Predicting mortality caused by heart failure

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2021-12-07

1 Introduction

In this project we will train a model to predict mortality caused by heart failure (HF) based on patients features. Acute heart failure is a leading cause of hospitalization and death, and it is an increasing burden on health care systems. The correct risk stratification of patients could improve clinical outcome and resources allocation, avoiding the overtreatment of low-risk subjects or the early, inappropriate discharge of high-risk patients.[1]

Heart failure occurs when the heart becomes too weak or stiff to pump enough blood to meet the body's needs. Symptoms typically include breathlessness, extreme fatigue, reduced capacity to exercise, etc. The number of people living with HF is high and growing. More than 15 million people (~ 2%) are estimated to be living with HF in Europe. People living with HF are at high risk of hospitalisation, despite improvements in treatment options and care in the past two decades, mortality from HF remains high.[2]

The used dataset contains medical records of 299 patients suffering from heart failure, collected during their follow-up period. Each patient profile includes 11 clinical features including blood measurements, health indicators and other relevant information. The dataset can be downloaded from the [UCI Machine Learning Repository] (https://archive-beta.ics.uci.edu/ml/datasets/heart+failure+clinical+records).

The goal of this project is to develop a machine learning model that will provide the best prediction of the patients death based on the available information. *caret* package will be used for training and assessing the models. Model performance will be evaluated using a metric most appropriate for the current data.

2 Analysis and methods

2.1 Data preparation

The dataset is available as a CSV file with columns separated by commas. It is saved as a data frame which has the following structure:

```
data <- read.csv("heart_failure_clinical_records_dataset.csv")
str(data)
```

```
## 'data.frame':    299 obs. of  13 variables:
##  $ age                     : num  75 55 65 50 65 90 75 60 65 80 ...
##  $ anaemia                 : int  0 0 0 1 1 1 1 1 0 1 ...
##  $ creatinine_phosphokinase: int  582 7861 146 111 160 47 246 315 157 123 ...
##  $ diabetes                : int  0 0 0 0 1 0 0 1 0 0 ...
```

[1] World J Cardiol. 2015 Dec 26; 7(12): 902–911.

[2] Heart Failure Policy Network. 2020. Heart failure policy and practice in Europe. London: HFPN

```
##  $ ejection_fraction       : int  20 38 20 20 20 40 15 60 65 35 ...
##  $ high_blood_pressure     : int  1 0 0 0 0 1 0 0 0 1 ...
##  $ platelets               : num  265000 263358 162000 210000 327000 ...
##  $ serum_creatinine        : num  1.9 1.1 1.3 1.9 2.7 2.1 1.2 1.1 1.5 9.4 ...
##  $ serum_sodium            : int  130 136 129 137 116 132 137 131 138 133 ...
##  $ sex                     : int  1 1 1 1 0 1 1 1 0 1 ...
##  $ smoking                 : int  0 0 1 0 0 1 0 1 0 1 ...
##  $ time                    : int  4 6 7 7 8 8 10 10 10 10 ...
##  $ DEATH_EVENT             : int  1 1 1 1 1 1 1 1 1 1 ...
```

The dataset has no missing values:

```
sum(is.na(data))
```

```
## [1] 0
```

For the final dataset used for prediction, the *time* feature (time in days after the patient was dismissed or died) is not selected since this information will not be available for real patients. Binary variables are converted to factors and numeric variables are scaled to improve the prediction. The outcome values' (death event) levels are converted to "No"/"Yes" as needed for some methods.

```
library(tidyverse)
data <- select(data, -time)
data_num <- data
factors <- c(2, 4, 6, 10, 11, 12)
data[factors] <- lapply(data[factors], factor)
data_sc <- data
data_sc[-factors] <- sapply(data[-factors], scale)
levels(data_sc$DEATH_EVENT) = c("No","Yes")
```

Based on the resulting dataet, train and test sets are created. It is shown that the both sets have a similar proportion of positive and negative oucomes.

```
library(caret)
set.seed(2)
train_index <- createDataPartition(data$DEATH_EVENT, p = 0.8, list = FALSE)
train_not_sc <- train <- data[train_index,]
train <- data_sc[train_index,]
test <- data_sc[-train_index,]
prop.table(table(train$DEATH_EVENT))
```

```
##
##        No       Yes
## 0.6791667 0.3208333
```

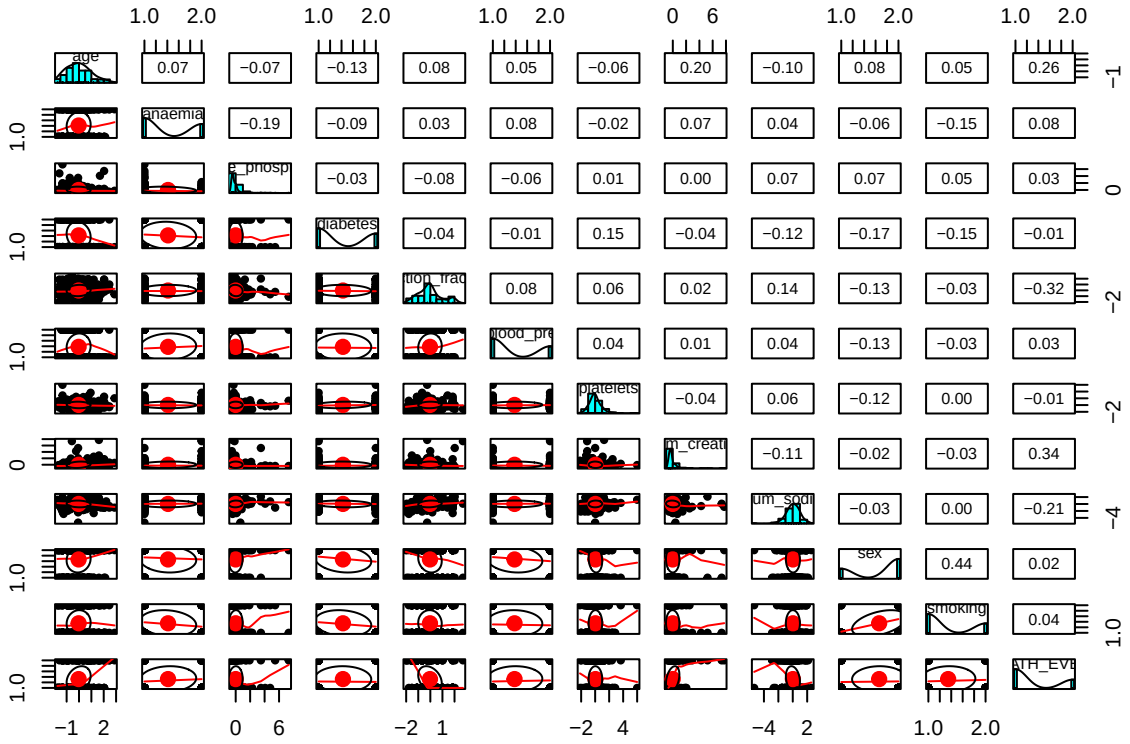
```
prop.table(table(test$DEATH_EVENT))
```

```
##
##        No       Yes
## 0.6779661 0.3220339
```

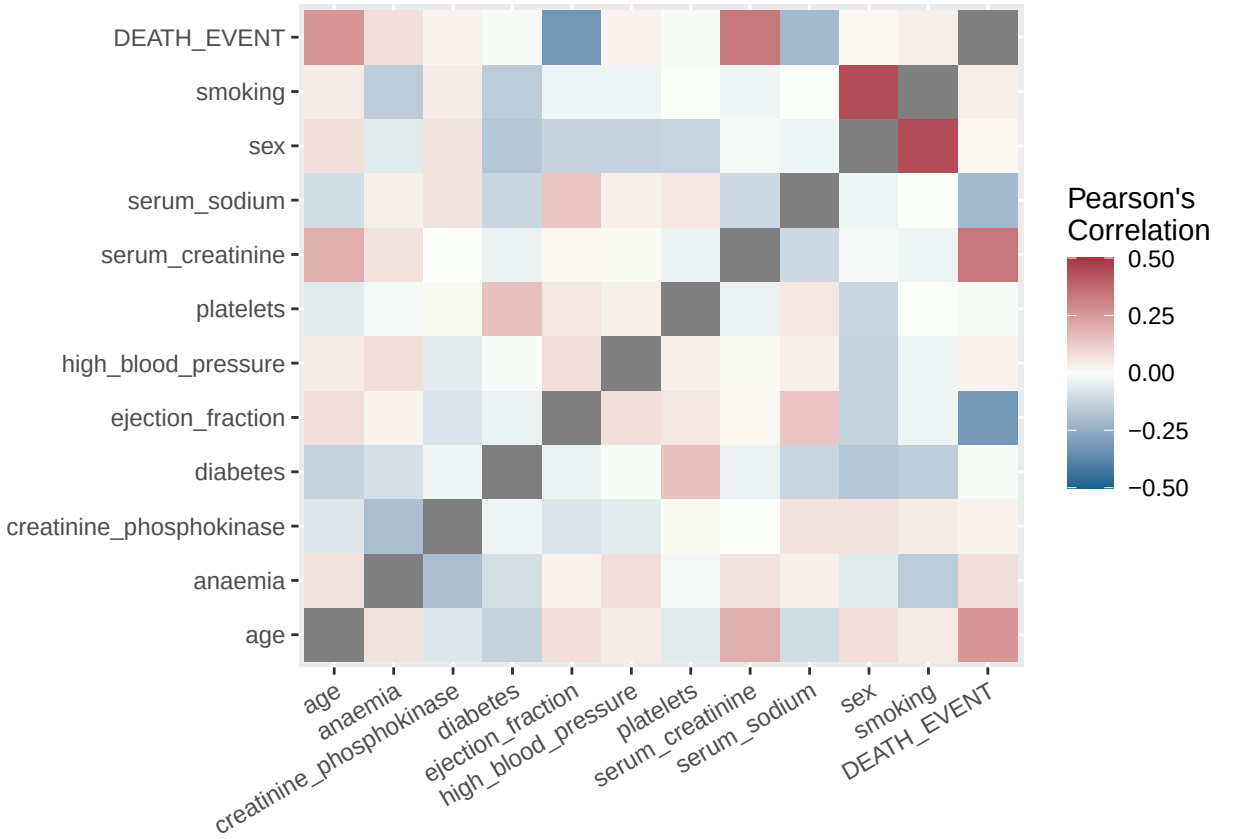
The train set will be used for the following data exploration.

2.2 Data exploration

The prepared train set contains 6 binary and 5 numeric features and one binary outcome value with 240 observations. The following summary table shows distributions of and correlations between all values and allows a swift examination of the main dependencies.



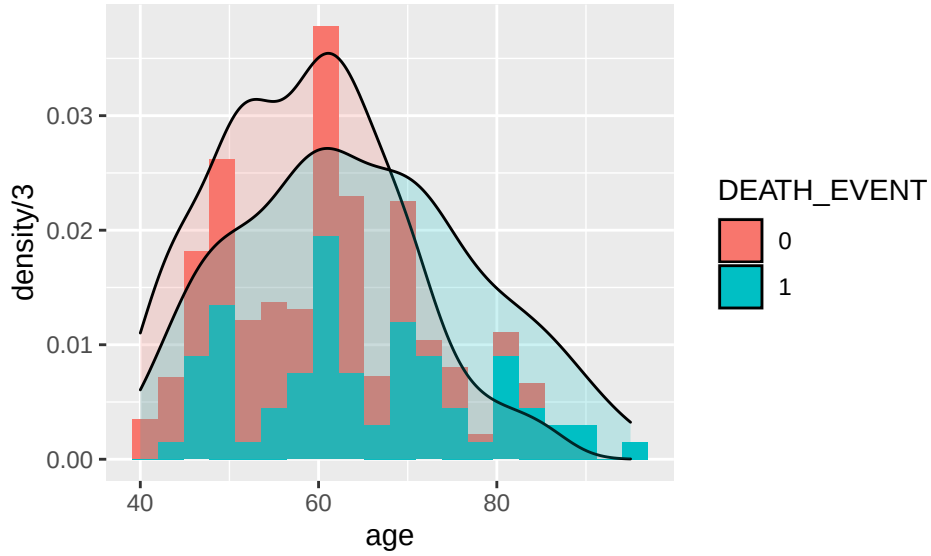
The following heatmap shows correlations between all values and allows a swift examination of the main dependencies.



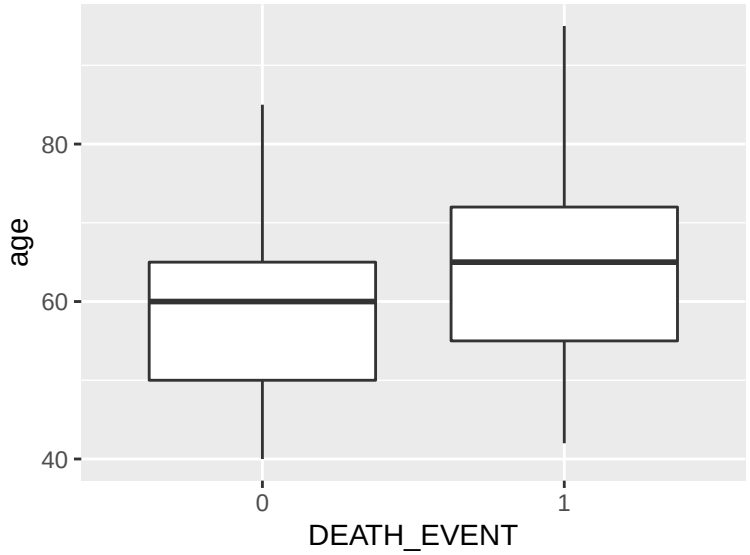
As can be seen, the outcome is most strongly correlated with age, ejection fraction, serum creatine and serum sodium features. There is no strong correlation between features except between sex and smoking. All features are evaluated in more detail in the following.

2.2.1 Age

Higher age is expected to be associated with higher mortality. It can be shown in the following histogram with overlayed density curves. The older patients died more often than the younger.

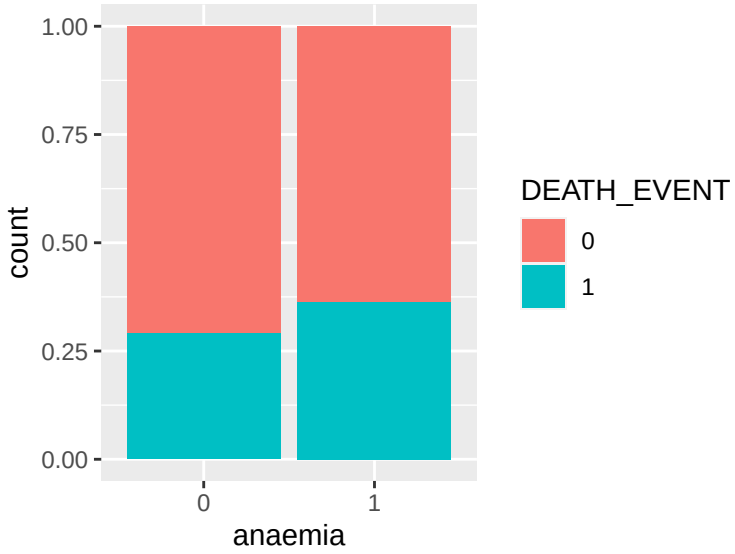


The following boxplots further confirm the assumption.



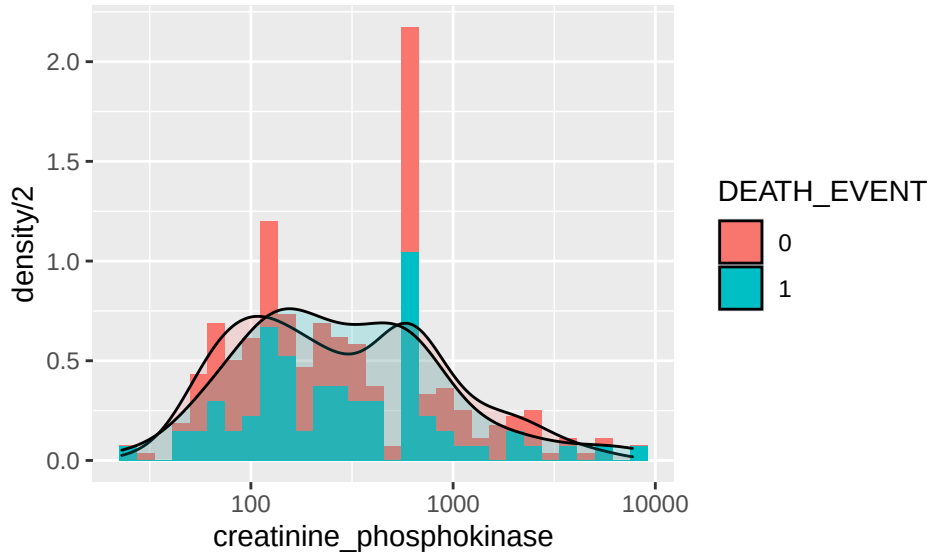
2.2.2 Anaemia

Patients that die seem to have anaemia more often than patients that are dismissed from hospital, as shown in the following percent stacked barchart. The difference is rather small, as expected based on the correlation heatmap.



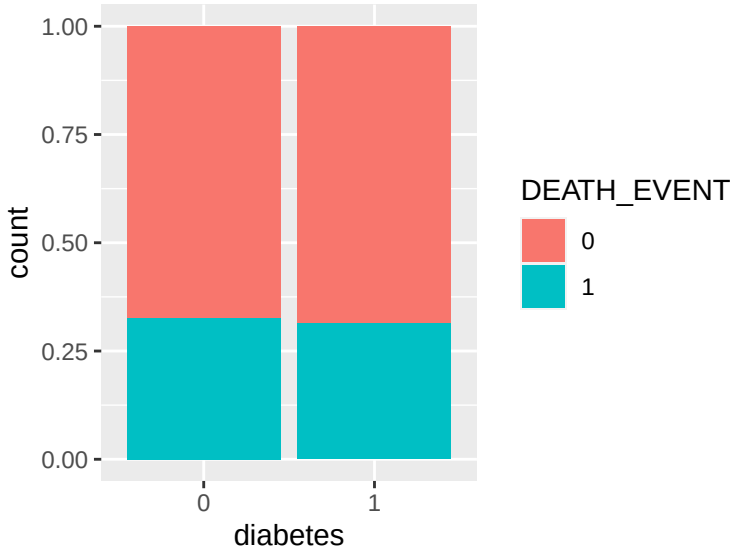
2.2.3 Creatinine phosphokinase

Creatinine phosphokinase levels are similar for both patients groups as shown in the following histogram with overlayed density curves.



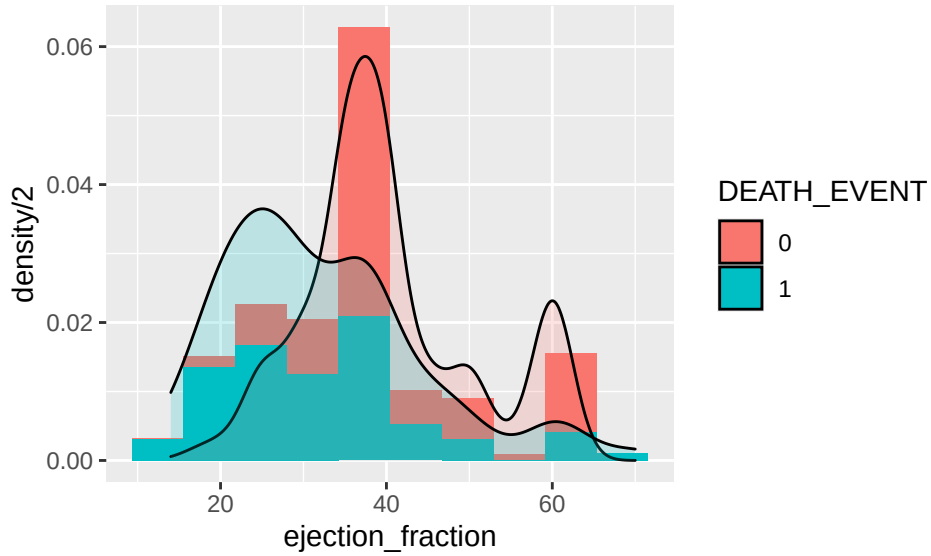
2.2.4 Diabetes

As expected based on the correlation heatmap, there is no evidence that patients sufferiing from diabetes are more likely to die from heart failure than patients without diabetes for the current dataset. This can be seen in the following percent stacked barchart.



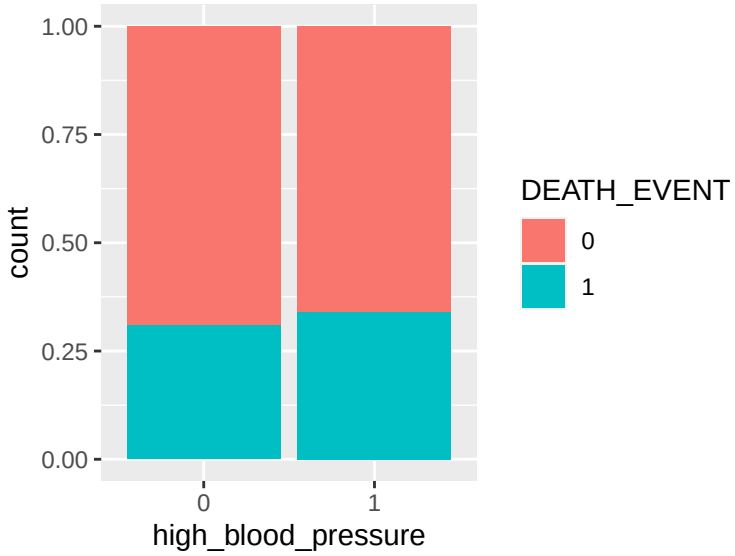
2.2.5 Ejection fraction

Ejection fraction strongly correlates with the outcome. It can be shown in the following histogram with overlayed density curves, where the death events density is skewed to the lower ejection fraction values.



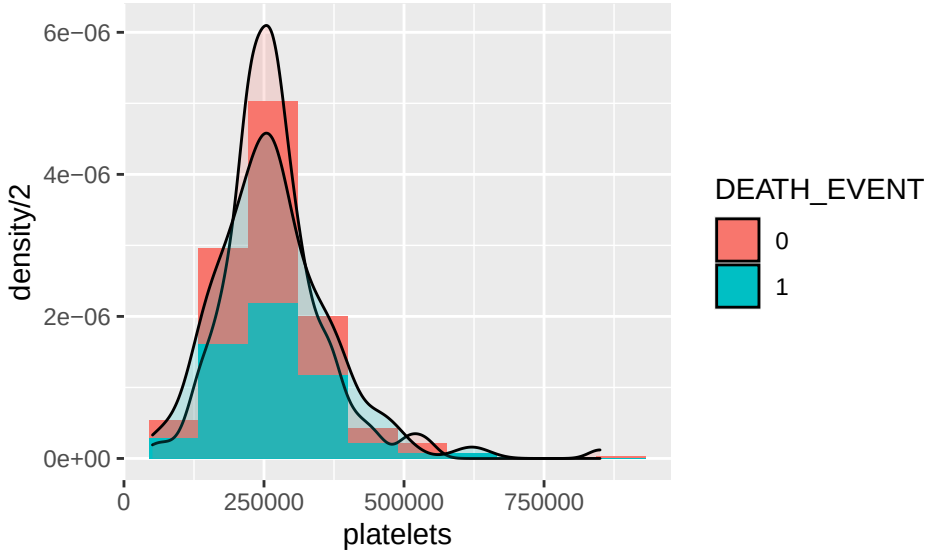
2.2.6 High blood pressure

Patients that die seem to have high blood pressure more often than patients that are dismissed from hospital, as shown in the following percent stacked barchart. The difference is rather small, as expected based on the correlation heatmap.



