  4.061  3.37  2.150  4.596  4.902  2.15  3.755  1.615
## eruptions    4.267  4.550  4.08  2.417  4.183  4.450  1.85  4.150  2.350
## CV residual  0.283  0.489  0.71  0.267 -0.413 -0.452 -0.30  0.395  0.735
##                248     251    257     258    260    263    265    266
## waiting     82.0000 54.0000 71.000 83.0000 79.000 58.000 43.000 60.000
## cvpred       4.2903  2.1497  3.449  4.3667  4.061  2.455  1.309  2.608
## eruptions    4.3670  2.2000  3.917  4.4500  4.283  1.850  1.983  2.250
## CV residual  0.0767  0.0503  0.468  0.0833  0.222 -0.605  0.674 -0.358
##                268    271    272
## waiting     81.0000 46.000 74.000
## cvpred       4.2138  1.538  3.679
## eruptions    4.1170  1.817  4.467
## CV residual -0.0968  0.279  0.788
##
## Sum of squares = 23.6    Mean square = 0.26    n = 90
##
## fold 2
## Observations in test set: 91
##                 1      4        5      6     12     13     15     23
## waiting     79.000 62.000 8.50e+01 55.000 84.000 78.000 83.000 78.000
## cvpred       4.087  2.825 4.53e+00  2.305  4.458  4.012  4.384  4.012
## eruptions    3.600  2.283 4.53e+00  2.883  3.917  4.200  4.700  3.450
## CV residual -0.487 -0.542 9.73e-04  0.578 -0.541  0.188  0.316 -0.562
##                30     35    40     41     42     44    47      48     50
## waiting     79.000 74.000 90.00 80.000 58.000 58.000 64.00 53.0000 59.000
## cvpred       4.087  3.716  4.90  4.161  2.528  2.528  2.97  2.1567  2.602
```

```
## eruptions    4.433  3.833  4.78  4.350  1.883  1.750  3.83  2.1000  2.000
## CV residual  0.346  0.117 -0.12  0.189 -0.645 -0.778  0.86 -0.0567 -0.602
##                 57    58     59      60      63     64     67      82
## waiting     71.000 64.00 77.000 81.0000 48.0000 82.000 78.000 82.0000
## cvpred       3.493  2.97  3.938  4.2351  1.7856  4.309  4.012  4.3093
## eruptions    3.717  1.67  4.567  4.3170  1.7500  4.800  4.167  4.3330
## CV residual  0.224 -1.31  0.629  0.0819 -0.0356  0.491  0.155  0.0237
##                 85     88     94      98     99    100    108    110
## waiting     73.000 80.000 78.000 75.0000 51.000 82.000 52.000 81.000
## cvpred       3.641  4.161  4.012  3.7897  2.008  4.309  2.082  4.235
## eruptions    4.067  4.517  4.817  3.7500  1.867  4.900  1.783  3.683
## CV residual  0.426  0.356  0.805 -0.0397 -0.141  0.591 -0.299 -0.552
##                111    112   114    115    116    119    125    131    134
## waiting     75.000 59.000 79.00 59.000 81.000 59.000 88.000 45.000 89.000
## cvpred       3.790  2.602  4.09  2.602  4.235  2.602  4.755  1.563  4.829
## eruptions    4.733  2.300  4.42  1.700  4.633  1.817  4.600  1.867  4.333
## CV residual  0.943 -0.302  0.33 -0.902  0.398 -0.785 -0.155  0.304 -0.496
##                136      141    142    145    148     152    153    154
## waiting     82.0000 81.00000 60.000 76.000 49.000 77.0000 65.000 81.000
## cvpred       4.3093  4.23511  2.676  3.864  1.860  3.9382  3.047  4.235
## eruptions    4.3830  4.23300  2.233  4.333  2.017  4.0000  2.400  4.600
## CV residual  0.0737 -0.00211 -0.443  0.469  0.157  