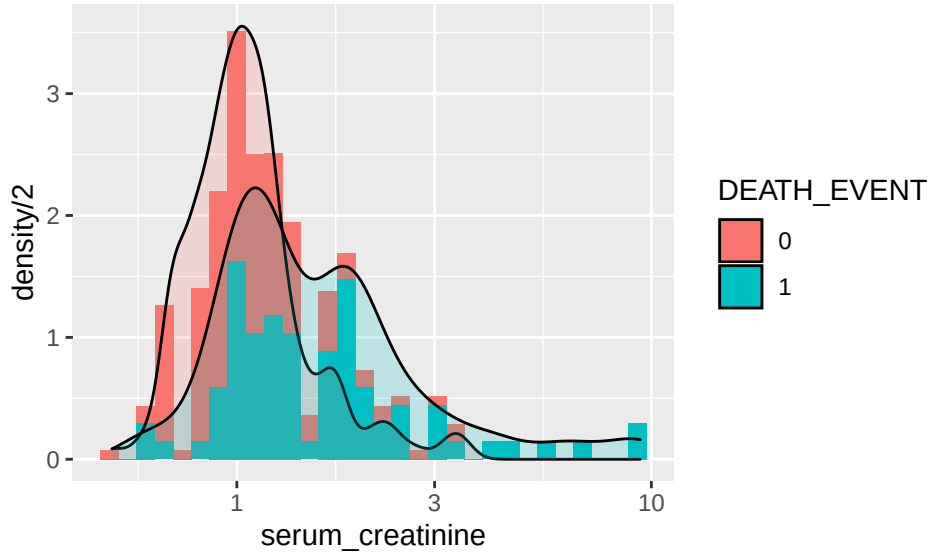
2.2.7 Platelets

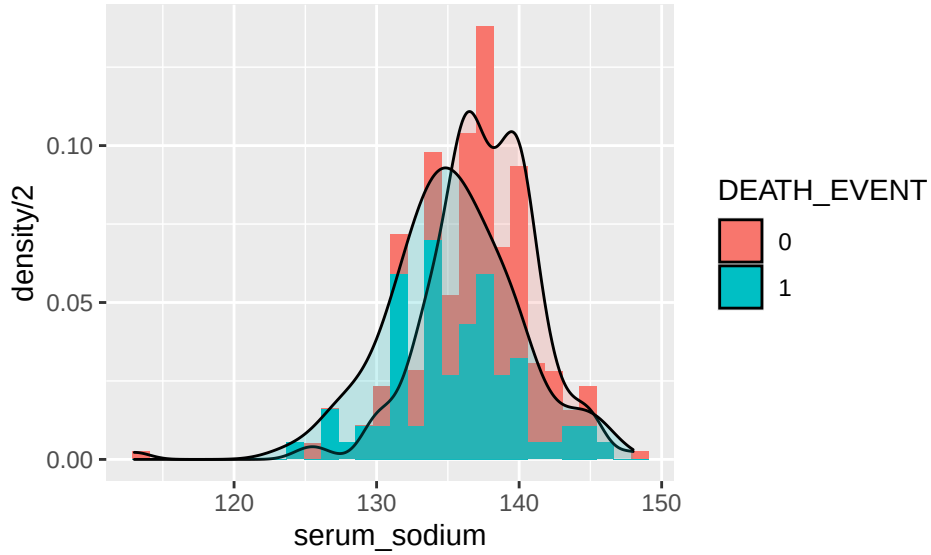
There is no difference in platelets levels for both patient groups, as shown in the following histogram with overlayed density curves.



2.2.8 Serum creatinine and Serum sodium

For serum creatinine and serum sodium considerable correlation was shown in the heatmap. The following histograms with overlayed density curves confirm that higher levels of creatinine in sserum and lower levels of sodium in serum correspond to more often cases of patient mortality.



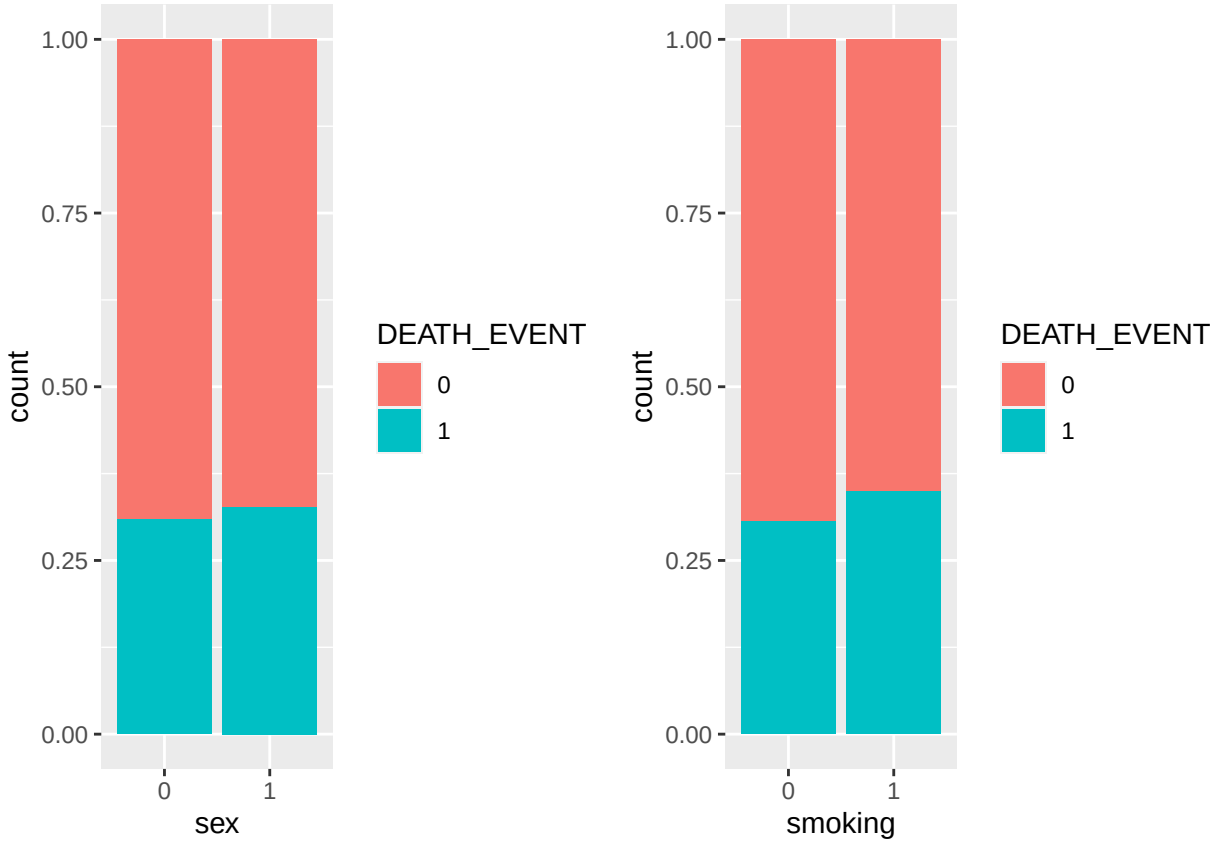


2.2.9 Sex and smoking

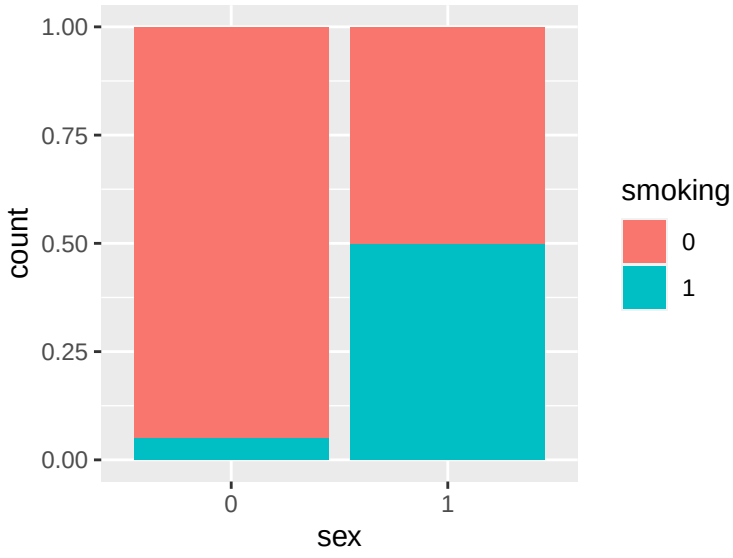
Sex and smoking were shown to have a low correlation with patients mortality. As can be seen, there is no significant difference between men and women to die from heart failure, whereas between smoking patients there were more death cases than between non-smoking patients, what can be generally expected.

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```



Interestingly, there is a high correlation between sex and smoking, as shown in the following plot. Based on it, one might deduce which sex is presented as "0" and which as "1".



2.2.10 Findings

2.3 Algorithms

Prediction of patients' mortality (binary outcome) based on several predictors presents a typical classification problem. Machine learning algorithms that will be used in this project are as following:

- Naive Bayes
- Logistic regression
- K-nearest neighbors
- Support vector machine (SVM)
  - Linear
  - Radial
  - Polynomial
- Decision tree
- Bagged decision tree
- Boosted decision tree
- Random forest
- Artificial neural network (ANN)

The algorithms were chosen to represent simple as well as more sophisticated methods. Their performance will be compared based on the selected metric. Additionally, an ensemble model considering prediction of all said models will be tried out.

2.4 Performance evaluation

As it was shown before, the dataset includes about 70% of negative outcomes and 30% of positive outcomes. This means that the data is imbalanced, and it is not recommended to use the accuracy metric for model evaluation, since it might show relatively high values for obviosuly bad predictions. For example, should all outcomes in the train set be predicted as negative, the accuracy would still be as high as 0.683:

```
pred_neg <- c(1, rep(0, nrow(train) - 1))
pred_neg <- factor(pred_neg)
levels(pred_neg) = c("No","Yes")
cm_neg <- confusionMatrix(pred_neg, train$DEATH_EVENT, mode = "everything", positive = "Yes")
cm_neg$overall["Accuracy"]
```

```
##  Accuracy
## 0.6833333
```

Alternatively, F1-score will be used as suggested by numerous sources (e.g. as summarized in [this article](https://towardsdatascience.com/metrics-for-imbalanced-classification-41c71549bbb5)). Death event will be used as a "positive" outcome since it is more important for the prediction — the cost of the mistake might be patients death. A false positive is less crucial in this sense. For the above example, the F1-score is only 0.0256:

```
cm_neg$byClass["F1"]
```

```
##         F1
## 0.02564103
```

10-fold cross-validation will be used for model training. The final model evaluation will be performed with the test set.

3 Results

3.1 Preparations

caret package will be used for model training and evaluation. Since there is no build-in function for training on F1-score, the necessary function is written first.

```
f1 <- function(data, lev = NULL, model = NULL) {
  f1_val <- MLmetrics::F1_Score(y_pred = data$pred,
                                y_true = data$obs,
                                # level 2 ("Yes") will be used as positive level
                                positive = lev[2])
  c(F1 = f1_val)
}
```

With the *trainControl* function the training method — 10-fold cross-validation — and the metric — F1-score — are defined:

```
fitControl <- trainControl(method = "cv",
                           number = 10,
                           p = 0.9,
                           classProbs = TRUE,
                           summaryFunction = f1)
```

The following function will be used to quickly try several algorithms. It will take a vector of methods to train and a list algorithm parameters and will return a list containing trained models, confusion matrices and a dataframe with selected metrics calculated for the train set (F1-score, accuracy and specificity).

```
calc_model <- function(method, tuneGrid) {
  set.seed(3)
  fit <- train(DEATH_EVENT ~., # all features will be considered first
               data = train,
               method = method,
               metric = "F1",
               trControl = fitControl,
               tuneGrid = tuneGrid)
  # F1-score for the train set will be used to evaluate models prior to evaluation
  # based on the test set
  F1_train <- max(fit$results$F1, na.rm = TRUE)
  # Prediction for the train set
  pred <- predict(fit, train)
  cm <- confusionMatrix(pred, train$DEATH_EVENT, mode = "everything", positive = "Yes")
  accuracy <- cm$overall["Accuracy"]
  F1 <- cm$byClass["F1"]
  results <- list()
  # The functions returns a list of trained models, confusion matrices and a dataframe with metrics
  results[[1]] <- fit
  results[[2]] <- cm
  results[[3]] <- data.frame(method = method, F1_train = F1_train, F1 = F1, accuracy = accuracy)
  return(results)
}
```

The following list includes all tuning parameters for training. Later in the chapter graphical representation of tuning will be used to reassess the choice of parameters.

```
tuneGrids <- list()

tuneGrids[[1]] <- expand.grid(fL = seq(0, 5, 1),
                              usekernel = c(TRUE, FALSE),
                              adjust = seq(0, 5, 1))

tuneGrids[2] <- list(NULL)

tuneGrids[[3]] <- data.frame(k = seq(1, 99, 2))

tuneGrids[[4]] <- data.frame(C = seq(0.5, 10, 0.5))

tuneGrids[5] <- list(NULL)

tuneGrids[6] <- list(NULL)

tuneGrids[[7]] <- data.frame(cp = seq(0, 0.05, len = 10))

tuneGrids[8] <- list(NULL)

tuneGrids[[9]] <- data.frame(nIter = seq(1, 19, 2),
                             method = "M1")

tuneGrids[[10]] <- data.frame(mtry = seq(1, 11, 1))

tuneGrids[[11]] <- expand.grid(size = seq(1, 10, 1),
               decay = seq(1, 10, 1))
```

3.2 Model training

The models are trained using the defined parameters and the resulting metrics are saved as a dataframe. The F1-score obtained in the cross-validation is opposed to the F1-score and accuracy calculated using the trained model for the train set. As can be seen, the F1-score values of the cross-validation are lower for all methods, especially for the bagged and boosted classification trees and random forest algorithms, what indicates overtraining. In the following, the trained models will be considered separately.

```
methods <- c("nb", "glm", "knn", "svmLinear", "svmRadial", "svmPoly", "rpart", "treebag", "adaboost", "
all_models <- mapply(calc_model, methods, tuneGrids)
```

```
## # weights:  14
## initial  value 146.220522
## iter  10 value 118.618854
## iter  20 value 118.449706
## final  value 118.449666
## converged
## # weights:  27
## initial  value 158.432125
## iter  10 value 115.216435
## iter  20 value 113.347213
## iter  30 value 113.308187
## final  value 113.308034
```

```
## converged
## # weights:  40
## initial  value 246.828551
## iter  10 value 115.178745
## iter  20 value 111.160282
## iter  30 value 111.039037
## iter  40 value 111.027033
## final  value 111.026926
## converged
## # weights:  53
## initial  value 180.686280
## iter  10 value 111.825642
## iter  20 value 110.608537
## iter  30 value 110.572118
## final  value 110.571643
## converged
## # weights:  66
## initial  value 164.501220
## iter  10 value 114.388069
## iter  20 value 110.702876
## iter  30 value 110.613643
## iter  40 value 110.604910
## iter  50 value 110.604623
## final  value 110.604620
## converged
## # weights:  79
## initial  value 164.151130
## iter  10 value 111.451287
## iter  20 value 110.043155
## iter  30 value 110.027232
## final  value 110.025935
## converged
## # weights:  92
## initial  value 181.376610
## iter  10 value 110.772312
## iter  20 value 109.962417
## iter  30 value 109.906332
## iter  40 value 109.898615
## final  value 109.898485
## converged
## # weights:  105
## initial  value 177.049011
## iter  10 value 115.835301
## iter  20 value 109.918976
## iter  30 value 109.847658
## iter  40 value 109.840931
## iter  50 value 109.839938
## final  value 109.839931
## converged
## # weights:  118
## initial  value 174.678621
## iter  10 value 110.018604
## iter  20 value 109.677696
## iter  30 value 109.638508
```

```
## iter  40 value 109.635776
## final  value 109.635646
## converged
## # weights:  131
## initial  value 156.973647
## iter  10 value 110.176533
## iter  20 value 109.615411
## iter  30 value 109.542220
## iter  40 value 109.537468
## iter  50 value 109.537236
## final  value 109.537223
## converged
## # weights:  14
## initial  value 157.108072
## iter  10 value 126.725770
## iter  20 value 124.892406
## final  value 124.865809
## converged
## # weights:  27
## initial  value 158.909590
## iter  10 value 125.529505
## iter  20 value 122.845498
## iter  30 value 122.763549
## final  value 122.763477
## converged
## # weights:  40
## initial  value 153.710394
## iter  10 value 122.124082
## iter  20 value 121.199486
## iter  30 value 121.198697
## final  value 121.198694
## converged
## # weights:  53
## initial  value 221.538409
## iter  10 value 121.141434
## iter  20 value 120.631244
## iter  30 value 120.627812
## final  value 120.627787
## converged
## # weights:  66
## initial  value 160.841783
## iter  10 value 123.028158
## iter  20 value 120.963266
## iter  30 value 120.946899
## iter  40 value 120.946166
## final  value 120.946156
## converged
## # weights:  79
## initial  value 286.487652
## iter  10 value 120.762235
## iter  20 value 119.941657
## iter  30 value 119.902428
## iter  40 value 119.899731
## final  value 119.899727
```

```
## converged
## # weights:  92
## initial  value 173.450196
## iter  10 value 120.396647
## iter  20 value 119.764512
## iter  30 value 119.743177
## final  value 119.742884
## converged
## # weights:  105
## initial  value 204.304568
## iter  10 value 121.766220
## iter  20 value 119.623371
## iter  30 value 119.540920
## iter  40 value 119.536458
## iter  50 value 119.536259
## iter  50 value 119.536258
## iter  50 value 119.536258
## final  value 119.536258
## converged
## # weights:  118
## initial  value 205.702415
## iter  10 value 121.027135
## iter  20 value 119.756057
## iter  30 value 119.746369
## iter  40 value 119.493827
## iter  50 value 119.466976
## iter  60 value 119.466560
## final  value 119.466542
## converged
## # weights:  131
## initial  value 211.534770
## iter  10 value 120.063904
## iter  20 value 119.462666
## iter  30 value 119.452304
## iter  40 value 119.451996
## iter  40 value 119.451995
## iter  40 value 119.451995
## final  value 119.451995
## converged
## # weights:  14
## initial  value 144.470229
## iter  10 value 130.504500
## iter  20 value 130.287318
## final  value 130.286920
## converged
## # weights:  27
## initial  value 248.662783
## iter  10 value 130.738993
## iter  20 value 128.985777
## iter  30 value 128.975824
## iter  30 value 128.975823
## iter  30 value 128.975822
## final  value 128.975822
## converged
```

```
## # weights:  40
## initial  value 181.756223
## iter  10 value 129.698866
## iter  20 value 129.401259
## iter  30 value 129.400319
## final  value 129.400316
## converged
## # weights:  53
## initial  value 311.194424
## iter  10 value 128.848408
## iter  20 value 127.717748
## iter  30 value 127.716269
## final  value 127.716263
## converged
## # weights:  66
## initial  value 176.745138
## iter  10 value 128.666337
## iter  20 value 127.121764
## iter  30 value 127.025017
## final  value 127.024707
## converged
## # weights:  79
## initial  value 187.386726
## iter  10 value 127.545517
## iter  20 value 126.706541
## iter  30 value 126.697756
## final  value 126.697749
## converged
## # weights:  92
## initial  value 199.435376
## iter  10 value 128.425987
## iter  20 value 126.582123
## iter  30 value 126.541525
## final  value 126.541418
## converged
## # weights:  105
## initial  value 208.139545
## iter  10 value 126.873959
## iter  20 value 126.401077
## iter  30 value 126.399729
## final  value 126.399710
## converged
## # weights:  118
## initial  value 214.178791
## iter  10 value 127.654080
## iter  20 value 126.408548
## iter  30 value 126.362262
## final  value 126.362093
## converged
## # weights:  131
## initial  value 217.860434
## iter  10 value 127.387867
## iter  20 value 126.221898
## iter  30 value 126.209292
```

```
## final  value 126.209250
## converged
## # weights:  14
## initial  value 155.621808
## iter  10 value 133.810073
## iter  20 value 133.585085
## final  value 133.584712
## converged
## # weights:  27
## initial  value 161.181267
## iter  10 value 133.847369
## iter  20 value 133.439724
## final  value 133.439535
## converged
## # weights:  40
## initial  value 208.394715
## iter  10 value 132.966184
## iter  20 value 132.420400
## iter  30 value 132.416793
## iter  30 value 132.416792
## iter  30 value 132.416792
## final  value 132.416792
## converged
## # weights:  53
## initial  value 174.972187
## iter  10 value 132.425834
## iter  20 value 131.711912
## iter  30 value 131.710055
## final  value 131.710048
## converged
## # weights:  66
## initial  value 187.150923
## iter  10 value 131.847354
## iter  20 value 131.646248
## iter  30 value 131.644281
## final  value 131.644276
## converged
## # weights:  79
## initial  value 274.062623
## iter  10 value 133.347080
## iter  20 value 131.506361
## iter  30 value 131.361639
## final  value 131.360637
## converged
## # weights:  92
## initial  value 200.199904
## iter  10 value 132.160987
## iter  20 value 131.259031
## iter  30 value 131.221605
## iter  40 value 131.220199
## final  value 131.220185
## converged
## # weights:  105
## initial  value 232.132656
```

```
## iter  10 value 131.530132
## iter  20 value 131.161010
## iter  30 value 131.159237
## final  value 131.159231
## converged
## # weights:  118
## initial  value 198.999225
## iter  10 value 131.321544
## iter  20 value 131.141246
## iter  30 value 131.136344
## final  value 131.136291
## converged
## # weights:  131
## initial  value 381.244355
## iter  10 value 136.906150
## iter  20 value 131.183164
## iter  30 value 131.028897
## iter  40 value 131.025168
## final  value 131.025149
## converged
## # weights:  14
## initial  value 148.453756
## iter  10 value 135.666966
## iter  20 value 135.662185
## iter  20 value 135.662185
## iter  20 value 135.662184
## final  value 135.662184
## converged
## # weights:  27
## initial  value 170.933827
## iter  10 value 135.800310
## iter  20 value 134.917189
## iter  30 value 134.913113
## final  value 134.913108
## converged
## # weights:  40
## initial  value 180.814599
## iter  10 value 135.039049
## iter  20 value 134.920008
## iter  30 value 134.919209
## final  value 134.919157
## converged
## # weights:  53
## initial  value 183.522724
## iter  10 value 135.230216
## iter  20 value 134.594869
## iter  30 value 134.560938
## final  value 134.560718
## converged
## # weights:  66
## initial  value 214.350683
## iter  10 value 134.566838
## iter  20 value 134.400133
## final  value 134.398770
```

```
## converged
## # weights:  79
## initial  value 221.180861
## iter  10 value 134.967786
## iter  20 value 134.370315
## iter  30 value 134.335435
## final  value 134.334547
## converged
## # weights:  92
## initial  value 293.643171
## iter  10 value 134.981004
## iter  20 value 134.273754
## iter  30 value 134.268506
## final  value 134.268473
## converged
## # weights:  105
## initial  value 269.008112
## iter  10 value 136.917758
## iter  20 value 134.416889
## iter  30 value 134.230784
## iter  40 value 134.211058
## final  value 134.210800
## converged
## # weights:  118
## initial  value 254.542598
## iter  10 value 134.633714
## iter  20 value 134.188653
## iter  30 value 134.186891
## final  value 134.186878
## converged
## # weights:  131
## initial  value 269.057165
## iter  10 value 135.160334
## iter  20 value 134.189874
## iter  30 value 134.178099
## iter  40 value 134.177562
## final  value 134.177531
## converged
## # weights:  14
## initial  value 222.325071
## iter  10 value 137.115230
## iter  20 value 137.000637
## final  value 137.000565
## converged
## # weights:  27
## initial  value 172.352162
## iter  10 value 136.725807
## iter  20 value 136.367677
## iter  30 value 136.358587
## iter  30 value 136.358587
## iter  30 value 136.358587
## final  value 136.358587
## converged
## # weights:  40
```

```
## initial  value 198.960864
## iter  10 value 136.527499
## iter  20 value 136.108925
## iter  30 value 136.106385
## final  value 136.106361
## converged
## # weights:  53
## initial  value 189.374389
## iter  10 value 136.354552
## iter  20 value 136.007636
## final  value 136.007365
## converged
## # weights:  66
## initial  value 219.799148
## iter  10 value 136.119487
## iter  20 value 135.981892
## iter  30 value 135.977043
## final  value 135.977039
## converged
## # weights:  79
## initial  value 216.982494
## iter  10 value 136.230421
## iter  20 value 135.966920
## iter  30 value 135.964919
## final  value 135.964911
## converged
## # weights:  92
## initial  value 233.212182
## iter  10 value 136.156068
## iter  20 value 135.937321
## final  value 135.935400
## converged
## # weights:  105
## initial  value 257.599397
## iter  10 value 139.318842
## iter  20 value 135.992289
## iter  30 value 135.936717
## iter  40 value 135.936231
## iter  50 value 135.935978
## iter  50 value 135.935978
## iter  50 value 135.935978
## final  value 135.935978
## converged
## # weights:  118
## initial  value 291.666946
## iter  10 value 136.540533
## iter  20 value 135.923533
## iter  30 value 135.913832
## final  value 135.913748
## converged
## # weights:  131
## initial  value 257.916225
## iter  10 value 136.624136
## iter  20 value 135.926281
```

```
## iter  30 value 135.900530
## final  value 135.900266
## converged
## # weights:  14
## initial  value 150.082635
## iter  10 value 138.021185
## iter  20 value 137.887957
## iter  20 value 137.887956
## final  value 137.887954
## converged
## # weights:  27
## initial  value 181.907771
## iter  10 value 137.353571
## iter  20 value 137.288686
## final  value 137.288607
## converged
## # weights:  40
## initial  value 200.673977
## iter  10 value 137.227209
## iter  20 value 136.987528
## final  value 136.987470
## converged
## # weights:  53
## initial  value 212.707843
## iter  10 value 140.457304
## iter  20 value 136.855557
## iter  30 value 136.817128
## final  value 136.817115
## converged
## # weights:  66
## initial  value 221.105041
## iter  10 value 145.173363
## iter  20 value 136.795780
## iter  30 value 136.713238
## final  value 136.713211
## converged
## # weights:  79
## initial  value 234.439985
## iter  10 value 136.872198
## iter  20 value 136.646472
## iter  30 value 136.646213
## final  value 136.646187
## converged
## # weights:  92
## initial  value 323.271912
## iter  10 value 137.208395
## iter  20 value 136.608662
## iter  30 value 136.600984
## final  value 136.600962
## converged
## # weights:  105
## initial  value 283.195571
## iter  10 value 138.540137
## iter  20 value 136.591972
```

```
## iter  30 value 136.569461
## final  value 136.569285
## converged
## # weights:  118
## initial  value 285.628545
## iter  10 value 160.649694
## iter  20 value 136.879858
## iter  30 value 136.577871
## iter  40 value 136.546780
## final  value 136.546365
## converged
## # weights:  131
## initial  value 277.091682
## iter  10 value 138.034435
## iter  20 value 136.590395
## iter  30 value 136.530205
## final  value 136.529336
## converged
## # weights:  14
## initial  value 160.781782
## iter  10 value 138.775093
## iter  20 value 138.507670
## iter  20 value 138.507669
## iter  20 value 138.507669
## final  value 138.507669
## converged
## # weights:  27
## initial  value 175.866874
## iter  10 value 138.763966
## iter  20 value 137.922633
## final  value 137.922510
## converged
## # weights:  40
## initial  value 181.105357
## iter  10 value 137.981144
## iter  20 value 137.583222
## final  value 137.583039
## converged
## # weights:  53
## initial  value 294.330911
## iter  10 value 137.635696
## iter  20 value 137.363908
## final  value 137.363763
## converged
## # weights:  66
## initial  value 225.229702
## iter  10 value 140.264781
## iter  20 value 137.230501
## iter  30 value 137.211939
## final  value 137.211927
## converged
## # weights:  79
## initial  value 271.526298
## iter  10 value 137.307354
```

```
## iter  20 value 137.102413
## final  value 137.101365
## converged
## # weights:  92
## initial  value 307.956424
## iter  10 value 137.160254
## iter  20 value 137.019896
## iter  30 value 137.017697
## final  value 137.017692
## converged
## # weights:  105
## initial  value 281.923827
## iter  10 value 141.344765
## iter  20 value 136.998262
## iter  30 value 136.952543
## final  value 136.952399
## converged
## # weights:  118
## initial  value 300.738252
## iter  10 value 137.442181
## iter  20 value 136.903622
## iter  30 value 136.900165
## iter  30 value 136.900164
## final  value 136.900163
## converged
## # weights:  131
## initial  value 311.718939
## iter  10 value 147.818753
## iter  20 value 136.994645
## iter  30 value 136.865881
## iter  40 value 136.857531
## final  value 136.857502
## converged
## # weights:  14
## initial  value 159.090746
## iter  10 value 139.193504
## iter  20 value 138.973976
## final  value 138.973956
## converged
## # weights:  27
## initial  value 176.620000
## iter  10 value 138.451533
## final  value 138.392553
## converged
## # weights:  40
## initial  value 196.674181
## iter  10 value 141.821087
## iter  20 value 138.029969
## final  value 138.025735
## converged
## # weights:  53
## initial  value 267.762869
## iter  10 value 138.001080
## iter  20 value 137.774584
```

```
## final  value 137.773077
## converged
## # weights:  66
## initial  value 219.428251
## iter  10 value 139.237617
## iter  20 value 137.596773
## final  value 137.588772
## converged
## # weights:  79
## initial  value 256.124189
## iter  10 value 138.082419
## iter  20 value 137.448925
## final  value 137.448639
## converged
## # weights:  92
## initial  value 283.798061
## iter  10 value 138.175921
## iter  20 value 137.339514
## final  value 137.338657
## converged
## # weights:  105
## initial  value 311.772502
## iter  10 value 141.194849
## iter  20 value 137.259758
## iter  30 value 137.250144
## iter  30 value 137.250143
## iter  30 value 137.250143
## final  value 137.250143
## converged
## # weights:  118
## initial  value 366.407715
## iter  10 value 138.814505
## iter  20 value 137.193884
## iter  30 value 137.177437
## final  value 137.177428
## converged
## # weights:  131
## initial  value 363.916900
## iter  10 value 137.395576
## iter  20 value 137.117624
## iter  30 value 137.116673
## final  value 137.116669
## converged
## # weights:  14
## initial  value 210.406199
## iter  10 value 139.383599
## final  value 139.352095
## converged
## # weights:  27
## initial  value 178.516026
## iter  10 value 138.849802
## final  value 138.770088
## converged
## # weights:  40
```

```
## initial  value 247.260809
## iter  10 value 138.525744
## final  value 138.382801
## converged
## # weights:  53
## initial  value 280.414777
## iter  10 value 138.277962
## iter  20 value 138.106193
## final  value 138.105619
## converged
## # weights:  66
## initial  value 270.586262
## iter  10 value 141.007472
## iter  20 value 137.977756
## iter  30 value 137.897337
## final  value 137.897332
## converged
## # weights:  79
## initial  value 262.039908
## iter  10 value 141.103038
## iter  20 value 137.759992
## iter  30 value 137.735150
## final  value 137.735139
## converged
## # weights:  92
## initial  value 412.574480
## iter  10 value 137.693846
## iter  20 value 137.606426
## final  value 137.605308
## converged
## # weights:  105
## initial  value 381.507488
## iter  10 value 137.889715
## iter  20 value 137.504445
## iter  30 value 137.499085
## iter  30 value 137.499084
## iter  30 value 137.499084
## final  value 137.499084
## converged
## # weights:  118
## initial  value 346.637261
## iter  10 value 141.300297
## iter  20 value 137.456277
## iter  30 value 137.410848
## final  value 137.410595
## converged
## # weights:  131
## initial  value 339.396807
## iter  10 value 138.012327
## iter  20 value 137.337480
## final  value 137.335758
## converged
## # weights:  14
## initial  value 141.280211
```

```
## iter  10 value 117.283431
## iter  20 value 114.986905
## final  value 114.980240
## converged
## # weights:  27
## initial  value 141.608608
## iter  10 value 114.749072
## iter  20 value 113.011267
## iter  30 value 112.975990
## final  value 112.975730
## converged
## # weights:  40
## initial  value 153.132877
## iter  10 value 117.732651
## iter  20 value 110.999772
## iter  30 value 110.764430
## iter  40 value 110.757787
## iter  50 value 110.757594
## iter  50 value 110.757593
## iter  50 value 110.757593
## final  value 110.757593
## converged
## # weights:  53
## initial  value 243.858167
## iter  10 value 114.168340
## iter  20 value 110.584043
## iter  30 value 110.441724
## iter  40 value 110.428208
## final  value 110.427552
## converged
## # weights:  66
## initial  value 153.331514
## iter  10 value 110.874468
## iter  20 value 109.948809
## iter  30 value 109.921390
## iter  40 value 109.919608
## final  value 109.919385
## converged
## # weights:  79
## initial  value 216.589380
## iter  10 value 110.591837
## iter  20 value 109.864917
## iter  30 value 109.800752
## iter  40 value 109.796932
## final  value 109.796855
## converged
## # weights:  92
## initial  value 153.676122
## iter  10 value 110.788746
## iter  20 value 109.521071
## iter  30 value 109.474618
## iter  40 value 109.472314
## final  value 109.472253
## converged
```

```
## # weights:  105
## initial  value 154.043414
## iter  10 value 111.428929
## iter  20 value 109.549048
## iter  30 value 109.445712
## iter  40 value 109.436693
## iter  50 value 109.436192
## final  value 109.436159
## converged
## # weights:  118
## initial  value 175.944965
## iter  10 value 123.503259
## iter  20 value 109.597913
## iter  30 value 109.285466
## iter  40 value 109.228226
## iter  50 value 109.219226
## iter  60 value 109.217471
## iter  70 value 109.217111
## final  value 109.217098
## converged
## # weights:  131
## initial  value 184.568329
## iter  10 value 116.406312
## iter  20 value 109.243842
## iter  30 value 109.154580
## iter  40 value 109.114527
## iter  50 value 109.109720
## final  value 109.109503
## converged
## # weights:  14
## initial  value 148.611963
## iter  10 value 127.271640
## iter  20 value 124.707449
## final  value 124.702271
## converged
## # weights:  27
## initial  value 151.376741
## iter  10 value 123.358182
## iter  20 value 122.863430
## final  value 122.861485
## converged
## # weights:  40
## initial  value 146.465923
## iter  10 value 121.508809
## iter  20 value 120.929716
## iter  30 value 120.927404
## final  value 120.927359
## converged
## # weights:  53
## initial  value 158.571484
## iter  10 value 122.205993
## iter  20 value 120.311232
## iter  30 value 120.284368
## final  value 120.284239
```

```
## converged
## # weights:  66
## initial  value 165.329095
## iter  10 value 122.577809
## iter  20 value 119.921637
## iter  30 value 119.883289
## iter  40 value 119.882685
## iter  40 value 119.882684
## iter  40 value 119.882684
## final  value 119.882684
## converged
## # weights:  79
## initial  value 182.361936
## iter  10 value 120.374239
## iter  20 value 119.507688
## iter  30 value 119.504321
## final  value 119.504309
## converged
## # weights:  92
## initial  value 172.263377
## iter  10 value 120.263856
## iter  20 value 119.313121
## iter  30 value 119.311443
## final  value 119.311432
## converged
## # weights:  105
## initial  value 189.989259
## iter  10 value 121.513461
## iter  20 value 119.127894
## iter  30 value 119.104496
## final  value 119.103869
## converged
## # weights:  118
## initial  value 166.989514
## iter  10 value 120.755215
## iter  20 value 119.345453
## iter  30 value 119.038510
## iter  40 value 119.032732
## final  value 119.032615
## converged
## # weights:  131
## initial  value 176.532344
## iter  10 value 119.246634
## iter  20 value 118.855962
## iter  30 value 118.853154
## final  value 118.853112
## converged
## # weights:  14
## initial  value 141.286119
## iter  10 value 130.302321
## iter  20 value 130.128465
## final  value 130.128308
## converged
## # weights:  27
```

```
## initial  value 174.197288
## iter  10 value 129.407146
## iter  20 value 129.090739
## final  value 129.090355
## converged
## # weights:  40
## initial  value 177.988876
## iter  10 value 129.604740
## iter  20 value 129.170262
## iter  30 value 129.167375
## final  value 129.167372
## converged
## # weights:  53
## initial  value 193.206434
## iter  10 value 129.182303
## iter  20 value 127.396006
## iter  30 value 127.390828
## final  value 127.390799
## converged
## # weights:  66
## initial  value 171.459589
## iter  10 value 127.397796
## iter  20 value 126.634071
## final  value 126.631359
## converged
## # weights:  79
## initial  value 198.462420
## iter  10 value 127.324284
## iter  20 value 126.611703
## iter  30 value 126.544759
## iter  40 value 126.542344
## iter  40 value 126.542343
## iter  40 value 126.542343
## final  value 126.542343
## converged
## # weights:  92
## initial  value 203.852003
## iter  10 value 127.101648
## iter  20 value 126.181890
## iter  30 value 126.165120
## final  value 126.165054
## converged
## # weights:  105
## initial  value 182.988862
## iter  10 value 126.084699
## iter  20 value 125.913885
## final  value 125.913050
## converged
## # weights:  118
## initial  value 215.561266
## iter  10 value 127.417650
## iter  20 value 125.828815
## iter  30 value 125.768092
## final  value 125.767820
```

```
## converged
## # weights:  131
## initial  value 234.882016
## iter  10 value 126.839015
## iter  20 value 125.740165
## iter  30 value 125.691139
## final  value 125.690915
## converged
## # weights:  14
## initial  value 149.822065
## iter  10 value 134.661837
## iter  20 value 133.459490
## final  value 133.419653
## converged
## # weights:  27
## initial  value 176.612251
## iter  10 value 132.755347
## iter  20 value 132.346476
## final  value 132.345049
## converged
## # weights:  40
## initial  value 162.363537
## iter  10 value 132.329147
## iter  20 value 132.068229
## final  value 132.067510
## converged
## # weights:  53
## initial  value 181.615342
## iter  10 value 131.910394
## iter  20 value 131.319273
## iter  30 value 131.315632
## iter  30 value 131.315632
## iter  30 value 131.315632
## final  value 131.315632
## converged
## # weights:  66
## initial  value 178.291466
## iter  10 value 131.627233
## iter  20 value 131.084998
## iter  30 value 131.082477
## final  value 131.082472
## converged
## # weights:  79
## initial  value 201.863748
## iter  10 value 132.916991
## iter  20 value 131.108595
## iter  30 value 130.896953
## iter  40 value 130.896514
## iter  40 value 130.896513
## iter  40 value 130.896513
## final  value 130.896513
## converged
## # weights:  92
## initial  value 230.505767
```