0.0618 -0.647  0.365
##                156    157   158    164    165    166    167    173     174
## waiting     70.000 81.000 93.00 78.000 66.000 76.000 63.000 77.000 68.0000
## cvpred       3.419  4.235  5.13  4.012  3.122  3.864  2.899  3.938  3.2701
## eruptions    4.000  4.500  4.08  3.833  3.500  4.583  2.367  4.583  3.3330
## CV residual  0.581  0.265 -1.04 -0.179  0.378  0.719 -0.532  0.645  0.0629
##                175    177    179    184    186    193     195      196
## waiting     81.0000 73.000 85.000 83.000 78.000 76.000 77.0000 81.00000
## cvpred       4.2351  3.641  4.532  4.384  4.012  3.864  3.9382  4.23511
## eruptions    4.1670  4.500  4.000  3.767  4.433  4.800  3.9660  4.23300
## CV residual -0.0681  0.859 -0.532 -0.617  0.421  0.936  0.0278 -0.00211
##                199    201    206    207    208      213     214    216
## waiting     51.000 60.000 46.000 77.000 84.000 49.00000 75.0000 76.000
## cvpred       2.008  2.676  1.637  3.938  4.458  1.85979  3.7897  3.864
## eruptions    2.250  2.100  1.783  4.367  3.850  1.86700  3.8330  4.233
## CV residual  0.242 -0.576  0.146  0.429 -0.608  0.00721  0.0433  0.369
##                222    234    236    239   240    243   249    250     252
## waiting     82.0000 50.000 54.000 79.000 64.00 86.000 67.00 74.000 83.0000
## cvpred       4.3093  1.934  2.231  4.087  2.97  4.606  3.20  3.716  4.3836
## eruptions    4.2670  2.217  1.883  3.950  2.33  4.933  2.13  4.350  4.4500
## CV residual -0.0423  0.283 -0.348 -0.137 -0.64  0.327 -1.06  0.634  0.0664
##                253    254    259    261     262    264    270
## waiting     73.0000 73.000 56.000 78.000 84.0000 83.000 90.000
## cvpred       3.6413  3.641  2.379  4.012  4.4578  4.384  4.903
## eruptions    3.5670  4.500  2.000  4.767  4.5330  4.250  4.417
## CV residual -0.0743  0.859 -0.379  0.755  0.0752 -0.134 -0.486
##
## Sum of squares = 22.6    Mean square = 0.25    n = 91
##
```

```
## fold 3
## Observations in test set: 91
##                  3     7     8       9     10      14    17     19      20
## waiting     74.000 88.00 85.00 51.0000 85.000 47.0000 62.00 52.000 79.0000
## cvpred       3.774  4.85  4.62  2.0067  4.619  1.6993  2.85  2.084  4.1582
## eruptions    3.333  4.70  3.60  1.9500  4.350  1.7500  1.75  1.600  4.2500
## CV residual -0.441 -0.15 -1.02 -0.0567 -0.269  0.0507 -1.10 -0.484  0.0918
##                 24     25     28     29     31     34      37     39
## waiting     69.000 74.000 76.000 78.000 73.000 80.000 48.0000 59.000
## cvpred       3.390  3.774  3.928  4.081  3.697  4.235  1.7762  2.621
## eruptions    3.067  4.533  4.083  3.850  4.300  4.033  1.8670  1.833
## CV residual -0.323  0.759  0.155 -0.231  0.603 -0.202  0.0908 -0.788
##                  43     45    46     52     54     55     56     61    69
## waiting     84.0000 73.000 83.00 90.000 80.000 54.000 83.000 59.000 65.00
## cvpred       4.5424  3.697  4.47  5.003  4.235  2.237  4.466  2.621  3.08
## eruptions    4.5670  4.533  3.32  4.716  4.833  1.733  4.883  2.233  2.07
## CV residual  0.0246  0.836 -1.15 -0.287  0.598 -0.504  0.417 -0.388 -1.02
##                 73     74     77      79     81     84      86      87
## waiting     79.000 71.000 60.000 76.0000 75.000 65.000 88.0000 76.0000
## cvpred       4.158  3.543  2.698  3.9277  3.851  3.082  4.8498  3.9277
## eruptions    4.500  4.000  2.017  3.8830  4.133  2.633  4.9330  3.9500
## CV residual  0.342  0.457 -0.681 -0.0447  0.282 -0.449  0.0832  0.0223
##                 91    95    96    101    102     104    105    106    107
## waiting     60.000 63.00 72.00 62.000 88.000 83.0000 81.000 47.000 84.000
## cvpred       2.698  2.93  3.62  2.852  4.850  4.4656  4.312  1.699  4.542
## eruptions    2.200  1.83  4.30  2.483  4.367  4.5000  4.050  1.867  4.700
## CV residual -0.498 -1.10  0.68 -0.369 -0.483  0.0344 -0.262  0.168  0.158
##                 113    117     118    120    121    124    126    127
## waiting     89.0000 50.000 85.0000 87.000 53.000 56.000 81.000 45.000
## cvpred       4.9266  1.930  4.6193  4.773  2.160  2.391  4.312  1.546
## eruptions    4.9000  2.317  4.6000  4.417  2.617  1.967  3.767  1.917
## CV residual -0.0266  0.387 -0.0193 -0.356  0.457 -0.424 -0.545  0.371
##                 128     129    130    135    137    140    146   150   159
## waiting     82.000 55.0000 90.000 46.000 51.000 79.000 59.000 53.00 53.00
## cvpred       4.389  2.3141  5.003  1.622  2.007  4.158  2.621  2.16  2.16
## eruptions    4.500  2.2670  4.650  1.833  1.883  3.733  1.983  1.80  1.80
## CV residual  0.111 -0.0471 -0.353  0.211 -0.124 -0.425 -0.638 -0.36 -0.36
##                 160    162    163    172     176    180    183    187    188
## waiting     89.00 86.000 58.000 57.000 81.0000 74.000 83.000 84.000 46.000
## cvpred       4.93  4.696  2.545  2.468  4.3119  3.774  4.466  4.542  1.622
## eruptions    3.97  4.150  2.000  2.083  4.3330  4.167  4.250  4.083  1.833
## CV residual -0.96 -0.546 -0.545 -0.385  0.0211  0.393 -0.216 -0.459  0.211
##                 189    192    194   197    198    200     202    203
## waiting     83.0000 57.000 84.000 87.00 77.000 78.000 82.0000 91.000
## cvpred       4.4656  2.468  4.542  4.77  4.005  4.081  4.3887  5.080
## eruptions    4.4170  1.833  4.100  3.50  4.366  4.667  4.3500  4.133
## CV residual -0.0486 -0.635 -0.442 -1.27  0.361  0.586 -0.0387 -0.947
##                 205     210     225      227   229    238     244     245
## waiting     78.000 83.0000 78.0000 78.00000 70.00 77.000 63.0000 85.0000
## cvpred       4.081  4.4656  4.0814  4.08137  3.47  4.005  2.9288  4.6193
```

```
## eruptions    4.600  4.5000  4.0000  4.08300  3.92  4.283  2.9000  4.5830
## CV residual  0.519  0.0344 -0.0814  0.00163  0.45  0.278 -0.0288 -0.0363
##                246    247   255    256    267    269
## waiting     82.000 57.000 88.00 80.000 75.000 46.000
## cvpred       4.389  2.468  4.85  4.235  3.851  1.622
## eruptions    3.833  2.083  4.15  3.817  4.750  2.150
## CV residual -0.556 -0.385 -0.70 -0.418  0.899  0.528
##
## Sum of squares = 22.8    Mean square = 0.25    n = 91
##
## Overall (Sum over all 91 folds)
##    ms
## 0.253
```