```
## iter  10 value 131.665807
## iter  20 value 130.743543
## iter  30 value 130.722032
## final  value 130.722012
## converged
## # weights:  105
## initial  value 277.778141
## iter  10 value 132.827650
## iter  20 value 130.807609
## iter  30 value 130.649875
## final  value 130.648718
## converged
## # weights:  118
## initial  value 244.595020
## iter  10 value 131.189787
## iter  20 value 130.634354
## iter  30 value 130.526830
## iter  40 value 130.518022
## final  value 130.517942
## converged
## # weights:  131
## initial  value 216.381822
## iter  10 value 131.362325
## iter  20 value 130.519649
## iter  30 value 130.476409
## iter  40 value 130.442783
## final  value 130.442521
## converged
## # weights:  14
## initial  value 167.190353
## iter  10 value 135.604695
## iter  20 value 135.500568
## final  value 135.500519
## converged
## # weights:  27
## initial  value 157.788701
## iter  10 value 134.753711
## iter  20 value 134.656882
## final  value 134.656861
## converged
## # weights:  40
## initial  value 209.405296
## iter  10 value 134.821530
## iter  20 value 134.634809
## iter  30 value 134.633545
## iter  30 value 134.633544
## iter  30 value 134.633544
## final  value 134.633544
## converged
## # weights:  53
## initial  value 204.806058
## iter  10 value 134.616385
## iter  20 value 134.198544
## final  value 134.197554
```

```
## converged
## # weights:  66
## initial  value 190.223991
## iter  10 value 134.313680
## iter  20 value 134.003981
## iter  30 value 133.992612
## final  value 133.992589
## converged
## # weights:  79
## initial  value 217.782948
## iter  10 value 134.155157
## iter  20 value 133.906063
## final  value 133.902816
## converged
## # weights:  92
## initial  value 212.044558
## iter  10 value 133.985386
## iter  20 value 133.876278
## final  value 133.875011
## converged
## # weights:  105
## initial  value 248.561439
## iter  10 value 133.994858
## iter  20 value 133.733207
## iter  30 value 133.731339
## final  value 133.731331
## converged
## # weights:  118
## initial  value 265.778394
## iter  10 value 134.304852
## iter  20 value 133.705267
## iter  30 value 133.694585
## final  value 133.694392
## converged
## # weights:  131
## initial  value 228.191869
## iter  10 value 134.592904
## iter  20 value 133.636406
## iter  30 value 133.630039
## final  value 133.630015
## converged
## # weights:  14
## initial  value 150.845318
## iter  10 value 136.871070
## iter  20 value 136.854435
## final  value 136.854419
## converged
## # weights:  27
## initial  value 186.836480
## iter  10 value 136.264378
## iter  20 value 136.139102
## final  value 136.139026
## converged
## # weights:  40
```

```
## initial  value 219.698657
## iter  10 value 136.271191
## iter  20 value 135.852491
## iter  30 value 135.850564
## final  value 135.850556
## converged
## # weights:  53
## initial  value 183.157225
## iter  10 value 136.664244
## iter  20 value 135.749277
## iter  30 value 135.736755
## final  value 135.736713
## converged
## # weights:  66
## initial  value 233.821409
## iter  10 value 136.087946
## iter  20 value 135.715051
## iter  30 value 135.704464
## final  value 135.704419
## converged
## # weights:  79
## initial  value 214.210517
## iter  10 value 135.863066
## iter  20 value 135.649713
## final  value 135.648638
## converged
## # weights:  92
## initial  value 254.298287
## iter  10 value 135.948704
## iter  20 value 135.616121
## iter  30 value 135.604931
## final  value 135.604819
## converged
## # weights:  105
## initial  value 247.333547
## iter  10 value 135.965761
## iter  20 value 135.603623
## iter  30 value 135.593991
## final  value 135.593836
## converged
## # weights:  118
## initial  value 271.164176
## iter  10 value 137.283424
## iter  20 value 135.598070
## iter  30 value 135.558609
## final  value 135.556996
## converged
## # weights:  131
## initial  value 350.834593
## iter  10 value 138.817089
## iter  20 value 135.653318
## iter  30 value 135.555415
## iter  40 value 135.553939
## iter  40 value 135.553938
```

```
## iter  40 value 135.553937
## final  value 135.553937
## converged
## # weights:  14
## initial  value 167.664771
## iter  10 value 137.938121
## iter  20 value 137.766008
## final  value 137.765949
## converged
## # weights:  27
## initial  value 218.523109
## iter  10 value 137.444307
## iter  20 value 137.113812
## final  value 137.113769
## converged
## # weights:  40
## initial  value 188.001414
## iter  10 value 137.032944
## iter  20 value 136.791866
## iter  30 value 136.791110
## final  value 136.791102
## converged
## # weights:  53
## initial  value 215.405080
## iter  10 value 136.760059
## iter  20 value 136.618016
## iter  30 value 136.615260
## final  value 136.615259
## converged
## # weights:  66
## initial  value 204.135868
## iter  10 value 136.831591
## iter  20 value 136.516848
## final  value 136.514309
## converged
## # weights:  79
## initial  value 263.157297
## iter  10 value 137.341811
## iter  20 value 136.475073
## iter  30 value 136.454630
## final  value 136.454529
## converged
## # weights:  92
## initial  value 276.098499
## iter  10 value 136.715122
## iter  20 value 136.426270
## final  value 136.418509
## converged
## # weights:  105
## initial  value 275.328933
## iter  10 value 136.914648
## iter  20 value 136.407477
## iter  30 value 136.396694
## iter  30 value 136.396693
```

```
## final  value 136.396690
## converged
## # weights:  118
## initial  value 259.746902
## iter  10 value 140.835725
## iter  20 value 136.584821
## iter  30 value 136.401255
## iter  40 value 136.383634
## final  value 136.383586
## converged
## # weights:  131
## initial  value 282.049548
## iter  10 value 136.448910
## iter  20 value 136.378246
## final  value 136.375947
## converged
## # weights:  14
## initial  value 179.385331
## iter  10 value 138.567515
## iter  20 value 138.412019
## final  value 138.411899
## converged
## # weights:  27
## initial  value 174.608145
## iter  10 value 138.018098
## iter  20 value 137.789078
## final  value 137.789075
## converged
## # weights:  40
## initial  value 227.200511
## iter  10 value 137.738272
## iter  20 value 137.435841
## final  value 137.435834
## converged
## # weights:  53
## initial  value 202.657162
## iter  10 value 138.543487
## iter  20 value 137.217176
## final  value 137.214022
## converged
## # weights:  66
## initial  value 235.916770
## iter  10 value 137.583450
## iter  20 value 137.066648
## final  value 137.065102
## converged
## # weights:  79
## initial  value 241.952779
## iter  10 value 137.135971
## iter  20 value 136.960373
## final  value 136.960029
## converged
## # weights:  92
## initial  value 338.887068
```

```
## iter  10 value 137.324100
## iter  20 value 136.886177
## iter  30 value 136.882907
## iter  30 value 136.882907
## iter  30 value 136.882906
## final  value 136.882906
## converged
## # weights:  105
## initial  value 280.114455
## iter  10 value 143.302389
## iter  20 value 137.037851
## iter  30 value 136.825226
## iter  40 value 136.824449
## iter  40 value 136.824448
## iter  40 value 136.824447
## final  value 136.824447
## converged
## # weights:  118
## initial  value 319.401296
## iter  10 value 137.133015
## iter  20 value 136.779093
## final  value 136.778923
## converged
## # weights:  131
## initial  value 349.371584
## iter  10 value 141.732404
## iter  20 value 136.972542
## iter  30 value 136.743868
## iter  40 value 136.742656
## iter  40 value 136.742656
## iter  40 value 136.742656
## final  value 136.742656
## converged
## # weights:  14
## initial  value 153.862193
## iter  10 value 138.985167
## final  value 138.900911
## converged
## # weights:  27
## initial  value 169.324252
## iter  10 value 138.437443
## iter  20 value 138.291418
## final  value 138.291398
## converged
## # weights:  40
## initial  value 213.424115
## iter  10 value 144.258001
## iter  20 value 137.920454
## final  value 137.914215
## converged
## # weights:  53
## initial  value 230.302344
## iter  10 value 141.811240
## iter  20 value 137.687585
```

```
## final  value 137.659334
## converged
## # weights:  66
## initial  value 282.349951
## iter  10 value 137.780216
## iter  20 value 137.477762
## final  value 137.476729
## converged
## # weights:  79
## initial  value 391.558885
## iter  10 value 138.161091
## iter  20 value 137.344092
## iter  30 value 137.340161
## iter  30 value 137.340160
## iter  30 value 137.340160
## final  value 137.340160
## converged
## # weights:  92
## initial  value 301.341376
## iter  10 value 138.112253
## iter  20 value 137.240188
## final  value 137.234562
## converged
## # weights:  105
## initial  value 373.005489
## iter  10 value 138.044540
## iter  20 value 137.155467
## iter  30 value 137.150693
## final  value 137.150687
## converged
## # weights:  118
## initial  value 323.218251
## iter  10 value 137.534884
## iter  20 value 137.082886
## final  value 137.082597
## converged
## # weights:  131
## initial  value 331.513184
## iter  10 value 138.335764
## iter  20 value 137.028637
## final  value 137.026298
## converged
## # weights:  14
## initial  value 164.509780
## iter  10 value 139.330373
## iter  20 value 139.296317
## iter  20 value 139.296316
## iter  20 value 139.296316
## final  value 139.296316
## converged
## # weights:  27
## initial  value 180.022127
## iter  10 value 138.736817
## final  value 138.692157
```

```
## converged
## # weights:  40
## initial  value 253.800182
## iter  10 value 139.218561
## iter  20 value 138.298017
## final  value 138.296145
## converged
## # weights:  53
## initial  value 212.610903
## iter  10 value 138.323398
## iter  20 value 138.020130
## final  value 138.016490
## converged
## # weights:  66
## initial  value 316.742105
## iter  10 value 137.877445
## iter  20 value 137.809008
## final  value 137.808819
## converged
## # weights:  79
## initial  value 399.242269
## iter  10 value 138.891280
## iter  20 value 137.654345
## final  value 137.648778
## converged
## # weights:  92
## initial  value 288.849191
## iter  10 value 147.187021
## iter  20 value 137.587751
## iter  30 value 137.522143
## final  value 137.521849
## converged
## # weights:  105
## initial  value 314.864107
## iter  10 value 137.694972
## iter  20 value 137.419332
## final  value 137.418887
## converged
## # weights:  118
## initial  value 350.478387
## iter  10 value 139.811230
## iter  20 value 137.382861
## iter  30 value 137.333638
## final  value 137.333592
## converged
## # weights:  131
## initial  value 339.902254
## iter  10 value 137.710897
## iter  20 value 137.264739
## final  value 137.261968
## converged
## # weights:  14
## initial  value 142.533023
## iter  10 value 117.528974
```

```
## iter  20 value 113.711854
## final  value 113.569660
## converged
## # weights:  27
## initial  value 154.642500
## iter  10 value 112.110163
## iter  20 value 111.615542
## iter  30 value 111.609488
## final  value 111.609481
## converged
## # weights:  40
## initial  value 145.945194
## iter  10 value 113.874874
## iter  20 value 110.564566
## iter  30 value 110.340494
## iter  40 value 110.335950
## final  value 110.335882
## converged
## # weights:  53
## initial  value 174.120887
## iter  10 value 110.512547
## iter  20 value 109.037434
## iter  30 value 109.020761
## iter  40 value 109.020500
## iter  50 value 109.002879
## iter  60 value 108.997298
## final  value 108.997296
## converged
## # weights:  66
## initial  value 194.026727
## iter  10 value 110.050556
## iter  20 value 108.854198
## iter  30 value 108.712935
## iter  40 value 108.698171
## final  value 108.698111
## converged
## # weights:  79
## initial  value 177.377204
## iter  10 value 110.105396
## iter  20 value 108.383256
## iter  30 value 108.237389
## iter  40 value 108.231600
## iter  50 value 108.231077
## final  value 108.231039
## converged
## # weights:  92
## initial  value 192.867763
## iter  10 value 109.217583
## iter  20 value 108.244193
## iter  30 value 108.075510
## iter  40 value 108.073686
## final  value 108.073611
## converged
## # weights:  105
```

```
## initial  value 150.742889
## iter  10 value 108.636985
## iter  20 value 108.057677
## iter  30 value 108.022192
## iter  40 value 108.021547
## final  value 108.021532
## converged
## # weights:  118
## initial  value 168.422832
## iter  10 value 108.573204
## iter  20 value 107.946111
## iter  30 value 107.840373
## iter  40 value 107.831959
## iter  50 value 107.831165
## iter  50 value 107.831164
## iter  50 value 107.831164
## final  value 107.831164
## converged
## # weights:  131
## initial  value 181.762676
## iter  10 value 111.252033
## iter  20 value 107.967288
## iter  30 value 107.831506
## iter  40 value 107.807470
## iter  50 value 107.803200
## final  value 107.803056
## converged
## # weights:  14
## initial  value 152.579868
## iter  10 value 128.491053
## iter  20 value 128.251013
## final  value 128.250917
## converged
## # weights:  27
## initial  value 179.618004
## iter  10 value 128.208976
## iter  20 value 128.000311
## final  value 128.000270
## converged
## # weights:  40
## initial  value 156.141412
## iter  10 value 122.261034
## iter  20 value 120.873088
## iter  30 value 119.637939
## iter  40 value 119.634662
## final  value 119.634647
## converged
## # weights:  53
## initial  value 174.069115
## iter  10 value 119.624634
## iter  20 value 119.314234
## final  value 119.314199
## converged
## # weights:  66
```

```
## initial  value 180.748937
## iter  10 value 119.105353
## iter  20 value 118.579196
## iter  30 value 118.569769
## final  value 118.569681
## converged
## # weights:  79
## initial  value 169.853158
## iter  10 value 119.223335
## iter  20 value 118.471361
## iter  30 value 118.470418
## final  value 118.470413
## converged
## # weights:  92
## initial  value 213.517863
## iter  10 value 118.507597
## iter  20 value 118.030936
## iter  30 value 118.023307
## final  value 118.023296
## converged
## # weights:  105
## initial  value 382.577945
## iter  10 value 120.988812
## iter  20 value 117.926051
## iter  30 value 117.800625
## iter  40 value 117.795658
## final  value 117.795584
## converged
## # weights:  118
## initial  value 193.726317
## iter  10 value 118.222709
## iter  20 value 117.692472
## iter  30 value 117.657827
## final  value 117.657396
## converged
## # weights:  131
## initial  value 200.037525
## iter  10 value 121.884796
## iter  20 value 117.734220
## iter  30 value 117.607911
## iter  40 value 117.545901
## iter  50 value 117.539984
## final  value 117.539706
## converged
## # weights:  14
## initial  value 141.309118
## iter  10 value 129.094481
## iter  20 value 129.000270
## final  value 129.000232
## converged
## # weights:  27
## initial  value 144.783402
## iter  10 value 127.621927
## iter  20 value 127.565829
```

```
## final  value 127.565774
## converged
## # weights:  40
## initial  value 154.945937
## iter  10 value 127.242878
## iter  20 value 126.296938
## final  value 126.293696
## converged
## # weights:  53
## initial  value 186.343686
## iter  10 value 128.412127
## iter  20 value 125.715400
## iter  30 value 125.676344
## final  value 125.676112
## converged
## # weights:  66
## initial  value 197.975574
## iter  10 value 128.245039
## iter  20 value 125.587809
## iter  30 value 125.423152
## final  value 125.422590
## converged
## # weights:  79
## initial  value 237.963322
## iter  10 value 126.384936
## iter  20 value 125.372915
## iter  30 value 125.360832
## final  value 125.360788
## converged
## # weights:  92
## initial  value 276.422686
## iter  10 value 128.337596
## iter  20 value 125.032206
## iter  30 value 124.917626
## iter  40 value 124.914404
## final  value 124.914355
## converged
## # weights:  105
## initial  value 246.295628
## iter  10 value 133.652909
## iter  20 value 124.693854
## iter  30 value 124.663010
## iter  40 value 124.662262
## final  value 124.662252
## converged
## # weights:  118
## initial  value 206.764921
## iter  10 value 127.526530
## iter  20 value 124.624591
## iter  30 value 124.611297
## final  value 124.611076
## converged
## # weights:  131
## initial  value 197.969843
```

```
## iter  10 value 124.541621
## iter  20 value 124.433862
## iter  30 value 124.430919
## final  value 124.430910
## converged
## # weights:  14
## initial  value 171.083116
## iter  10 value 133.317970
## iter  20 value 132.310467
## final  value 132.304043
## converged
## # weights:  27
## initial  value 164.604983
## iter  10 value 131.521162
## iter  20 value 131.212731
## iter  30 value 131.211390
## iter  30 value 131.211389
## iter  30 value 131.211389
## final  value 131.211389
## converged
## # weights:  40
## initial  value 195.495134
## iter  10 value 130.786624
## iter  20 value 130.695645
## final  value 130.695542
## converged
## # weights:  53
## initial  value 237.779145
## iter  10 value 132.618047
## iter  20 value 130.172371
## iter  30 value 130.142630
## final  value 130.142585
## converged
## # weights:  66
## initial  value 187.347947
## iter  10 value 130.314780
## iter  20 value 129.906618
## final  value 129.905418
## converged
## # weights:  79
## initial  value 282.144556
## iter  10 value 130.748832
## iter  20 value 129.831685
## iter  30 value 129.818442
## final  value 129.818431
## converged
## # weights:  92
## initial  value 207.015524
## iter  10 value 130.210291
## iter  20 value 129.674274
## iter  30 value 129.670959
## final  value 129.670929
## converged
## # weights:  105
```

```
## initial  value 279.945969
## iter  10 value 131.258620
## iter  20 value 129.452178
## iter  30 value 129.436312
## final  value 129.436203
## converged
## # weights:  118
## initial  value 257.330092
## iter  10 value 132.885400
## iter  20 value 129.364745
## iter  30 value 129.309753
## final  value 129.309635
## converged
## # weights:  131
## initial  value 292.309642
## iter  10 value 131.055747
## iter  20 value 129.445470
## iter  30 value 129.281746
## iter  40 value 129.268138
## final  value 129.268090
## converged
## # weights:  14
## initial  value 152.745082
## iter  10 value 134.683063
## iter  20 value 134.393592
## final  value 134.390203
## converged
## # weights:  27
## initial  value 156.807273
## iter  10 value 133.737390
## iter  20 value 133.524934
## final  value 133.524885
## converged
## # weights:  40
## initial  value 187.848543
## iter  10 value 133.780839
## iter  20 value 133.249366
## final  value 133.248022
## converged
## # weights:  53
## initial  value 201.101973
## iter  10 value 133.158969
## iter  20 value 133.047867
## final  value 133.047495
## converged
## # weights:  66
## initial  value 187.008366
## iter  10 value 133.267591
## iter  20 value 133.065119
## final  value 133.063744
## converged
## # weights:  79
## initial  value 224.057737
## iter  10 value 133.003530
```

```
## iter  20 value 132.745257
## iter  30 value 132.741863
## final  value 132.741844
## converged
## # weights:  92
## initial  value 214.286936
## iter  10 value 133.066842
## iter  20 value 132.655643
## iter  30 value 132.644144
## final  value 132.644045
## converged
## # weights:  105
## initial  value 238.998005
## iter  10 value 133.214228
## iter  20 value 132.579295
## iter  30 value 132.561658
## final  value 132.561612
## converged
## # weights:  118
## initial  value 231.610336
## iter  10 value 133.039688
## iter  20 value 132.562246
## iter  30 value 132.522724
## iter  40 value 132.521663
## final  value 132.521655
## converged
## # weights:  131
## initial  value 256.538351
## iter  10 value 137.906994
## iter  20 value 132.743762
## iter  30 value 132.528488
## iter  40 value 132.474010
## iter  50 value 132.454767
## final  value 132.454544
## converged
## # weights:  14
## initial  value 171.336353
## iter  10 value 135.803604
## iter  20 value 135.755025
## final  value 135.755020
## converged
## # weights:  27
## initial  value 171.803380
## iter  10 value 135.191872
## iter  20 value 135.017663
## final  value 135.017578
## converged
## # weights:  40
## initial  value 172.665906
## iter  10 value 134.869706
## iter  20 value 134.717714
## final  value 134.717482
## converged
## # weights:  53
```

```
## initial  value 207.194670
## iter  10 value 134.946542
## iter  20 value 134.665200
## iter  30 value 134.596622
## final  value 134.596382
## converged
## # weights:  66
## initial  value 230.811960
## iter  10 value 134.786575
## iter  20 value 134.564602
## iter  30 value 134.559505
## final  value 134.559482
## converged
## # weights:  79
## initial  value 230.580419
## iter  10 value 140.221909
## iter  20 value 134.551081
## iter  30 value 134.505793
## final  value 134.505149
## converged
## # weights:  92
## initial  value 255.532108
## iter  10 value 134.734853
## iter  20 value 134.474073
## iter  30 value 134.458580
## final  value 134.458450
## converged
## # weights:  105
## initial  value 261.702633
## iter  10 value 134.733402
## iter  20 value 134.464563
## iter  30 value 134.447409
## final  value 134.447340
## converged
## # weights:  118
## initial  value 259.568096
## iter  10 value 137.509120
## iter  20 value 134.501507
## iter  30 value 134.453595
## iter  40 value 134.433265
## iter  50 value 134.408425
## final  value 134.408321
## converged
## # weights:  131
## initial  value 421.400590
## iter  10 value 136.996283
## iter  20 value 134.452573
## iter  30 value 134.399102
## iter  40 value 134.385611
## final  value 134.385600
## converged
## # weights:  14
## initial  value 172.603596
## iter  10 value 136.892465
```

```
## iter  20 value 136.682992
## final  value 136.682272
## converged
## # weights:  27
## initial  value 208.543580
## iter  10 value 136.169618
## iter  20 value 136.008680
## final  value 136.008434
## converged
## # weights:  40
## initial  value 196.234095
## iter  10 value 136.115841
## iter  20 value 135.678081
## iter  30 value 135.674180
## iter  30 value 135.674180
## iter  30 value 135.674179
## final  value 135.674179
## converged
## # weights:  53
## initial  value 254.879421
## iter  10 value 135.847512
## iter  20 value 135.496355
## iter  30 value 135.491249
## final  value 135.491243
## converged
## # weights:  66
## initial  value 227.107027
## iter  10 value 144.223772
## iter  20 value 137.831515
## iter  30 value 135.465790
## iter  40 value 135.385827
## final  value 135.385678
## converged
## # weights:  79
## initial  value 233.249292
## iter  10 value 137.204835
## iter  20 value 135.353171
## final  value 135.322794
## converged
## # weights:  92
## initial  value 263.723834
## iter  10 value 135.395462
## iter  20 value 135.289456
## iter  30 value 135.284651
## final  value 135.284646
## converged
## # weights:  105
## initial  value 286.273746
## iter  10 value 135.725011
## iter  20 value 135.273812
## iter  30 value 135.261365
## final  value 135.261351
## converged
## # weights:  118
```

```
## initial  value 347.610679
## iter  10 value 143.085742
## iter  20 value 135.397143
## iter  30 value 135.265301
## iter  40 value 135.247279
## final  value 135.247220
## converged
## # weights:  131
## initial  value 287.809872
## iter  10 value 139.754033
## iter  20 value 135.400437
## iter  30 value 135.246124
## iter  40 value 135.239357
## final  value 135.238852
## converged
## # weights:  14
## initial  value 165.785212
## iter  10 value 137.405914
## iter  20 value 137.345171
## final  value 137.345168
## converged
## # weights:  27
## initial  value 210.071558
## iter  10 value 137.480462
## iter  20 value 136.701272
## final  value 136.700917
## converged
## # weights:  40
## initial  value 191.447619
## iter  10 value 136.516022
## iter  20 value 136.335654
## final  value 136.335641
## converged
## # weights:  53
## initial  value 289.289833
## iter  10 value 136.366335
## iter  20 value 136.107853
## final  value 136.106117
## converged
## # weights:  66
## initial  value 227.312798
## iter  10 value 139.427871
## iter  20 value 136.010246
## iter  30 value 135.951924
## final  value 135.951895
## converged
## # weights:  79
## initial  value 232.013643
## iter  10 value 137.107985
## iter  20 value 135.878385
## iter  30 value 135.843000
## final  value 135.842997
## converged
## # weights:  92
```

```
## initial  value 355.745639
## iter  10 value 136.080575
## iter  20 value 135.763795
## iter  30 value 135.763029
## final  value 135.763020
## converged
## # weights:  105
## initial  value 302.368175
## iter  10 value 136.015157
## iter  20 value 135.706191
## iter  30 value 135.702369
## iter  30 value 135.702368
## iter  30 value 135.702368
## final  value 135.702368
## converged
## # weights:  118
## initial  value 281.874827
## iter  10 value 143.485042
## iter  20 value 135.795645
## iter  30 value 135.655749
## final  value 135.655123
## converged
## # weights:  131
## initial  value 311.850896
## iter  10 value 137.330819
## iter  20 value 135.622395
## iter  30 value 135.617477
## iter  30 value 135.617476
## iter  30 value 135.617476
## final  value 135.617476
## converged
## # weights:  14
## initial  value 156.946425
## iter  10 value 137.957916
## iter  20 value 137.850033
## iter  20 value 137.850033
## iter  20 value 137.850033
## final  value 137.850033
## converged
## # weights:  27
## initial  value 180.452839
## iter  10 value 137.355437
## iter  20 value 137.219193
## final  value 137.219107
## converged
## # weights:  40
## initial  value 211.261239
## iter  10 value 137.169184
## iter  20 value 136.829310
## final  value 136.829173
## converged
## # weights:  53
## initial  value 225.603064
## iter  10 value 138.876695
```

```
## iter  20 value 136.576018
## final  value 136.565733
## converged
## # weights:  66
## initial  value 241.120280
## iter  10 value 139.332127
## iter  20 value 136.417416
## iter  30 value 136.376976
## final  value 136.376968
## converged
## # weights:  79
## initial  value 307.166319
## iter  10 value 136.519813
## iter  20 value 136.236010
## final  value 136.235756
## converged
## # weights:  92
## initial  value 286.619443
## iter  10 value 136.283028
## iter  20 value 136.127503
## iter  30 value 136.126542
## iter  30 value 136.126541
## iter  30 value 136.126541
## final  value 136.126541
## converged
## # weights:  105
## initial  value 307.717886
## iter  10 value 145.265070
## iter  20 value 136.192891
## iter  30 value 136.040316
## final  value 136.039769
## converged
## # weights:  118
## initial  value 344.082517
## iter  10 value 142.637873
## iter  20 value 136.203217
## iter  30 value 135.973561
## iter  40 value 135.969316
## final  value 135.969310
## converged
## # weights:  131
## initial  value 363.267399
## iter  10 value 136.459943
## iter  20 value 135.917079
## iter  30 value 135.911061
## final  value 135.911041
## converged
## # weights:  14
## initial  value 205.299502
## iter  10 value 138.363677
## final  value 138.259484
## converged
## # weights:  27
## initial  value 250.188807
```

```
## iter  10 value 137.693094
## iter  20 value 137.633846
## final  value 137.633839
## converged
## # weights:  40
## initial  value 195.776989
## iter  10 value 139.194457
## iter  20 value 137.233687
## final  value 137.224360
## converged
## # weights:  53
## initial  value 250.401085
## iter  10 value 137.198718
## iter  20 value 136.935510
## final  value 136.935320
## converged
## # weights:  66
## initial  value 296.798202
## iter  10 value 136.820059
## iter  20 value 136.722020
## final  value 136.720688
## converged
## # weights:  79
## initial  value 287.616136
## iter  10 value 148.067888
## iter  20 value 136.687682
## iter  30 value 136.555633
## final  value 136.555258
## converged
## # weights:  92
## initial  value 299.008049
## iter  10 value 139.174523
## iter  20 value 136.450378
## iter  30 value 136.424030
## final  value 136.424024
## converged
## # weights:  105
## initial  value 346.978568
## iter  10 value 140.838674
## iter  20 value 136.424065
## iter  30 value 136.319522
## final  value 136.317493
## converged
## # weights:  118
## initial  value 328.407812
## iter  10 value 142.419053
## iter  20 value 136.353641
## iter  30 value 136.229498
## final  value 136.229338
## converged
## # weights:  131
## initial  value 328.490095
## iter  10 value 136.477530
## iter  20 value 136.155780
```

```
## final  value 136.155246
## converged
## # weights:  14
## initial  value 143.093138
## iter  10 value 114.723938
## iter  20 value 113.902351
## final  value 113.900769
## converged
## # weights:  27
## initial  value 177.653513
## iter  10 value 113.164704
## iter  20 value 111.178083
## iter  30 value 111.151093
## final  value 111.150832
## converged
## # weights:  40
## initial  value 140.857234
## iter  10 value 110.779792
## iter  20 value 110.033412
## iter  30 value 109.998420
## final  value 109.998079
## converged
## # weights:  53
## initial  value 143.893933
## iter  10 value 110.118232
## iter  20 value 109.629812
## iter  30 value 109.626951
## final  value 109.626694
## converged
## # weights:  66
## initial  value 148.325717
## iter  10 value 111.028893
## iter  20 value 109.442432
## iter  30 value 109.407301
## final  value 109.406465
## converged
## # weights:  79
## initial  value 149.581849
## iter  10 value 110.296408
## iter  20 value 108.945319
## iter  30 value 108.918859
## iter  40 value 108.917324
## final  value 108.917314
## converged
## # weights:  92
## initial  value 207.019867
## iter  10 value 109.644910
## iter  20 value 108.824361
## iter  30 value 108.809410
## iter  40 value 108.808167
## final  value 108.808145
## converged
## # weights:  105
## initial  value 158.050472
```

```
## iter  10 value 109.502166
## iter  20 value 108.762437
## iter  30 value 108.734312
## iter  40 value 108.699849
## iter  50 value 108.698590
## iter  50 value 108.698589
## final  value 108.698578
## converged
## # weights:  118
## initial  value 157.985164
## iter  10 value 110.920201
## iter  20 value 108.686411
## iter  30 value 108.552073
## iter  40 value 108.528374
## iter  50 value 108.526556
## iter  50 value 108.526556
## iter  50 value 108.526556
## final  value 108.526556
## converged
## # weights:  131
## initial  value 163.985908
## iter  10 value 109.721986
## iter  20 value 108.531255
## iter  30 value 108.432328
## iter  40 value 108.424937
## final  value 108.424243
## converged
## # weights:  14
## initial  value 152.539368
## iter  10 value 123.489199
## iter  20 value 123.416335
## final  value 123.416304
## converged
## # weights:  27
## initial  value 150.077897
## iter  10 value 128.267496
## iter  20 value 127.884936
## final  value 127.881982
## converged
## # weights:  40
## initial  value 207.871498
## iter  10 value 121.025233
## iter  20 value 119.807162
## iter  30 value 119.794822
## final  value 119.794807
## converged
## # weights:  53
## initial  value 202.345014
## iter  10 value 121.667716
## iter  20 value 121.410056
## iter  30 value 121.403644
## final  value 121.403524
## converged
## # weights:  66
```

```
## initial  value 171.196248
## iter  10 value 119.605153
## iter  20 value 118.824648
## iter  30 value 118.816966
## final  value 118.816943
## converged
## # weights:  79
## initial  value 270.905484
## iter  10 value 124.241259
## iter  20 value 118.537681
## iter  30 value 118.496162
## iter  40 value 118.494811
## final  value 118.494778
## converged
## # weights:  92
## initial  value 195.091844
## iter  10 value 119.387641
## iter  20 value 118.350803
## iter  30 value 118.335257
## final  value 118.335150
## converged
## # weights:  105
## initial  value 205.828566
## iter  10 value 118.745892
## iter  20 value 118.127684
## iter  30 value 118.123075
## final  value 118.123000
## converged
## # weights:  118
## initial  value 166.701790
## iter  10 value 118.587579
## iter  20 value 118.175094
## iter  30 value 118.044906
## iter  40 value 118.043852
## iter  40 value 118.043851
## iter  40 value 118.043851
## final  value 118.043851
## converged
## # weights:  131
## initial  value 257.691501
## iter  10 value 121.274699
## iter  20 value 117.997670
## iter  30 value 117.947239
## iter  40 value 117.946344
## final  value 117.946323
## converged
## # weights:  14
## initial  value 160.329014
## iter  10 value 129.566298
## iter  20 value 128.770074
## final  value 128.769618
## converged
## # weights:  27
## initial  value 146.787894
```

```
## iter  10 value 128.098884
## iter  20 value 127.751406
## final  value 127.751032
## converged
## # weights:  40
## initial  value 161.433450
## iter  10 value 127.019798
## iter  20 value 126.252996
## final  value 126.248787
## converged
## # weights:  53
## initial  value 167.465563
## iter  10 value 126.670806
## iter  20 value 125.691966
## iter  30 value 125.686322
## final  value 125.686316
## converged
## # weights:  66
## initial  value 169.780805
## iter  10 value 126.768003
## iter  20 value 125.461436
## iter  30 value 125.428755
## final  value 125.428568
## converged
## # weights:  79
## initial  value 182.485826
## iter  10 value 125.612427
## iter  20 value 125.094027
## iter  30 value 125.092244
## final  value 125.092235
## converged
## # weights:  92
## initial  value 229.637461
## iter  10 value 126.148252
## iter  20 value 124.999348
## iter  30 value 124.996118
## final  value 124.996112
## converged
## # weights:  105
## initial  value 232.535008
## iter  10 value 126.969699
## iter  20 value 125.060949
## iter  30 value 124.781543
## iter  40 value 124.772685
## final  value 124.772664
## converged
## # weights:  118
## initial  value 219.534134
## iter  10 value 125.471405
## iter  20 value 124.652651
## iter  30 value 124.647699
## final  value 124.647681
## converged
## # weights:  131
```

```
## initial  value 195.448971
## iter  10 value 125.341693
## iter  20 value 124.576533
## iter  30 value 124.567780
## final  value 124.567704
## converged
## # weights:  14
## initial  value 179.309808
## iter  10 value 132.438543
## iter  20 value 132.011660
## final  value 132.011391
## converged
## # weights:  27
## initial  value 148.793372
## iter  10 value 131.276714
## iter  20 value 130.990169
## final  value 130.989983
## converged
## # weights:  40
## initial  value 209.706399
## iter  10 value 130.940718
## iter  20 value 130.521693
## final  value 130.521103
## converged
## # weights:  53
## initial  value 280.271257
## iter  10 value 130.912915
## iter  20 value 130.208492
## iter  30 value 130.014211
## iter  40 value 130.012951
## iter  40 value 130.012950
## iter  40 value 130.012950
## final  value 130.012950
## converged
## # weights:  66
## initial  value 186.074561
## iter  10 value 130.140400
## iter  20 value 129.803904
## iter  30 value 129.802349
## iter  30 value 129.802349
## iter  30 value 129.802349
## final  value 129.802349
## converged
## # weights:  79
## initial  value 193.014101
## iter  10 value 133.021115
## iter  20 value 129.642604
## iter  30 value 129.619149
## final  value 129.619090
## converged
## # weights:  92
## initial  value 254.854111
## iter  10 value 129.948640
## iter  20 value 129.465973
```

```
## iter  30 value 129.461688
## final  value 129.461682
## converged
## # weights:  105
## initial  value 213.932085
## iter  10 value 130.535304
## iter  20 value 129.430089
## iter  30 value 129.389264
## final  value 129.388427
## converged
## # weights:  118
## initial  value 221.172456
## iter  10 value 130.172464
## iter  20 value 129.281887
## iter  30 value 129.270951
## final  value 129.270746
## converged
## # weights:  131
## initial  value 233.231142
## iter  10 value 129.492768
## iter  20 value 129.235391
## iter  30 value 129.233648
## final  value 129.233644
## converged
## # weights:  14
## initial  value 146.506452
## iter  10 value 134.086183
## iter  20 value 134.056819
## final  value 134.056741
## converged
## # weights:  27
## initial  value 170.061915
## iter  10 value 133.703312
## iter  20 value 133.240257
## final  value 133.239523
## converged
## # weights:  40
## initial  value 182.834372
## iter  10 value 133.705922
## iter  20 value 132.988329
## iter  30 value 132.986861
## final  value 132.986854
## converged
## # weights:  53
## initial  value 189.040485
## iter  10 value 133.157675
## iter  20 value 132.967156
## iter  30 value 132.947127
## final  value 132.946991
## converged
## # weights:  66
## initial  value 185.941991
## iter  10 value 132.863458
## iter  20 value 132.620111
```

```
## final  value 132.619696
## converged
## # weights:  79
## initial  value 211.054831
## iter  10 value 133.152314
## iter  20 value 132.562938
## iter  30 value 132.536676
## final  value 132.536580
## converged
## # weights:  92
## initial  value 316.766373
## iter  10 value 132.914293
## iter  20 value 132.515088
## iter  30 value 132.511535
## final  value 132.511493
## converged
## # weights:  105
## initial  value 219.543229
## iter  10 value 134.481092
## iter  20 value 132.465381
## iter  30 value 132.442728
## iter  40 value 132.442222
## final  value 132.442210
## converged
## # weights:  118
## initial  value 255.975415
## iter  10 value 133.294424
## iter  20 value 132.360385
## iter  30 value 132.344913
## final  value 132.344842
## converged
## # weights:  131
## initial  value 247.757624
## iter  10 value 132.745821
## iter  20 value 132.333098
## iter  30 value 132.329702
## final  value 132.329639
## converged
## # weights:  14
## initial  value 169.797716
## iter  10 value 135.471516
## iter  20 value 135.389806
## iter  20 value 135.389806
## final  value 135.389778
## converged
## # weights:  27
## initial  value 197.639160
## iter  10 value 135.147940
## iter  20 value 134.686617
## iter  30 value 134.685275
## iter  30 value 134.685274
## iter  30 value 134.685274
## final  value 134.685274
## converged
```

```
## # weights:  40
## initial  value 187.763311
## iter  10 value 134.669610
## iter  20 value 134.401281
## final  value 134.400471
## converged
## # weights:  53
## initial  value 225.910816
## iter  10 value 134.668689
## iter  20 value 134.289459
## iter  30 value 134.285537
## final  value 134.285364
## converged
## # weights:  66
## initial  value 216.820755
## iter  10 value 135.212493
## iter  20 value 134.297179
## iter  30 value 134.286511
## final  value 134.286237
## converged
## # weights:  79
## initial  value 303.308463
## iter  10 value 134.686052
## iter  20 value 134.211900
## final  value 134.209737
## converged
## # weights:  92
## initial  value 225.676041
## iter  10 value 134.338680
## iter  20 value 134.171632
## final  value 134.167208
## converged
## # weights:  105
## initial  value 250.685757
## iter  10 value 134.805790
## iter  20 value 134.179809
## iter  30 value 134.160738
## final  value 134.160610
## converged
## # weights:  118
## initial  value 252.854097
## iter  10 value 139.975962
## iter  20 value 134.227610
## iter  30 value 134.129147
## iter  40 value 134.125949
## final  value 134.125897
## converged
## # weights:  131
## initial  value 309.506472
## iter  10 value 135.570011
## iter  20 value 134.144218
## iter  30 value 134.106079
## final  value 134.105403
## converged
```

```
## # weights:  14
## initial  value 197.856173
## iter  10 value 136.568553
## iter  20 value 136.292347
## final  value 136.292329
## converged
## # weights:  27
## initial  value 182.041825
## iter  10 value 135.747510
## iter  20 value 135.642667
## final  value 135.642619
## converged
## # weights:  40
## initial  value 233.406762
## iter  10 value 135.751731
## iter  20 value 135.320012
## final  value 135.319783
## converged
## # weights:  53
## initial  value 207.578632
## iter  10 value 135.659914
## iter  20 value 135.169536
## iter  30 value 135.141789
## final  value 135.141717
## converged
## # weights:  66
## initial  value 236.837659
## iter  10 value 135.217751
## iter  20 value 135.038124
## final  value 135.037567
## converged
## # weights:  79
## initial  value 361.812713
## iter  10 value 136.372960
## iter  20 value 134.985075
## iter  30 value 134.974288
## final  value 134.974284
## converged
## # weights:  92
## initial  value 306.448892
## iter  10 value 136.207603
## iter  20 value 134.953039
## iter  30 value 134.934892
## final  value 134.934824
## converged
## # weights:  105
## initial  value 302.177619
## iter  10 value 135.109762
## iter  20 value 134.910007
## final  value 134.909802
## converged
## # weights:  118
## initial  value 304.844295
## iter  10 value 134.948139
```

```
## iter  20 value 134.894527
## iter  30 value 134.893806
## iter  30 value 134.893805
## iter  30 value 134.893804
## final  value 134.893804
## converged
## # weights:  131
## initial  value 313.952002
## iter  10 value 137.931769
## iter  20 value 134.925207
## iter  30 value 134.884017
## iter  40 value 134.883580
## final  value 134.883571
## converged
## # weights:  14
## initial  value 166.146385
## iter  10 value 136.998146
## iter  20 value 136.936736
## final  value 136.936711
## converged
## # weights:  27
## initial  value 231.664381
## iter  10 value 136.878229
## iter  20 value 136.312115
## final  value 136.311874
## converged
## # weights:  40
## initial  value 185.723898
## iter  10 value 137.178362
## iter  20 value 135.957369
## final  value 135.956579
## converged
## # weights:  53
## initial  value 259.404008
## iter  10 value 136.066246
## iter  20 value 135.733837
## iter  30 value 135.732212
## iter  30 value 135.732211
## iter  30 value 135.732211
## final  value 135.732211
## converged
## # weights:  66
## initial  value 247.857413
## iter  10 value 135.952173
## iter  20 value 135.582949
## final  value 135.580548
## converged
## # weights:  79
## initial  value 318.430489
## iter  10 value 135.879382
## iter  20 value 135.472930
## final  value 135.472764
## converged
## # weights:  92
```

```
## initial  value 251.745903
## iter  10 value 135.943580
## iter  20 value 135.394054
## final  value 135.393103
## converged
## # weights:  105
## initial  value 276.997086
## iter  10 value 136.686606
## iter  20 value 135.343018
## iter  30 value 135.332365
## final  value 135.332318
## converged
## # weights:  118
## initial  value 299.839680
## iter  10 value 140.585163
## iter  20 value 135.454809
## iter  30 value 135.285511
## final  value 135.284705
## converged
## # weights:  131
## initial  value 372.206890
## iter  10 value 136.760380
## iter  20 value 135.258552
## iter  30 value 135.246571
## final  value 135.246546
## converged
## # weights:  14
## initial  value 187.911209
## iter  10 value 137.571571
## iter  20 value 137.428097
## final  value 137.427764
## converged
## # weights:  27
## initial  value 207.902844
## iter  10 value 137.221814
## iter  20 value 136.814264
## final  value 136.813765
## converged
## # weights:  40
## initial  value 202.110809
## iter  10 value 137.030673
## iter  20 value 136.433429
## final  value 136.433377
## converged
## # weights:  53
## initial  value 222.475379
## iter  10 value 137.475937
## iter  20 value 136.175719
## final  value 136.175598
## converged
## # weights:  66
## initial  value 233.173546
## iter  10 value 139.055701
## iter  20 value 136.087157
```

```
## iter  30 value 135.990383
## final  value 135.990300
## converged
## # weights:  79
## initial  value 248.164030
## iter  10 value 151.030429
## iter  20 value 135.956152
## iter  30 value 135.851788
## final  value 135.851253
## converged
## # weights:  92
## initial  value 301.425751
## iter  10 value 135.958102
## iter  20 value 135.743749
## final  value 135.743401
## converged
## # weights:  105
## initial  value 294.555435
## iter  10 value 137.505010
## iter  20 value 135.667554
## final  value 135.657497
## converged
## # weights:  118
## initial  value 394.767788
## iter  10 value 137.295166
## iter  20 value 135.647378
## iter  30 value 135.587715
## final  value 135.587580
## converged
## # weights:  131
## initial  value 334.235304
## iter  10 value 139.734320
## iter  20 value 135.559796
## iter  30 value 135.529689
## final  value 135.529640
## converged
## # weights:  14
## initial  value 184.552546
## iter  10 value 137.924287
## iter  20 value 137.826682
## final  value 137.826589
## converged
## # weights:  27
## initial  value 182.514320
## iter  10 value 137.349087
## iter  20 value 137.216507
## final  value 137.216502
## converged
## # weights:  40
## initial  value 193.815506
## iter  10 value 137.020679
## iter  20 value 136.819310
## final  value 136.816474
## converged
```

```
## # weights:  53
## initial  value 255.872141
## iter  10 value 136.646210
## iter  20 value 136.533626
## final  value 136.533543
## converged
## # weights:  66
## initial  value 259.672795
## iter  10 value 136.699567
## iter  20 value 136.324245
## final  value 136.323034
## converged
## # weights:  79
## initial  value 263.911722
## iter  10 value 140.116173
## iter  20 value 136.174696
## iter  30 value 136.160499
## final  value 136.160490
## converged
## # weights:  92
## initial  value 274.746808
## iter  10 value 136.764362
## iter  20 value 136.033211
## iter  30 value 136.031328
## iter  30 value 136.031328
## iter  30 value 136.031328
## final  value 136.031328
## converged
## # weights:  105
## initial  value 321.315600
## iter  10 value 140.976990
## iter  20 value 136.005366
## iter  30 value 135.926373
## final  value 135.926316
## converged
## # weights:  118
## initial  value 406.797349
## iter  10 value 157.397322
## iter  20 value 136.163430
## iter  30 value 135.844305
## final  value 135.839318
## converged
## # weights:  131
## initial  value 357.355551
## iter  10 value 143.025552
## iter  20 value 135.852651
## iter  30 value 135.766389
## final  value 135.766103
## converged
## # weights:  14
## initial  value 172.287790
## iter  10 value 117.880444
## iter  20 value 117.162593
## final  value 117.155178
```

```
## converged
## # weights:  27
## initial  value 160.802714
## iter  10 value 116.256626
## iter  20 value 115.602520
## iter  30 value 115.596852
## final  value 115.596830
## converged
## # weights:  40
## initial  value 146.617570
## iter  10 value 114.592178
## iter  20 value 113.786266
## iter  30 value 113.770896
## final  value 113.770695
## converged
## # weights:  53
## initial  value 203.541376
## iter  10 value 113.600297
## iter  20 value 113.495490
## iter  30 value 113.493297
## final  value 113.493264
## converged
## # weights:  66
## initial  value 157.065035
## iter  10 value 113.394545
## iter  20 value 113.274784
## iter  30 value 113.250998
## final  value 113.250608
## converged
## # weights:  79
## initial  value 156.756697
## iter  10 value 113.394621
## iter  20 value 112.884945
## iter  30 value 112.873513
## iter  40 value 112.873065
## final  value 112.873049
## converged
## # weights:  92
## initial  value 149.884477
## iter  10 value 114.259685
## iter  20 value 113.001560
## iter  30 value 112.773167
## iter  40 value 112.753993
## iter  50 value 112.750507
## final  value 112.750292
## converged
## # weights:  105
## initial  value 151.596287
## iter  10 value 113.091734
## iter  20 value 112.738108
## iter  30 value 112.720300
## final  value 112.719508
## converged
## # weights:  118
```

```
## initial  value 174.751038
## iter  10 value 113.289367
## iter  20 value 112.738569
## iter  30 value 112.587939
## iter  40 value 112.552551
## iter  50 value 112.551370
## final  value 112.551355
## converged
## # weights:  131
## initial  value 181.920824
## iter  10 value 113.092647
## iter  20 value 112.529135
## iter  30 value 112.491708
## iter  40 value 112.491229
## final  value 112.491224
## converged
## # weights:  14
## initial  value 200.248418
## iter  10 value 127.119748
## iter  20 value 125.605098
## final  value 125.594064
## converged
## # weights:  27
## initial  value 176.448805
## iter  10 value 124.213984
## iter  20 value 123.968328
## final  value 123.967255
## converged
## # weights:  40
## initial  value 235.993381
## iter  10 value 123.552530
## iter  20 value 122.572118
## iter  30 value 122.566578
## iter  30 value 122.566577
## final  value 122.566572
## converged
## # weights:  53
## initial  value 162.347466
## iter  10 value 123.117109
## iter  20 value 122.053638
## iter  30 value 122.049125
## final  value 122.049105
## converged
## # weights:  66
## initial  value 155.679464
## iter  10 value 122.631299
## iter  20 value 122.398635
## iter  30 value 122.390950
## final  value 122.390876
## converged
## # weights:  79
## initial  value 162.603801
## iter  10 value 123.373544
## iter  20 value 121.469139
```

```
## iter  30 value 121.437031
## final  value 121.436517
## converged
## # weights:  92
## initial  value 217.877952
## iter  10 value 121.609580
## iter  20 value 121.291924
## iter  30 value 121.289298
## final  value 121.289282
## converged
## # weights:  105
## initial  value 168.667734
## iter  10 value 121.609309
## iter  20 value 121.128662
## iter  30 value 121.123978
## final  value 121.123937
## converged
## # weights:  118
## initial  value 192.795315
## iter  10 value 122.121996
## iter  20 value 121.330778
## iter  30 value 121.315778
## iter  40 value 121.315209
## final  value 121.315198
## converged
## # weights:  131
## initial  value 170.949773
## iter  10 value 121.229163
## iter  20 value 120.932375
## iter  30 value 120.928987
## final  value 120.928942
## converged
## # weights:  14
## initial  value 167.970282
## iter  10 value 130.774608
## iter  20 value 130.310949
## final  value 130.310255
## converged
## # weights:  27
## initial  value 199.309390
## iter  10 value 130.205563
## iter  20 value 129.639768
## final  value 129.639005
## converged
## # weights:  40
## initial  value 215.482745
## iter  10 value 129.911950
## iter  20 value 128.299025
## iter  30 value 128.288420
## final  value 128.288408
## converged
## # weights:  53
## initial  value 178.230636
## iter  10 value 128.432166
```

```
## iter  20 value 128.243870
## iter  30 value 128.241866
## iter  30 value 128.241866
## iter  30 value 128.241866
## final  value 128.241866
## converged
## # weights:  66
## initial  value 170.166990
## iter  10 value 127.904124
## iter  20 value 127.572540
## final  value 127.570744
## converged
## # weights:  79
## initial  value 185.126318
## iter  10 value 128.294268
## iter  20 value 127.313274
## iter  30 value 127.302087
## final  value 127.302078
## converged
## # weights:  92
## initial  value 187.984658
## iter  10 value 129.518226
## iter  20 value 127.290747
## iter  30 value 127.245633
## final  value 127.245103
## converged
## # weights:  105
## initial  value 183.924673
## iter  10 value 127.789941
## iter  20 value 127.046130
## iter  30 value 127.041723
## final  value 127.041682
## converged
## # weights:  118
## initial  value 218.920304
## iter  10 value 131.143057
## iter  20 value 127.041800
## iter  30 value 127.015926
## iter  40 value 127.015703
## iter  40 value 127.015702
## iter  40 value 127.015702
## final  value 127.015702
## converged
## # weights:  131
## initial  value 209.205742
## iter  10 value 130.180558
## iter  20 value 126.917553
## iter  30 value 126.865818
## iter  40 value 126.862681
## final  value 126.862610
## converged
## # weights:  14
## initial  value 174.301726
## iter  10 value 133.318226
```

```
## iter  20 value 133.165861
## final  value 133.165648
## converged
## # weights:  27
## initial  value 162.173681
## iter  10 value 132.604752
## iter  20 value 132.267405
## final  value 132.267354
## converged
## # weights:  40
## initial  value 173.133643
## iter  10 value 133.120539
## iter  20 value 132.024681
## final  value 132.023849
## converged
## # weights:  53
## initial  value 177.733255
## iter  10 value 131.695611
## iter  20 value 131.570904
## final  value 131.570689
## converged
## # weights:  66
## initial  value 194.855592
## iter  10 value 131.860085
## iter  20 value 131.543894
## final  value 131.543137
## converged
## # weights:  79
## initial  value 205.275130
## iter  10 value 131.640533
## iter  20 value 131.274451
## iter  30 value 131.272779
## iter  30 value 131.272778
## iter  30 value 131.272778
## final  value 131.272778
## converged
## # weights:  92
## initial  value 211.052906
## iter  10 value 131.563467
## iter  20 value 131.133039
## iter  30 value 131.131062
## final  value 131.131057
## converged
## # weights:  105
## initial  value 215.618093
## iter  10 value 131.413517
## iter  20 value 131.061098
## iter  30 value 131.059790
## final  value 131.059705
## converged
## # weights:  118
## initial  value 213.181230
## iter  10 value 131.228451
## iter  20 value 130.990935
```

```
## final  value 130.988805
## converged
## # weights:  131
## initial  value 316.176185
## iter  10 value 134.734710
## iter  20 value 131.085648
## iter  30 value 130.972689
## iter  40 value 130.970842
## final  value 130.970829
## converged
## # weights:  14
## initial  value 202.994856
## iter  10 value 135.488536
## iter  20 value 134.969680
## final  value 134.967396
## converged
## # weights:  27
## initial  value 162.303184
## iter  10 value 134.362896
## iter  20 value 134.235687
## final  value 134.235564
## converged
## # weights:  40
## initial  value 171.926744
## iter  10 value 134.151218
## iter  20 value 133.987444
## final  value 133.987060
## converged
## # weights:  53
## initial  value 216.577914
## iter  10 value 134.377098
## iter  20 value 133.946499
## iter  30 value 133.924986
## final  value 133.924641
## converged
## # weights:  66
## initial  value 197.877553
## iter  10 value 134.382180
## iter  20 value 133.790951
## iter  30 value 133.780782
## final  value 133.780768
## converged
## # weights:  79
## initial  value 200.478248
## iter  10 value 135.491883
## iter  20 value 133.726440
## iter  30 value 133.701470
## final  value 133.701381
## converged
## # weights:  92
## initial  value 240.232106
## iter  10 value 133.874900
## iter  20 value 133.678109
## final  value 133.672073
```

```
## converged
## # weights:  105
## initial  value 229.715305
## iter  10 value 134.109718
## iter  20 value 133.665880
## iter  30 value 133.609654
## iter  40 value 133.608384
## final  value 133.608357
## converged
## # weights:  118
## initial  value 239.041001
## iter  10 value 133.866944
## iter  20 value 133.579155
## iter  30 value 133.574277
## final  value 133.574242
## converged
## # weights:  131
## initial  value 270.607902
## iter  10 value 133.776413
## iter  20 value 133.554376
## iter  30 value 133.549583
## final  value 133.549561
## converged
## # weights:  14
## initial  value 181.844093
## iter  10 value 136.689381
## iter  20 value 136.142542
## final  value 136.142464
## converged
## # weights:  27
## initial  value 162.278118
## iter  10 value 135.600860
## iter  20 value 135.494861
## final  value 135.494401
## converged
## # weights:  40
## initial  value 182.340054
## iter  10 value 135.336704
## iter  20 value 135.208647
## final  value 135.208171
## converged
## # weights:  53
## initial  value 181.298415
## iter  10 value 136.147195
## iter  20 value 135.104330
## iter  30 value 135.072920
## final  value 135.072911
## converged
## # weights:  66
## initial  value 196.079128
## iter  10 value 135.421096
## iter  20 value 135.011744
## final  value 135.010340
## converged
```

```
## # weights:  79
## initial  value 254.832805
## iter  10 value 135.892048
## iter  20 value 134.997329
## iter  30 value 134.985093
## final  value 134.985021
## converged
## # weights:  92
## initial  value 237.088048
## iter  10 value 142.437996
## iter  20 value 135.216657
## iter  30 value 135.019126
## iter  40 value 134.982648
## iter  50 value 134.979450
## final  value 134.979417
## converged
## # weights:  105
## initial  value 313.050418
## iter  10 value 136.791033
## iter  20 value 135.007870
## iter  30 value 134.971179
## iter  40 value 134.963383
## iter  40 value 134.963382
## iter  40 value 134.963382
## final  value 134.963382
## converged
## # weights:  118
## initial  value 256.177496
## iter  10 value 136.211780
## iter  20 value 134.991839
## iter  30 value 134.965044
## iter  40 value 134.963265
## iter  50 value 134.951931
## final  value 134.951582
## converged
## # weights:  131
## initial  value 261.188926
## iter  10 value 135.387846
## iter  20 value 134.958353
## iter  30 value 134.949237
## final  value 134.949166
## converged
## # weights:  14
## initial  value 171.838612
## iter  10 value 137.114596
## iter  20 value 136.942771
## final  value 136.942761
## converged
## # weights:  27
## initial  value 168.235870
## iter  10 value 136.447045
## iter  20 value 136.330558
## final  value 136.330519
## converged
```

```
## # weights:  40
## initial  value 214.828295
## iter  10 value 136.190883
## iter  20 value 136.008657
## iter  30 value 136.005066
## iter  30 value 136.005066
## iter  30 value 136.005066
## final  value 136.005066
## converged
## # weights:  53
## initial  value 210.931994
## iter  10 value 136.048979
## iter  20 value 135.812223
## final  value 135.811728
## converged
## # weights:  66
## initial  value 223.027233
## iter  10 value 138.313559
## iter  20 value 135.711444
## iter  30 value 135.688600
## final  value 135.688531
## converged
## # weights:  79
## initial  value 316.443077
## iter  10 value 135.974791
## iter  20 value 135.606838
## final  value 135.605864
## converged
## # weights:  92
## initial  value 281.246158
## iter  10 value 135.926574
## iter  20 value 135.548472
## final  value 135.548058
## converged
## # weights:  105
## initial  value 263.681281
## iter  10 value 135.846153
## iter  20 value 135.507363
## final  value 135.506228
## converged
## # weights:  118
## initial  value 272.766088
## iter  10 value 135.748695
## iter  20 value 135.476726
## final  value 135.475065
## converged
## # weights:  131
## initial  value 280.896806
## iter  10 value 139.016955
## iter  20 value 135.481271
## iter  30 value 135.451558
## final  value 135.451264
## converged
## # weights:  14
```

```
## initial  value 165.088516
## iter  10 value 137.624832
## iter  20 value 137.522959
## final  value 137.522910
## converged
## # weights:  27
## initial  value 189.781764
## iter  10 value 137.247785
## iter  20 value 136.924500
## final  value 136.924076
## converged
## # weights:  40
## initial  value 202.484291
## iter  10 value 136.884506
## iter  20 value 136.567025
## final  value 136.567004
## converged
## # weights:  53
## initial  value 219.960491
## iter  10 value 136.477995
## iter  20 value 136.333703
## final  value 136.332012
## converged
## # weights:  66
## initial  value 262.971397
## iter  10 value 136.373347
## iter  20 value 136.168154
## final  value 136.167093
## converged
## # weights:  79
## initial  value 266.090509
## iter  10 value 136.212297
## iter  20 value 136.047085
## final  value 136.045847
## converged
## # weights:  92
## initial  value 328.128015
## iter  10 value 136.145924
## iter  20 value 135.953800
## final  value 135.953428
## converged
## # weights:  105
## initial  value 287.776676
## iter  10 value 136.131833
## iter  20 value 135.882008
## final  value 135.880921
## converged
## # weights:  118
## initial  value 445.236477
## iter  10 value 137.059047
## iter  20 value 135.830355
## iter  30 value 135.822684
## final  value 135.822677
## converged
```

```
## # weights:  131
## initial  value 295.456519
## iter  10 value 136.660954
## iter  20 value 135.785087
## iter  30 value 135.774981
## final  value 135.774959
## converged
## # weights:  14
## initial  value 163.688116
## iter  10 value 138.199561
## final  value 137.975118
## converged
## # weights:  27
## initial  value 166.204210
## iter  10 value 137.470547
## iter  20 value 137.379923
## final  value 137.379908
## converged
## # weights:  40
## initial  value 208.203138
## iter  10 value 137.764802
## iter  20 value 137.005231
## final  value 136.998587
## converged
## # weights:  53
## initial  value 207.201508
## iter  10 value 136.885904
## iter  20 value 136.733812
## final  value 136.733327
## converged
## # weights:  66
## initial  value 243.589893
## iter  10 value 142.585766
## iter  20 value 136.642148
## iter  30 value 136.538968
## final  value 136.538505
## converged
## # weights:  79
## initial  value 251.472354
## iter  10 value 138.548316
## iter  20 value 136.399090
## iter  30 value 136.389696
## final  value 136.389643
## converged
## # weights:  92
## initial  value 275.828768
## iter  10 value 139.877086
## iter  20 value 136.284867
## iter  30 value 136.272391
## final  value 136.272384
## converged
## # weights:  105
## initial  value 306.315474
## iter  10 value 136.629764
```

```
## iter  20 value 136.178881
## iter  30 value 136.177753
## iter  30 value 136.177752
## final  value 136.177748
## converged
## # weights:  118
## initial  value 307.045863
## iter  10 value 141.357060
## iter  20 value 136.137538
## iter  30 value 136.100045
## final  value 136.099841
## converged
## # weights:  131
## initial  value 362.033737
## iter  10 value 141.854104
## iter  20 value 136.172996
## iter  30 value 136.037188
## iter  40 value 136.034632
## iter  40 value 136.034631
## iter  40 value 136.034631
## final  value 136.034631
## converged
## # weights:  14
## initial  value 155.560733
## iter  10 value 138.518707
## final  value 138.351053
## converged
## # weights:  27
## initial  value 280.221147
## iter  10 value 138.304758
## final  value 137.754698
## converged
## # weights:  40
## initial  value 195.016500
## iter  10 value 138.007511
## iter  20 value 137.358357
## final  value 137.353998
## converged
## # weights:  53
## initial  value 247.127543
## iter  10 value 140.506818
## iter  20 value 137.088752
## final  value 137.065385
## converged
## # weights:  66
## initial  value 333.253309
## iter  10 value 136.901922
## iter  20 value 136.847658
## final  value 136.847531
## converged
## # weights:  79
## initial  value 258.148708
## iter  10 value 136.700535
## iter  20 value 136.677469
```

```
## final  value 136.677319
## converged
## # weights:  92
## initial  value 318.579952
## iter  10 value 136.966256
## iter  20 value 136.540808
## final  value 136.540731
## converged
## # weights:  105
## initial  value 351.863939
## iter  10 value 137.108858
## iter  20 value 136.430305
## iter  30 value 136.428757
## final  value 136.428752
## converged
## # weights:  118
## initial  value 354.388172
## iter  10 value 140.356923
## iter  20 value 136.362811
## iter  30 value 136.335350
## final  value 136.335321
## converged
## # weights:  131
## initial  value 394.606634
## iter  10 value 139.402408
## iter  20 value 136.344702
## iter  30 value 136.256530
## final  value 136.256208
## converged
## # weights:  14
## initial  value 154.055114
## iter  10 value 122.178328
## iter  20 value 115.712903
## final  value 115.619549
## converged
## # weights:  27
## initial  value 144.807879
## iter  10 value 114.593679
## iter  20 value 114.053504
## iter  30 value 113.998390
## final  value 113.997579
## converged
## # weights:  40
## initial  value 150.229084
## iter  10 value 116.271188
## iter  20 value 113.118513
## iter  30 value 112.863426
## iter  40 value 112.804362
## iter  50 value 112.802919
## final  value 112.802908
## converged
## # weights:  53
## initial  value 197.133607
## iter  10 value 114.030622
```

```
## iter  20 value 111.852708
## iter  30 value 111.763739
## iter  40 value 111.757905
## final  value 111.757803
## converged
## # weights:  66
## initial  value 148.614231
## iter  10 value 113.517592
## iter  20 value 111.806923
## iter  30 value 111.724391
## iter  40 value 111.722240
## final  value 111.722082
## converged
## # weights:  79
## initial  value 153.838523
## iter  10 value 113.686619
## iter  20 value 111.306471
## iter  30 value 111.225561
## iter  40 value 111.217287
## final  value 111.216687
## converged
## # weights:  92
## initial  value 161.968458
## iter  10 value 112.486504
## iter  20 value 111.171239
## iter  30 value 111.123442
## iter  40 value 111.121990
## final  value 111.121971
## converged
## # weights:  105
## initial  value 157.929740
## iter  10 value 113.647945
## iter  20 value 111.020267
## iter  30 value 110.970090
## iter  40 value 110.964166
## iter  50 value 110.963818
## final  value 110.963814
## converged
## # weights:  118
## initial  value 195.512009
## iter  10 value 112.990963
## iter  20 value 111.012261
## iter  30 value 110.899779
## iter  40 value 110.894759
## iter  50 value 110.894317
## final  value 110.894308
## converged
## # weights:  131
## initial  value 191.546875
## iter  10 value 112.558458
## iter  20 value 110.949106
## iter  30 value 110.822685
## iter  40 value 110.815405
## iter  50 value 110.814839
```

```
## final  value 110.814833
## converged
## # weights:  14
## initial  value 149.008644
## iter  10 value 125.300403
## iter  20 value 124.725257
## final  value 124.725130
## converged
## # weights:  27
## initial  value 196.256993
## iter  10 value 125.257349
## iter  20 value 123.218730
## iter  30 value 123.211736
## final  value 123.211729
## converged
## # weights:  40
## initial  value 149.128347
## iter  10 value 125.082221
## iter  20 value 121.556150
## iter  30 value 121.531080
## final  value 121.530928
## converged
## # weights:  53
## initial  value 206.656630
## iter  10 value 121.449667
## iter  20 value 121.031804
## iter  30 value 121.023503
## final  value 121.023483
## converged
## # weights:  66
## initial  value 162.149063
## iter  10 value 122.151398
## iter  20 value 120.693993
## iter  30 value 120.687796
## final  value 120.687749
## converged
## # weights:  79
## initial  value 162.561080
## iter  10 value 120.675296
## iter  20 value 120.395763
## iter  30 value 120.394143
## final  value 120.394141
## converged
## # weights:  92
## initial  value 191.868598
## iter  10 value 121.828214
## iter  20 value 120.281376
## iter  30 value 120.272248
## final  value 120.272125
## converged
## # weights:  105
## initial  value 204.229908
## iter  10 value 121.058303
## iter  20 value 120.309586
```

```
## iter  30 value 120.117846
## iter  40 value 120.079031
## iter  50 value 120.078885
## iter  50 value 120.078884
## iter  50 value 120.078883
## final  value 120.078883
## converged
## # weights:  118
## initial  value 228.754898
## iter  10 value 122.063125
## iter  20 value 120.103210
## iter  30 value 120.031680
## iter  40 value 120.021212
## iter  50 value 120.020371
## final  value 120.020360
## converged
## # weights:  131
## initial  value 189.898369
## iter  10 value 120.116779
## iter  20 value 119.886443
## iter  30 value 119.884334
## final  value 119.884248
## converged
## # weights:  14
## initial  value 168.465449
## iter  10 value 129.966380
## iter  20 value 129.828223
## final  value 129.828137
## converged
## # weights:  27
## initial  value 173.773390
## iter  10 value 129.337385
## iter  20 value 129.054405
## final  value 129.053626
## converged
## # weights:  40
## initial  value 158.089507
## iter  10 value 127.960154
## iter  20 value 127.673509
## final  value 127.673385
## converged
## # weights:  53
## initial  value 184.562395
## iter  10 value 128.078343
## iter  20 value 127.615982
## iter  30 value 127.612853
## final  value 127.612844
## converged
## # weights:  66
## initial  value 229.552677
## iter  10 value 128.049089
## iter  20 value 126.977497
## iter  30 value 126.963814
## final  value 126.963656
```

```
## converged
## # weights:  79
## initial  value 197.621055
## iter  10 value 127.452542
## iter  20 value 126.970338
## iter  30 value 126.968426
## final  value 126.968408
## converged
## # weights:  92
## initial  value 239.992750
## iter  10 value 127.093100
## iter  20 value 126.604553
## iter  30 value 126.601984
## final  value 126.601980
## converged
## # weights:  105
## initial  value 253.554221
## iter  10 value 130.172048
## iter  20 value 126.606443
## iter  30 value 126.410161
## iter  40 value 126.400036
## iter  50 value 126.399763
## iter  50 value 126.399763
## iter  50 value 126.399762
## final  value 126.399762
## converged
## # weights:  118
## initial  value 189.207181
## iter  10 value 126.819016
## iter  20 value 126.289230
## iter  30 value 126.286569
## final  value 126.286544
## converged
## # weights:  131
## initial  value 241.697682
## iter  10 value 127.826574
## iter  20 value 126.247313
## iter  30 value 126.226157
## iter  40 value 126.225701
## final  value 126.225692
## converged
## # weights:  14
## initial  value 159.548864
## iter  10 value 133.214220
## iter  20 value 132.898723
## final  value 132.896377
## converged
## # weights:  27
## initial  value 176.691435
## iter  10 value 132.284475
## iter  20 value 131.980950
## final  value 131.980848
## converged
## # weights:  40
```

```
## initial  value 171.702802
## iter  10 value 132.285277
## iter  20 value 131.760327
## final  value 131.759493
## converged
## # weights:  53
## initial  value 205.910878
## iter  10 value 132.169568
## iter  20 value 131.270706
## iter  30 value 131.217862
## final  value 131.217823
## converged
## # weights:  66
## initial  value 230.261681
## iter  10 value 131.362361
## iter  20 value 131.027993
## final  value 131.026868
## converged
## # weights:  79
## initial  value 191.087415
## iter  10 value 131.444263
## iter  20 value 131.010639
## iter  30 value 130.905287
## iter  40 value 130.904316
## final  value 130.904311
## converged
## # weights:  92
## initial  value 208.706611
## iter  10 value 131.158052
## iter  20 value 130.765882
## final  value 130.763488
## converged
## # weights:  105
## initial  value 212.966864
## iter  10 value 131.632225
## iter  20 value 130.765116
## iter  30 value 130.736007
## iter  40 value 130.718044
## final  value 130.717920
## converged
## # weights:  118
## initial  value 255.891798
## iter  10 value 133.481080
## iter  20 value 130.644992
## iter  30 value 130.614173
## iter  40 value 130.613971
## final  value 130.613958
## converged
## # weights:  131
## initial  value 237.154949
## iter  10 value 131.108167
## iter  20 value 130.606917
## iter  30 value 130.557376
## iter  40 value 130.554766
```

```
## final  value 130.554752
## converged
## # weights:  14
## initial  value 189.253053
## iter  10 value 135.386912
## iter  20 value 134.816798
## final  value 134.816443
## converged
## # weights:  27
## initial  value 193.422944
## iter  10 value 134.472019
## iter  20 value 134.074787
## final  value 134.072884
## converged
## # weights:  40
## initial  value 209.379724
## iter  10 value 134.271979
## iter  20 value 133.847154
## iter  30 value 133.832886
## final  value 133.832867
## converged
## # weights:  53
## initial  value 230.490920
## iter  10 value 134.211317
## iter  20 value 133.771532
## iter  30 value 133.764388
## final  value 133.764360
## converged
## # weights:  66
## initial  value 219.504391
## iter  10 value 134.198616
## iter  20 value 133.606142
## iter  30 value 133.595544
## final  value 133.595537
## converged
## # weights:  79
## initial  value 221.973991
## iter  10 value 133.950876
## iter  20 value 133.593821
## iter  30 value 133.591661
## final  value 133.591617
## converged
## # weights:  92
## initial  value 246.433283
## iter  10 value 133.735998
## iter  20 value 133.479060
## iter  30 value 133.478059
## final  value 133.478050
## converged
## # weights:  105
## initial  value 215.708439
## iter  10 value 134.005796
## iter  20 value 133.486334
## iter  30 value 133.480706
```

```
## iter  40 value 133.480438
## final  value 133.480434
## converged
## # weights:  118
## initial  value 246.785203
## iter  10 value 139.694758
## iter  20 value 133.703633
## iter  30 value 133.416061
## iter  40 value 133.382597
## iter  50 value 133.381683
## final  value 133.381662
## converged
## # weights:  131
## initial  value 320.316040
## iter  10 value 134.725112
## iter  20 value 133.376992
## iter  30 value 133.350835
## final  value 133.350691
## converged
## # weights:  14
## initial  value 152.877288
## iter  10 value 136.083686
## iter  20 value 136.057512
## final  value 136.057493
## converged
## # weights:  27
## initial  value 169.249875
## iter  10 value 135.692435
## iter  20 value 135.401274
## final  value 135.401171
## converged
## # weights:  40
## initial  value 197.880864
## iter  10 value 135.973322
## iter  20 value 135.121034
## final  value 135.119508
## converged
## # weights:  53
## initial  value 182.412263
## iter  10 value 135.341874
## iter  20 value 134.993328
## final  value 134.991766
## converged
## # weights:  66
## initial  value 276.785528
## iter  10 value 135.337708
## iter  20 value 134.937991
## final  value 134.936976
## converged
## # weights:  79
## initial  value 243.464975
## iter  10 value 135.235828
## iter  20 value 134.940901
## iter  30 value 134.920644
```

```
## final  value 134.918933
## converged
## # weights:  92
## initial  value 318.879763
## iter  10 value 137.711642
## iter  20 value 134.941886
## iter  30 value 134.909020
## final  value 134.907678
## converged
## # weights:  105
## initial  value 255.386482
## iter  10 value 135.202276
## iter  20 value 134.915346
## iter  30 value 134.892995
## final  value 134.887139
## converged
## # weights:  118
## initial  value 260.570595
## iter  10 value 135.323509
## iter  20 value 134.886707
## iter  30 value 134.876896
## final  value 134.876814
## converged
## # weights:  131
## initial  value 273.233594
## iter  10 value 136.015560
## iter  20 value 134.892575
## iter  30 value 134.870489
## iter  40 value 134.870006
## iter  40 value 134.870005
## iter  40 value 134.870004
## final  value 134.870004
## converged
## # weights:  14
## initial  value 168.224280
## iter  10 value 136.988856
## iter  20 value 136.893955
## final  value 136.893757
## converged
## # weights:  27
## initial  value 196.749531
## iter  10 value 136.298150
## iter  20 value 136.274912
## iter  20 value 136.274912
## iter  20 value 136.274911
## final  value 136.274911
## converged
## # weights:  40
## initial  value 224.405811
## iter  10 value 136.176548
## iter  20 value 135.952056
## iter  30 value 135.951119
## iter  30 value 135.951119
## iter  30 value 135.951119
```

```
## final  value 135.951119
## converged
## # weights:  53
## initial  value 214.369310
## iter  10 value 136.085327
## iter  20 value 135.762009
## final  value 135.761568
## converged
## # weights:  66
## initial  value 273.701013
## iter  10 value 135.812727
## iter  20 value 135.642877
## final  value 135.642528
## converged
## # weights:  79
## initial  value 250.939949
## iter  10 value 135.712825
## iter  20 value 135.563839
## final  value 135.563814
## converged
## # weights:  92
## initial  value 284.478675
## iter  10 value 135.890153
## iter  20 value 135.511522
## final  value 135.509578
## converged
## # weights:  105
## initial  value 296.369849
## iter  10 value 137.121779
## iter  20 value 135.520714
## iter  30 value 135.471198
## final  value 135.470915
## converged
## # weights:  118
## initial  value 287.037101
## iter  10 value 138.500776
## iter  20 value 135.513640
## iter  30 value 135.443028
## final  value 135.442524
## converged
## # weights:  131
## initial  value 312.945798
## iter  10 value 141.481230
## iter  20 value 135.556461
## iter  30 value 135.424681
## iter  40 value 135.421158
## iter  40 value 135.421157
## iter  40 value 135.421157
## final  value 135.421157
## converged
## # weights:  14
## initial  value 157.077396
## iter  10 value 137.580246
## iter  20 value 137.493059
```

```
## final  value 137.493056
## converged
## # weights:  27
## initial  value 170.748104
## iter  10 value 137.002427
## iter  20 value 136.888738
## final  value 136.888600
## converged
## # weights:  40
## initial  value 258.171928
## iter  10 value 136.683461
## iter  20 value 136.531593
## final  value 136.531536
## converged
## # weights:  53
## initial  value 238.780652
## iter  10 value 136.339606
## iter  20 value 136.298261
## final  value 136.298238
## converged
## # weights:  66
## initial  value 225.632110
## iter  10 value 137.385664
## iter  20 value 136.144985
## final  value 136.135509
## converged
## # weights:  79
## initial  value 236.072970
## iter  10 value 138.156452
## iter  20 value 136.058419
## iter  30 value 136.016470
## iter  30 value 136.016469
## iter  30 value 136.016469
## final  value 136.016469
## converged
## # weights:  92
## initial  value 271.901009
## iter  10 value 144.075642
## iter  20 value 136.104287
## iter  30 value 135.928984
## iter  40 value 135.926128
## final  value 135.926125
## converged
## # weights:  105
## initial  value 321.113022
## iter  10 value 137.048582
## iter  20 value 135.878472
## iter  30 value 135.855764
## final  value 135.855512
## converged
## # weights:  118
## initial  value 287.320131
## iter  10 value 137.260909
## iter  20 value 135.803074
```

```
## final  value 135.798971
## converged
## # weights:  131
## initial  value 319.507154
## iter  10 value 136.145518
## iter  20 value 135.755169
## final  value 135.752799
## converged
## # weights:  14
## initial  value 166.643930
## iter  10 value 138.307091
## iter  20 value 137.955577
## final  value 137.955573
## converged
## # weights:  27
## initial  value 224.399545
## iter  10 value 137.922894
## iter  20 value 137.356505
## final  value 137.355556
## converged
## # weights:  40
## initial  value 287.019425
## iter  10 value 137.051496
## iter  20 value 136.973669
## final  value 136.973472
## converged
## # weights:  53
## initial  value 242.462277
## iter  10 value 137.038869
## iter  20 value 136.709336
## final  value 136.708858
## converged
## # weights:  66
## initial  value 252.839896
## iter  10 value 137.324418
## iter  20 value 136.523565
## final  value 136.515178
## converged
## # weights:  79
## initial  value 315.616371
## iter  10 value 136.441809
## iter  20 value 136.367927
## final  value 136.367609
## converged
## # weights:  92
## initial  value 242.121245
## iter  10 value 136.615708
## iter  20 value 136.254795
## iter  30 value 136.251631
## final  value 136.251627
## converged
## # weights:  105
## initial  value 339.297395
## iter  10 value 136.436568
```

```
## iter  20 value 136.159100
## final  value 136.158208
## converged
## # weights:  118
## initial  value 318.925398
## iter  10 value 137.263918
## iter  20 value 136.091592
## iter  30 value 136.081436
## final  value 136.081423
## converged
## # weights:  131
## initial  value 366.374083
## iter  10 value 140.217015
## iter  20 value 136.104101
## iter  30 value 136.017584
## final  value 136.017263
## converged
## # weights:  14
## initial  value 182.715951
## iter  10 value 138.428551
## final  value 138.337340
## converged
## # weights:  27
## initial  value 169.725400
## iter  10 value 138.488750
## iter  20 value 137.736888
## final  value 137.736883
## converged
## # weights:  40
## initial  value 207.336351
## iter  10 value 138.379982
## iter  20 value 137.335266
## final  value 137.335121
## converged
## # weights:  53
## initial  value 267.365824
## iter  10 value 138.654647
## iter  20 value 137.048707
## final  value 137.046618
## converged
## # weights:  66
## initial  value 246.352814
## iter  10 value 141.927523
## iter  20 value 136.871423
## iter  30 value 136.829365
## final  value 136.829354
## converged
## # weights:  79
## initial  value 264.822063
## iter  10 value 139.795345
## iter  20 value 136.686843
## iter  30 value 136.659938
## final  value 136.659923
## converged
```

```
## # weights:  92
## initial  value 310.600199
## iter  10 value 146.125982
## iter  20 value 136.566441
## iter  30 value 136.524497
## final  value 136.524169
## converged
## # weights:  105
## initial  value 316.395482
## iter  10 value 138.215306
## iter  20 value 136.455625
## iter  30 value 136.413099
## final  value 136.413016
## converged
## # weights:  118
## initial  value 424.862465
## iter  10 value 139.695624
## iter  20 value 136.335514
## iter  30 value 136.320384
## iter  30 value 136.320383
## final  value 136.320375
## converged
## # weights:  131
## initial  value 433.709948
## iter  10 value 136.806247
## iter  20 value 136.244937
## iter  30 value 136.242005
## final  value 136.242000
## converged
## # weights:  14
## initial  value 137.709855
## iter  10 value 118.480781
## iter  20 value 117.833771
## final  value 117.833551
## converged
## # weights:  27
## initial  value 148.812685
## iter  10 value 113.894467
## iter  20 value 113.022295
## iter  30 value 112.976031
## final  value 112.974780
## converged
## # weights:  40
## initial  value 158.425909
## iter  10 value 111.223692
## iter  20 value 110.883686
## iter  30 value 110.882152
## iter  40 value 110.878724
## final  value 110.878695
## converged
## # weights:  53
## initial  value 143.145003
## iter  10 value 113.115710
## iter  20 value 112.668368
```

```
## iter  30 value 112.656753
## iter  40 value 112.656317
## final  value 112.656308
## converged
## # weights:  66
## initial  value 177.691973
## iter  10 value 111.853231
## iter  20 value 110.143758
## iter  30 value 110.091265
## iter  40 value 110.088102
## iter  50 value 110.087778
## final  value 110.087765
## converged
## # weights:  79
## initial  value 179.301139
## iter  10 value 110.726472
## iter  20 value 109.926314
## iter  30 value 109.868938
## iter  40 value 109.867721
## final  value 109.867662
## converged
## # weights:  92
## initial  value 190.289063
## iter  10 value 110.963542
## iter  20 value 109.947080
## iter  30 value 109.722311
## iter  40 value 109.713791
## final  value 109.713374
## converged
## # weights:  105
## initial  value 172.459447
## iter  10 value 110.330467
## iter  20 value 109.606345
## iter  30 value 109.572269
## iter  40 value 109.570089
## final  value 109.570043
## converged
## # weights:  118
## initial  value 188.730588
## iter  10 value 113.113013
## iter  20 value 109.691336
## iter  30 value 109.538269
## iter  40 value 109.497119
## iter  50 value 109.494094
## final  value 109.493892
## converged
## # weights:  131
## initial  value 157.159583
## iter  10 value 110.573236
## iter  20 value 109.459228
## iter  30 value 109.400591
## iter  40 value 109.393224
## final  value 109.392848
## converged
```

```
## # weights:  14
## initial  value 221.797543
## iter  10 value 126.329618
## iter  20 value 124.079517
## final  value 124.066856
## converged
## # weights:  27
## initial  value 253.406011
## iter  10 value 126.695585
## iter  20 value 122.141376
## iter  30 value 122.078836
## iter  40 value 122.077382
## final  value 122.077379
## converged
## # weights:  40
## initial  value 153.407123
## iter  10 value 121.420778
## iter  20 value 120.579699
## iter  30 value 120.575789
## final  value 120.575780
## converged
## # weights:  53
## initial  value 192.927300
## iter  10 value 121.396243
## iter  20 value 120.101451
## iter  30 value 120.027974
## final  value 120.027409
## converged
## # weights:  66
## initial  value 193.822824
## iter  10 value 125.323573
## iter  20 value 120.374016
## iter  30 value 119.755721
## iter  40 value 119.642136
## iter  50 value 119.632713
## final  value 119.632637
## converged
## # weights:  79
## initial  value 162.139995
## iter  10 value 119.833002
## iter  20 value 119.320153
## iter  30 value 119.314809
## final  value 119.314805
## converged
## # weights:  92
## initial  value 187.055788
## iter  10 value 120.026764
## iter  20 value 119.178981
## iter  30 value 119.165940
## final  value 119.165486
## converged
## # weights:  105
## initial  value 184.114738
## iter  10 value 123.436673
```

```
## iter  20 value 119.208303
## iter  30 value 119.067447
## iter  40 value 118.956470
## iter  50 value 118.955405
## iter  60 value 118.955267
## iter  60 value 118.955267
## iter  60 value 118.955267
## final  value 118.955267
## converged
## # weights:  118
## initial  value 219.074945
## iter  10 value 125.225948
## iter  20 value 119.181348
## iter  30 value 118.908506
## iter  40 value 118.845564
## iter  50 value 118.840015
## iter  60 value 118.839046
## final  value 118.839022
## converged
## # weights:  131
## initial  value 221.710881
## iter  10 value 120.694611
## iter  20 value 118.853962
## iter  30 value 118.780281
## iter  40 value 118.778019
## final  value 118.778017
## converged
## # weights:  14
## initial  value 148.425422
## iter  10 value 134.503207
## iter  20 value 134.389450
## final  value 134.389429
## converged
## # weights:  27
## initial  value 145.719748
## iter  10 value 128.338338
## iter  20 value 128.056765
## final  value 128.056646
## converged
## # weights:  40
## initial  value 247.839867
## iter  10 value 127.559422
## iter  20 value 126.943369
## final  value 126.940801
## converged
## # weights:  53
## initial  value 170.701283
## iter  10 value 127.638816
## iter  20 value 126.387875
## iter  30 value 126.386713
## iter  30 value 126.386712
## iter  30 value 126.386712
## final  value 126.386712
## converged
```

```
## # weights:  66
## initial  value 214.227740
## iter  10 value 127.167520
## iter  20 value 126.155830
## iter  30 value 126.150405
## final  value 126.150393
## converged
## # weights:  79
## initial  value 202.578075
## iter  10 value 127.995065
## iter  20 value 126.114132
## iter  30 value 126.106054
## final  value 126.106029
## converged
## # weights:  92
## initial  value 193.191429
## iter  10 value 126.613280
## iter  20 value 125.655069
## iter  30 value 125.653386
## final  value 125.653379
## converged
## # weights:  105
## initial  value 215.454066
## iter  10 value 126.461306
## iter  20 value 125.611724
## iter  30 value 125.579575
## iter  40 value 125.578818
## iter  40 value 125.578818
## iter  40 value 125.578818
## final  value 125.578818
## converged
## # weights:  118
## initial  value 202.119354
## iter  10 value 126.253543
## iter  20 value 125.480960
## iter  30 value 125.468625
## final  value 125.468266
## converged
## # weights:  131
## initial  value 235.392661
## iter  10 value 128.816453
## iter  20 value 125.454457
## iter  30 value 125.317141
## iter  40 value 125.311709
## final  value 125.311597
## converged
## # weights:  14
## initial  value 177.662648
## iter  10 value 132.838647
## iter  20 value 132.553510
## final  value 132.552972
## converged
## # weights:  27
## initial  value 163.184546
```

```
## iter  10 value 131.983924
## iter  20 value 131.554517
## final  value 131.554303
## converged
## # weights:  40
## initial  value 167.988055
## iter  10 value 131.489045
## iter  20 value 131.307552
## iter  30 value 131.306911
## iter  30 value 131.306910
## iter  30 value 131.306910
## final  value 131.306910
## converged
## # weights:  53
## initial  value 219.335390
## iter  10 value 131.452844
## iter  20 value 131.180108
## iter  30 value 131.079775
## iter  40 value 130.641943
## final  value 130.640812
## converged
## # weights:  66
## initial  value 253.202235
## iter  10 value 131.144898
## iter  20 value 130.450253
## iter  30 value 130.431108
## final  value 130.431070
## converged
## # weights:  79
## initial  value 200.088527
## iter  10 value 130.721284
## iter  20 value 130.366672
## iter  30 value 130.357266
## final  value 130.357260
## converged
## # weights:  92
## initial  value 253.899728
## iter  10 value 132.349390
## iter  20 value 130.180213
## iter  30 value 130.111476
## final  value 130.111232
## converged
## # weights:  105
## initial  value 211.878601
## iter  10 value 130.452862
## iter  20 value 130.054531
## iter  30 value 130.046837
## final  value 130.046806
## converged
## # weights:  118
## initial  value 243.045144
## iter  10 value 131.424262
## iter  20 value 130.044829
## iter  30 value 130.038942
```

```
## final  value 130.038819
## converged
## # weights:  131
## initial  value 221.973046
## iter  10 value 130.284401
## iter  20 value 129.906672
## iter  30 value 129.898253
## final  value 129.898095
## converged
## # weights:  14
## initial  value 154.700026
## iter  10 value 134.738297
## iter  20 value 134.572119
## final  value 134.569165
## converged
## # weights:  27
## initial  value 158.484615
## iter  10 value 134.095828
## iter  20 value 133.765567
## final  value 133.764881
## converged
## # weights:  40
## initial  value 176.513289
## iter  10 value 133.711253
## iter  20 value 133.513508
## iter  30 value 133.509711
## final  value 133.509704
## converged
## # weights:  53
## initial  value 185.876896
## iter  10 value 133.620690
## iter  20 value 133.373689
## final  value 133.373073
## converged
## # weights:  66
## initial  value 213.089624
## iter  10 value 133.580302
## iter  20 value 133.395683
## iter  30 value 133.339683
## iter  40 value 133.185374
## iter  50 value 133.183273
## final  value 133.183231
## converged
## # weights:  79
## initial  value 251.257450
## iter  10 value 133.729012
## iter  20 value 133.169090
## iter  30 value 133.161137
## final  value 133.161032
## converged
## # weights:  92
## initial  value 204.078228
## iter  10 value 133.416853
## iter  20 value 133.089317
```

```
## iter  30 value 133.071295
## final  value 133.071278
## converged
## # weights:  105
## initial  value 225.470940
## iter  10 value 133.158723
## iter  20 value 133.025731
## iter  30 value 133.024128
## final  value 133.024125
## converged
## # weights:  118
## initial  value 272.233115
## iter  10 value 133.985205
## iter  20 value 132.994299
## iter  30 value 132.931658
## iter  40 value 132.929516
## final  value 132.929499
## converged
## # weights:  131
## initial  value 271.319857
## iter  10 value 133.500913
## iter  20 value 132.924294
## iter  30 value 132.906267
## final  value 132.905614
## converged
## # weights:  14
## initial  value 171.154401
## iter  10 value 136.159186
## iter  20 value 135.881088
## final  value 135.880918
## converged
## # weights:  27
## initial  value 199.267315
## iter  10 value 135.470041
## iter  20 value 135.182111
## final  value 135.182049
## converged
## # weights:  40
## initial  value 188.520406
## iter  10 value 135.163746
## iter  20 value 134.896463
## final  value 134.892470
## converged
## # weights:  53
## initial  value 252.579923
## iter  10 value 135.469622
## iter  20 value 134.770661
## iter  30 value 134.769820
## iter  30 value 134.769820
## iter  30 value 134.769820
## final  value 134.769820
## converged
## # weights:  66
## initial  value 228.873487
```

```
## iter  10 value 135.017319
## iter  20 value 134.755690
## iter  30 value 134.725759
## final  value 134.725560
## converged
## # weights:  79
## initial  value 221.729140
## iter  10 value 134.944259
## iter  20 value 134.727189
## iter  30 value 134.707972
## final  value 134.706656
## converged
## # weights:  92
## initial  value 328.032296
## iter  10 value 136.933300
## iter  20 value 134.729252
## iter  30 value 134.666162
## iter  40 value 134.664017
## final  value 134.664014
## converged
## # weights:  105
## initial  value 267.423204
## iter  10 value 135.416135
## iter  20 value 134.706518
## iter  30 value 134.644555
## final  value 134.642635
## converged
## # weights:  118
## initial  value 295.022389
## iter  10 value 136.256328
## iter  20 value 134.686249
## iter  30 value 134.633722
## iter  40 value 134.629617
## final  value 134.629585
## converged
## # weights:  131
## initial  value 271.952147
## iter  10 value 135.546070
## iter  20 value 134.657548
## iter  30 value 134.622580
## iter  40 value 134.609275
## final  value 134.609079
## converged
## # weights:  14
## initial  value 206.540836
## iter  10 value 136.863342
## iter  20 value 136.770136
## final  value 136.768692
## converged
## # weights:  27
## initial  value 165.078173
## iter  10 value 136.276464
## iter  20 value 136.119913
## final  value 136.119854
```

```
## converged
## # weights:  40
## initial  value 181.015485
## iter  10 value 136.850861
## iter  20 value 135.799761
## iter  30 value 135.791374
## final  value 135.791363
## converged
## # weights:  53
## initial  value 224.534457
## iter  10 value 135.825079
## iter  20 value 135.606931
## final  value 135.606292
## converged
## # weights:  66
## initial  value 258.597908
## iter  10 value 135.805230
## iter  20 value 135.502593
## iter  30 value 135.495240
## iter  30 value 135.495240
## iter  30 value 135.495239
## final  value 135.495239
## converged
## # weights:  79
## initial  value 230.524423
## iter  10 value 136.104487
## iter  20 value 135.435252
## iter  30 value 135.425630
## final  value 135.425626
## converged
## # weights:  92
## initial  value 303.158470
## iter  10 value 136.004136
## iter  20 value 135.393246
## iter  30 value 135.380558
## final  value 135.380525
## converged
## # weights:  105
## initial  value 270.493379
## iter  10 value 142.535142
## iter  20 value 135.603011
## iter  30 value 135.350921
## final  value 135.350535
## converged
## # weights:  118
## initial  value 285.296859
## iter  10 value 142.834408
## iter  20 value 135.596564
## iter  30 value 135.335709
## iter  40 value 135.330216
## final  value 135.330173
## converged
## # weights:  131
## initial  value 317.707552
```

```
## iter  10 value 136.467735
## iter  20 value 135.337792
## iter  30 value 135.316525
## final  value 135.316125
## converged
## # weights:  14
## initial  value 159.705091
## iter  10 value 137.516756
## iter  20 value 137.404304
## final  value 137.404244
## converged
## # weights:  27
## initial  value 189.540475
## iter  10 value 137.189902
## iter  20 value 136.778487
## final  value 136.777418
## converged
## # weights:  40
## initial  value 257.800099
## iter  10 value 136.669678
## iter  20 value 136.419434
## iter  30 value 136.416365
## iter  30 value 136.416365
## iter  30 value 136.416365
## final  value 136.416365
## converged
## # weights:  53
## initial  value 225.617969
## iter  10 value 136.509385
## iter  20 value 136.186419
## final  value 136.185740
## converged
## # weights:  66
## initial  value 263.670514
## iter  10 value 136.175650
## iter  20 value 136.029241
## final  value 136.028205
## converged
## # weights:  79
## initial  value 247.040354
## iter  10 value 142.419525
## iter  20 value 136.048431
## iter  30 value 135.916292
## final  value 135.915171
## converged
## # weights:  92
## initial  value 315.972956
## iter  10 value 136.088872
## iter  20 value 135.831082
## final  value 135.830889
## converged
## # weights:  105
## initial  value 291.795326
## iter  10 value 137.405063
```

```
## iter  20 value 135.773838
## iter  30 value 135.766074
## final  value 135.766066
## converged
## # weights:  118
## initial  value 280.723610
## iter  10 value 143.134320
## iter  20 value 135.896274
## iter  30 value 135.716039
## final  value 135.714909
## converged
## # weights:  131
## initial  value 299.703143
## iter  10 value 141.841626
## iter  20 value 135.738227
## iter  30 value 135.674015
## final  value 135.673655
## converged
## # weights:  14
## initial  value 159.829462
## iter  10 value 138.375844
## iter  20 value 137.891260
## final  value 137.891245
## converged
## # weights:  27
## initial  value 181.639486
## iter  10 value 137.396034
## iter  20 value 137.273683
## final  value 137.273440
## converged
## # weights:  40
## initial  value 211.903453
## iter  10 value 138.333383
## iter  20 value 136.892370
## final  value 136.887276
## converged
## # weights:  53
## initial  value 216.890631
## iter  10 value 136.794970
## iter  20 value 136.625468
## final  value 136.623739
## converged
## # weights:  66
## initial  value 227.853892
## iter  10 value 138.754045
## iter  20 value 136.447460
## iter  30 value 136.433214
## final  value 136.433199
## converged
## # weights:  79
## initial  value 296.235899
## iter  10 value 136.781428
## iter  20 value 136.291345
## final  value 136.289528
```

```
## converged
## # weights:  92
## initial  value 339.092850
## iter  10 value 136.529379
## iter  20 value 136.180171
## iter  30 value 136.177620
## final  value 136.177610
## converged
## # weights:  105
## initial  value 345.388639
## iter  10 value 137.345265
## iter  20 value 136.097103
## iter  30 value 136.088176
## final  value 136.088163
## converged
## # weights:  118
## initial  value 346.398216
## iter  10 value 140.233577
## iter  20 value 136.039217
## iter  30 value 136.015161
## final  value 136.015134
## converged
## # weights:  131
## initial  value 356.406111
## iter  10 value 136.329455
## iter  20 value 135.956051
## iter  30 value 135.954484
## final  value 135.954453
## converged
## # weights:  14
## initial  value 162.753835
## iter  10 value 138.308562
## final  value 138.289255
## converged
## # weights:  27
## initial  value 243.255677
## iter  10 value 138.136892
## iter  20 value 137.674083
## final  value 137.674033
## converged
## # weights:  40
## initial  value 199.952179
## iter  10 value 137.316554
## iter  20 value 137.268090
## final  value 137.268087
## converged
## # weights:  53
## initial  value 236.716930
## iter  10 value 137.226952
## iter  20 value 136.979633
## final  value 136.979604
## converged
## # weights:  66
## initial  value 256.106139
```

```
## iter  10 value 136.790303
## iter  20 value 136.764216
## final  value 136.764133
## converged
## # weights:  79
## initial  value 262.604019
## iter  10 value 136.780864
## iter  20 value 136.597496
## final  value 136.597247
## converged
## # weights:  92
## initial  value 319.402090
## iter  10 value 144.280648
## iter  20 value 136.508150
## iter  30 value 136.464436
## final  value 136.464297
## converged
## # weights:  105
## initial  value 316.605655
## iter  10 value 144.700194
## iter  20 value 136.422934
## iter  30 value 136.356197
## final  value 136.355967
## converged
## # weights:  118
## initial  value 346.904195
## iter  10 value 140.957707
## iter  20 value 136.320230
## iter  30 value 136.266224
## final  value 136.266053
## converged
## # weights:  131
## initial  value 375.364328
## iter  10 value 138.678071
## iter  20 value 136.231924
## iter  30 value 136.190544
## final  value 136.190264
## converged
## # weights:  14
## initial  value 144.897108
## iter  10 value 115.810077
## iter  20 value 115.576329
## final  value 115.576286
## converged
## # weights:  27
## initial  value 214.597233
## iter  10 value 114.739018
## iter  20 value 113.225222
## iter  30 value 113.206854
## final  value 113.206156
## converged
## # weights:  40
## initial  value 165.414212
## iter  10 value 115.193062
```

```
## iter  20 value 113.066200
## iter  30 value 113.018692
## iter  40 value 113.017353
## final  value 113.017153
## converged
## # weights:  53
## initial  value 177.798959
## iter  10 value 113.564748
## iter  20 value 111.773443
## iter  30 value 111.691338
## iter  40 value 111.687616
## final  value 111.687599
## converged
## # weights:  66
## initial  value 145.090785
## iter  10 value 111.933727
## iter  20 value 111.780208
## iter  30 value 111.779278
## final  value 111.779276
## converged
## # weights:  79
## initial  value 145.102759
## iter  10 value 113.335629
## iter  20 value 111.549297
## iter  30 value 111.217451
## iter  40 value 111.154091
## iter  50 value 111.146345
## iter  60 value 111.145943
## final  value 111.145921
## converged
## # weights:  92
## initial  value 167.805097
## iter  10 value 114.162007
## iter  20 value 111.204274
## iter  30 value 111.033381
## iter  40 value 111.026676
## iter  50 value 111.024452
## final  value 111.024369
## converged
## # weights:  105
## initial  value 179.898197
## iter  10 value 120.651902
## iter  20 value 111.203817
## iter  30 value 111.023971
## iter  40 value 110.914125
## iter  50 value 110.892046
## iter  60 value 110.889512
## iter  70 value 110.889264
## final  value 110.889260
## converged
## # weights:  118
## initial  value 176.962649
## iter  10 value 111.480149
## iter  20 value 110.838814
```

```
## iter  30 value 110.810715
## iter  40 value 110.808899
## final  value 110.808733
## converged
## # weights:  131
## initial  value 233.898805
## iter  10 value 117.587617
## iter  20 value 111.024281
## iter  30 value 110.831234
## iter  40 value 110.747523
## iter  50 value 110.735956
## iter  60 value 110.735194
## final  value 110.735172
## converged
## # weights:  14
## initial  value 150.689871
## iter  10 value 124.969339
## iter  20 value 124.835351
## final  value 124.835209
## converged
## # weights:  27
## initial  value 146.122253
## iter  10 value 123.783351
## iter  20 value 123.236813
## iter  30 value 123.234919
## iter  30 value 123.234918
## iter  30 value 123.234918
## final  value 123.234918
## converged
## # weights:  40
## initial  value 170.195938
## iter  10 value 121.827239
## iter  20 value 121.561171
## final  value 121.560963
## converged
## # weights:  53
## initial  value 155.030000
## iter  10 value 121.853537
## iter  20 value 121.340857
## iter  30 value 121.337368
## final  value 121.337347
## converged
## # weights:  66
## initial  value 207.104598
## iter  10 value 123.244805
## iter  20 value 120.697051
## iter  30 value 120.667845
## iter  40 value 120.667253
## final  value 120.667244
## converged
## # weights:  79
## initial  value 165.431421
## iter  10 value 121.028001
## iter  20 value 120.365996
```

```
## iter  30 value 120.346137
## final  value 120.346046
## converged
## # weights:  92
## initial  value 176.382006
## iter  10 value 120.827944
## iter  20 value 120.223382
## iter  30 value 120.220164
## final  value 120.220134
## converged
## # weights:  105
## initial  value 260.657859
## iter  10 value 121.771568
## iter  20 value 120.129437
## iter  30 value 120.012781
## iter  40 value 120.008524
## final  value 120.008505
## converged
## # weights:  118
## initial  value 204.608574
## iter  10 value 121.448016
## iter  20 value 120.213255
## iter  30 value 120.204876
## iter  40 value 120.204743
## final  value 120.204691
## converged
## # weights:  131
## initial  value 338.719195
## iter  10 value 121.973059
## iter  20 value 119.855138
## iter  30 value 119.800073
## iter  40 value 119.797915
## final  value 119.797888
## converged
## # weights:  14
## initial  value 155.400935
## iter  10 value 130.166785
## iter  20 value 129.901781
## final  value 129.901701
## converged
## # weights:  27
## initial  value 163.116752
## iter  10 value 129.391954
## iter  20 value 128.661405
## iter  30 value 128.647377
## final  value 128.647355
## converged
## # weights:  40
## initial  value 168.891847
## iter  10 value 128.173743
## iter  20 value 127.672502
## final  value 127.672006
## converged
## # weights:  53
```

```
## initial  value 162.628147
## iter  10 value 127.386685
## iter  20 value 127.122218
## final  value 127.121746
## converged
## # weights:  66
## initial  value 178.504629
## iter  10 value 127.282708
## iter  20 value 126.923137
## final  value 126.922238
## converged
## # weights:  79
## initial  value 179.478347
## iter  10 value 127.401279
## iter  20 value 126.593152
## iter  30 value 126.591369
## final  value 126.591362
## converged
## # weights:  92
## initial  value 201.284114
## iter  10 value 127.032724
## iter  20 value 126.424951
## iter  30 value 126.424384
## final  value 126.424372
## converged
## # weights:  105
## initial  value 209.117007
## iter  10 value 127.870207
## iter  20 value 126.317709
## iter  30 value 126.299822
## final  value 126.299762
## converged
## # weights:  118
## initial  value 201.396620
## iter  10 value 127.996296
## iter  20 value 126.214945
## iter  30 value 126.174201
## final  value 126.173954
## converged
## # weights:  131
## initial  value 217.800047
## iter  10 value 127.848188
## iter  20 value 126.132491
## iter  30 value 126.104142
## final  value 126.104015
## converged
## # weights:  14
## initial  value 148.852153
## iter  10 value 132.973635
## iter  20 value 132.929161
## final  value 132.929145
## converged
## # weights:  27
## initial  value 167.705460
```

```
## iter  10 value 133.227706
## iter  20 value 131.975263
## final  value 131.969571
## converged
## # weights:  40
## initial  value 196.185039
## iter  10 value 132.355068
## iter  20 value 131.725789
## iter  30 value 131.717786
## final  value 131.717779
## converged
## # weights:  53
## initial  value 219.863014
## iter  10 value 132.527281
## iter  20 value 131.737219
## iter  30 value 131.724576
## final  value 131.724474
## converged
## # weights:  66
## initial  value 175.577762
## iter  10 value 131.145407
## iter  20 value 130.949397
## final  value 130.948753
## converged
## # weights:  79
## initial  value 218.565636
## iter  10 value 131.103919
## iter  20 value 130.815164
## final  value 130.814585
## converged
## # weights:  92
## initial  value 324.831816
## iter  10 value 132.475474
## iter  20 value 130.684923
## iter  30 value 130.660183
## final  value 130.659069
## converged
## # weights:  105
## initial  value 218.533555
## iter  10 value 130.872168
## iter  20 value 130.608285
## final  value 130.606979
## converged
## # weights:  118
## initial  value 258.312587
## iter  10 value 131.688459
## iter  20 value 130.588878
## iter  30 value 130.548350
## iter  40 value 130.546053
## final  value 130.546035
## converged
## # weights:  131
## initial  value 262.911412
## iter  10 value 132.522622
```

```
## iter  20 value 130.483070
## iter  30 value 130.465785
## final  value 130.465709
## converged
## # weights:  14
## initial  value 156.445915
## iter  10 value 134.994907
## iter  20 value 134.820577
## final  value 134.820562
## converged
## # weights:  27
## initial  value 159.248184
## iter  10 value 134.144370
## iter  20 value 134.045470
## final  value 134.045440
## converged
## # weights:  40
## initial  value 194.876740
## iter  10 value 134.093608
## iter  20 value 133.786181
## final  value 133.784071
## converged
## # weights:  53
## initial  value 210.884079
## iter  10 value 133.812579
## iter  20 value 133.703526
## final  value 133.703146
## converged
## # weights:  66
## initial  value 255.217565
## iter  10 value 134.205618
## iter  20 value 133.527818
## iter  30 value 133.517194
## final  value 133.517150
## converged
## # weights:  79
## initial  value 248.361812
## iter  10 value 134.399575
## iter  20 value 133.439464
## iter  30 value 133.429971
## final  value 133.429928
## converged
## # weights:  92
## initial  value 241.625322
## iter  10 value 133.998838
## iter  20 value 133.393511
## iter  30 value 133.381047
## final  value 133.381027
## converged
## # weights:  105
## initial  value 243.413644
## iter  10 value 133.690334
## iter  20 value 133.315731
## iter  30 value 133.308804
```

```
## final  value 133.308695
## converged
## # weights:  118
## initial  value 253.585175
## iter  10 value 134.229579
## iter  20 value 133.297845
## iter  30 value 133.272574
## final  value 133.270223
## converged
## # weights:  131
## initial  value 299.996305
## iter  10 value 134.354068
## iter  20 value 133.295054
## iter  30 value 133.235372
## iter  40 value 133.233128
## final  value 133.233107
## converged
## # weights:  14
## initial  value 159.123662
## iter  10 value 136.075089
## iter  20 value 136.044978
## final  value 136.044968
## converged
## # weights:  27
## initial  value 229.309120
## iter  10 value 135.585647
## iter  20 value 135.366333
## final  value 135.366212
## converged
## # weights:  40
## initial  value 189.993424
## iter  10 value 135.436612
## iter  20 value 135.088110
## iter  30 value 135.070978
## final  value 135.070879
## converged
## # weights:  53
## initial  value 188.022420
## iter  10 value 135.267211
## iter  20 value 134.936576
## final  value 134.935642
## converged
## # weights:  66
## initial  value 255.050331
## iter  10 value 135.106581
## iter  20 value 134.880503
## iter  30 value 134.877329
## final  value 134.877327
## converged
## # weights:  79
## initial  value 210.065562
## iter  10 value 135.700000
## iter  20 value 134.880608
## iter  30 value 134.858698
```

```
## final  value 134.858326
## converged
## # weights:  92
## initial  value 237.627364
## iter  10 value 135.450378
## iter  20 value 134.858838
## iter  30 value 134.837728
## final  value 134.837610
## converged
## # weights:  105
## initial  value 345.593517
## iter  10 value 136.647737
## iter  20 value 134.880337
## iter  30 value 134.814657
## final  value 134.813365
## converged
## # weights:  118
## initial  value 328.643520
## iter  10 value 135.545266
## iter  20 value 134.821721
## iter  30 value 134.810267
## final  value 134.810178
## converged
## # weights:  131
## initial  value 305.491627
## iter  10 value 139.000602
## iter  20 value 134.950464
## iter  30 value 134.793934
## iter  40 value 134.789638
## final  value 134.789587
## converged
## # weights:  14
## initial  value 159.234789
## iter  10 value 136.949077
## iter  20 value 136.874671
## final  value 136.874663
## converged
## # weights:  27
## initial  value 179.435002
## iter  10 value 137.173463
## iter  20 value 136.242794
## iter  30 value 136.240365
## iter  30 value 136.240364
## iter  30 value 136.240364
## final  value 136.240364
## converged
## # weights:  40
## initial  value 266.974841
## iter  10 value 136.054402
## iter  20 value 135.909175
## final  value 135.908479
## converged
## # weights:  53
## initial  value 237.208929
```

```
## iter  10 value 135.992083
## iter  20 value 135.715627
## final  value 135.715330
## converged
## # weights:  66
## initial  value 214.391192
## iter  10 value 137.212087
## iter  20 value 135.679352
## iter  30 value 135.595575
## final  value 135.595309
## converged
## # weights:  79
## initial  value 232.063435
## iter  10 value 138.870749
## iter  20 value 135.561859
## iter  30 value 135.517126
## final  value 135.517112
## converged
## # weights:  92
## initial  value 287.029188
## iter  10 value 135.589236
## iter  20 value 135.464424
## final  value 135.464216
## converged
## # weights:  105
## initial  value 286.466899
## iter  10 value 139.593667
## iter  20 value 135.462337
## iter  30 value 135.428556
## final  value 135.427305
## converged
## # weights:  118
## initial  value 323.522428
## iter  10 value 135.576118
## iter  20 value 135.401394
## iter  30 value 135.400859
## final  value 135.400857
## converged
## # weights:  131
## initial  value 284.896097
## iter  10 value 144.918220
## iter  20 value 135.819376
## iter  30 value 135.402261
## iter  40 value 135.382599
## final  value 135.381465
## converged
## # weights:  14
## initial  value 161.743126
## iter  10 value 137.528983
## iter  20 value 137.473771
## final  value 137.473768
## converged
## # weights:  27
## initial  value 187.181945
```

```
## iter  10 value 137.009347
## iter  20 value 136.859897
## final  value 136.858576
## converged
## # weights:  40
## initial  value 191.050482
## iter  10 value 136.578224
## iter  20 value 136.496794
## final  value 136.496558
## converged
## # weights:  53
## initial  value 208.187304
## iter  10 value 136.527176
## iter  20 value 136.265871
## final  value 136.261434
## converged
## # weights:  66
## initial  value 244.757985
## iter  10 value 142.759527
## iter  20 value 136.125670
## iter  30 value 136.098741
## final  value 136.098561
## converged
## # weights:  79
## initial  value 281.509810
## iter  10 value 136.074398
## iter  20 value 135.982833
## final  value 135.980270
## converged
## # weights:  92
## initial  value 328.607581
## iter  10 value 136.867096
## iter  20 value 135.902727
## iter  30 value 135.891136
## final  value 135.891131
## converged
## # weights:  105
## initial  value 327.518285
## iter  10 value 137.419355
## iter  20 value 135.832513
## iter  30 value 135.821938
## final  value 135.821931
## converged
## # weights:  118
## initial  value 373.042381
## iter  10 value 138.415121
## iter  20 value 135.773044
## final  value 135.766907
## converged
## # weights:  131
## initial  value 301.376472
## iter  10 value 141.494568
## iter  20 value 136.100559
## iter  30 value 135.728735
```

```
## iter  40 value 135.722182
## final  value 135.722147
## converged
## # weights:  14
## initial  value 166.730426
## iter  10 value 137.976732
## iter  20 value 137.938706
## final  value 137.938700
## converged
## # weights:  27
## initial  value 191.800980
## iter  10 value 137.628133
## iter  20 value 137.331002
## final  value 137.330793
## converged
## # weights:  40
## initial  value 205.637203
## iter  10 value 137.845242
## iter  20 value 136.951440
## final  value 136.945281
## converged
## # weights:  53
## initial  value 231.190409
## iter  10 value 136.917885
## iter  20 value 136.679641
## final  value 136.679491
## converged
## # weights:  66
## initial  value 264.777743
## iter  10 value 137.237694
## iter  20 value 136.486427
## final  value 136.485813
## converged
## # weights:  79
## initial  value 237.932306
## iter  10 value 137.582153
## iter  20 value 136.354687
## iter  30 value 136.338854
## final  value 136.338848
## converged
## # weights:  92
## initial  value 273.939284
## iter  10 value 137.379436
## iter  20 value 136.231210
## iter  30 value 136.223790
## iter  30 value 136.223789
## iter  30 value 136.223788
## final  value 136.223788
## converged
## # weights:  105
## initial  value 256.585601
## iter  10 value 136.146166
## final  value 136.131418
## converged
```

```
## # weights:  118
## initial  value 343.915742
## iter  10 value 136.507224
## iter  20 value 136.057050
## final  value 136.055732
## converged
## # weights:  131
## initial  value 343.587650
## iter  10 value 150.366881
## iter  20 value 136.125281
## iter  30 value 135.993700
## final  value 135.992646
## converged
## # weights:  14
## initial  value 183.792364
## iter  10 value 138.336294
## final  value 138.323311
## converged
## # weights:  27
## initial  value 187.128404
## iter  10 value 138.017181
## final  value 137.716681
## converged
## # weights:  40
## initial  value 211.542157
## iter  10 value 138.749199
## iter  20 value 137.313607
## final  value 137.312244
## converged
## # weights:  53
## initial  value 265.306527
## iter  10 value 137.135415
## iter  20 value 137.022941
## final  value 137.022793
## converged
## # weights:  66
## initial  value 302.400908
## iter  10 value 137.019786
## iter  20 value 136.805667
## final  value 136.805478
## converged
## # weights:  79
## initial  value 273.700749
## iter  10 value 136.687445
## iter  20 value 136.636476
## final  value 136.636465
## converged
## # weights:  92
## initial  value 304.438168
## iter  10 value 136.713018
## iter  20 value 136.501504
## final  value 136.501372
## converged
## # weights:  105
```

```
## initial  value 307.977044
## iter  10 value 136.578737
## iter  20 value 136.391239
## final  value 136.390994
## converged
## # weights:  118
## initial  value 297.447524
## iter  10 value 140.536336
## iter  20 value 136.316729
## final  value 136.299177
## converged
## # weights:  131
## initial  value 407.183795
## iter  10 value 139.333297
## iter  20 value 136.248430
## iter  30 value 136.221626
## final  value 136.221619
## converged
## # weights:  14
## initial  value 141.207078
## iter  10 value 119.891521
## iter  20 value 119.117807
## final  value 119.117532
## converged
## # weights:  27
## initial  value 174.747696
## iter  10 value 115.091443
## iter  20 value 113.330422
## iter  30 value 113.321475
## final  value 113.321439
## converged
## # weights:  40
## initial  value 141.570677
## iter  10 value 113.722675
## iter  20 value 112.328213
## iter  30 value 112.300157
## final  value 112.300062
## converged
## # weights:  53
## initial  value 164.839372
## iter  10 value 113.411773
## iter  20 value 112.001451
## iter  30 value 111.976169
## final  value 111.975961
## converged
## # weights:  66
## initial  value 148.014921
## iter  10 value 112.901618
## iter  20 value 111.902965
## iter  30 value 111.846569
## iter  40 value 111.845934
## iter  50 value 111.845555
## final  value 111.845524
## converged
```

```
## # weights:  79
## initial  value 152.776912
## iter  10 value 113.462991
## iter  20 value 111.565430
## iter  30 value 111.483082
## iter  40 value 111.479575
## final  value 111.479513
## converged
## # weights:  92
## initial  value 180.834844
## iter  10 value 113.627903
## iter  20 value 111.369717
## iter  30 value 111.257925
## iter  40 value 111.246004
## iter  50 value 111.245263
## final  value 111.245249
## converged
## # weights:  105
## initial  value 181.892033
## iter  10 value 116.750277
## iter  20 value 111.822169
## iter  30 value 111.313525
## iter  40 value 111.223608
## iter  50 value 111.111699
## iter  60 value 111.098128
## iter  70 value 111.096836
## iter  80 value 111.096724
## final  value 111.096721
## converged
## # weights:  118
## initial  value 332.350511
## iter  10 value 113.139488
## iter  20 value 111.160034
## iter  30 value 111.040503
## iter  40 value 111.027164
## iter  50 value 111.025204
## final  value 111.025170
## converged
## # weights:  131
## initial  value 156.493602
## iter  10 value 112.497643
## iter  20 value 111.239947
## iter  30 value 111.004785
## iter  40 value 110.968168
## iter  50 value 110.966328
## final  value 110.966231
## converged
## # weights:  14
## initial  value 142.481348
## iter  10 value 125.854941
## iter  20 value 125.358708
## final  value 125.358650
## converged
## # weights:  27
```

```
## initial  value 154.307813
## iter  10 value 123.741231
## iter  20 value 123.406038
## final  value 123.402562
## converged
## # weights:  40
## initial  value 161.747886
## iter  10 value 122.612261
## iter  20 value 121.927690
## final  value 121.925197
## converged
## # weights:  53
## initial  value 172.920561
## iter  10 value 121.960544
## iter  20 value 121.661674
## iter  30 value 121.661323
## final  value 121.661319
## converged
## # weights:  66
## initial  value 161.652991
## iter  10 value 125.922210
## iter  20 value 121.088859
## iter  30 value 120.992470
## iter  40 value 120.991977
## final  value 120.991969
## converged
## # weights:  79
## initial  value 161.364426
## iter  10 value 121.166135
## iter  20 value 120.671248
## iter  30 value 120.669713
## final  value 120.669707
## converged
## # weights:  92
## initial  value 204.381184
## iter  10 value 121.384523
## iter  20 value 120.523057
## iter  30 value 120.510954
## iter  40 value 120.510795
## iter  40 value 120.510795
## iter  40 value 120.510795
## final  value 120.510795
## converged
## # weights:  105
## initial  value 250.206928
## iter  10 value 121.452062
## iter  20 value 120.374838
## iter  30 value 120.313952
## iter  40 value 120.311535
## final  value 120.311493
## converged
## # weights:  118
## initial  value 182.594129
## iter  10 value 124.109884
```

```
## iter  20 value 120.447532
## iter  30 value 120.260219
## iter  40 value 120.192463
## iter  50 value 120.190887
## final  value 120.190858
## converged
## # weights:  131
## initial  value 188.960686
## iter  10 value 123.097958
## iter  20 value 120.139901
## iter  30 value 120.090845
## iter  40 value 120.088672
## iter  50 value 120.088569
## final  value 120.088566
## converged
## # weights:  14
## initial  value 143.977126
## iter  10 value 130.840562
## iter  20 value 130.440693
## final  value 130.440541
## converged
## # weights:  27
## initial  value 148.513035
## iter  10 value 129.828263
## iter  20 value 129.535421
## final  value 129.535274
## converged
## # weights:  40
## initial  value 187.641647
## iter  10 value 129.351754
## iter  20 value 128.898830
## final  value 128.898635
## converged
## # weights:  53
## initial  value 251.683482
## iter  10 value 128.196869
## iter  20 value 128.007491
## final  value 128.007023
## converged
## # weights:  66
## initial  value 209.680512
## iter  10 value 130.257351
## iter  20 value 127.340148
## iter  30 value 127.330225
## final  value 127.330059
## converged
## # weights:  79
## initial  value 174.568648
## iter  10 value 127.779308
## iter  20 value 127.282511
## iter  30 value 127.001645
## final  value 127.000237
## converged
## # weights:  92
```

```
## initial  value 200.317146
## iter  10 value 127.878887
## iter  20 value 126.863054
## iter  30 value 126.835320
## final  value 126.835210
## converged
## # weights:  105
## initial  value 193.113614
## iter  10 value 127.420245
## iter  20 value 126.770720
## iter  30 value 126.696895
## final  value 126.696612
## converged
## # weights:  118
## initial  value 200.812381
## iter  10 value 127.106459
## iter  20 value 126.575568
## iter  30 value 126.571296
## final  value 126.571284
## converged
## # weights:  131
## initial  value 199.971088
## iter  10 value 129.058894
## iter  20 value 126.711119
## iter  30 value 126.553022
## iter  40 value 126.503816
## iter  50 value 126.502553
## final  value 126.502541
## converged
## # weights:  14
## initial  value 177.605229
## iter  10 value 133.917193
## iter  20 value 133.494418
## final  value 133.494213
## converged
## # weights:  27
## initial  value 172.024041
## iter  10 value 132.807636
## iter  20 value 132.541485
## final  value 132.541289
## converged
## # weights:  40
## initial  value 215.349136
## iter  10 value 133.037475
## iter  20 value 132.303334
## final  value 132.302542
## converged
## # weights:  53
## initial  value 234.252140
## iter  10 value 132.368843
## iter  20 value 131.665954
## iter  30 value 131.665105
## iter  30 value 131.665104
## iter  30 value 131.665104
```

```
## final  value 131.665104
## converged
## # weights:  66
## initial  value 194.312685
## iter  10 value 131.779514
## iter  20 value 131.463863
## iter  30 value 131.460489
## final  value 131.460484
## converged
## # weights:  79
## initial  value 213.434314
## iter  10 value 132.427830
## iter  20 value 131.313246
## iter  30 value 131.303697
## final  value 131.303598
## converged
## # weights:  92
## initial  value 195.244249
## iter  10 value 131.752145
## iter  20 value 131.154130
## iter  30 value 131.150625
## final  value 131.150619
## converged
## # weights:  105
## initial  value 214.336659
## iter  10 value 131.569136
## iter  20 value 131.096129
## iter  30 value 131.075012
## final  value 131.074839
## converged
## # weights:  118
## initial  value 254.679925
## iter  10 value 131.541294
## iter  20 value 130.976529
## iter  30 value 130.974507
## final  value 130.974492
## converged
## # weights:  131
## initial  value 221.414607
## iter  10 value 131.144966
## iter  20 value 130.913143
## iter  30 value 130.908948
## final  value 130.908939
## converged
## # weights:  14
## initial  value 173.283474
## iter  10 value 135.495048
## iter  20 value 135.405760
## final  value 135.405735
## converged
## # weights:  27
## initial  value 201.389720
## iter  10 value 135.337711
## iter  20 value 134.648273
```

```
## iter  30 value 134.645340
## final  value 134.645336
## converged
## # weights:  40
## initial  value 224.840505
## iter  10 value 134.659935
## iter  20 value 134.402737
## final  value 134.401834
## converged
## # weights:  53
## initial  value 193.227105
## iter  10 value 134.861482
## iter  20 value 134.294452
## iter  30 value 134.277579
## final  value 134.277547
## converged
## # weights:  66
## initial  value 220.769313
## iter  10 value 134.735207
## iter  20 value 134.113877
## iter  30 value 134.095942
## final  value 134.095901
## converged
## # weights:  79
## initial  value 246.001062
## iter  10 value 134.478308
## iter  20 value 134.031221
## iter  30 value 134.014817
## final  value 134.014720
## converged
## # weights:  92
## initial  value 230.386035
## iter  10 value 134.235799
## iter  20 value 133.962975
## iter  30 value 133.949683
## iter  30 value 133.949683
## final  value 133.949631
## converged
## # weights:  105
## initial  value 239.910952
## iter  10 value 134.317329
## iter  20 value 133.885045
## iter  30 value 133.879871
## final  value 133.879837
## converged
## # weights:  118
## initial  value 230.837266
## iter  10 value 134.124592
## iter  20 value 133.856638
## iter  30 value 133.854425
## final  value 133.854414
## converged
## # weights:  131
## initial  value 251.843478
```

```
## iter  10 value 134.568276
## iter  20 value 133.800357
## iter  30 value 133.798416
## final  value 133.798411
## converged
## # weights:  14
## initial  value 185.177568
## iter  10 value 137.070645
## iter  20 value 136.640284
## final  value 136.640233
## converged
## # weights:  27
## initial  value 186.305524
## iter  10 value 136.142712
## iter  20 value 135.981879
## final  value 135.981832
## converged
## # weights:  40
## initial  value 176.683562
## iter  10 value 135.854250
## iter  20 value 135.706351
## final  value 135.706160
## converged
## # weights:  53
## initial  value 193.284720
## iter  10 value 137.270608
## iter  20 value 135.597980
## iter  30 value 135.587815
## iter  30 value 135.587814
## iter  30 value 135.587813
## final  value 135.587813
## converged
## # weights:  66
## initial  value 257.427313
## iter  10 value 135.908642
## iter  20 value 135.549757
## iter  30 value 135.543610
## final  value 135.543604
## converged
## # weights:  79
## initial  value 237.190242
## iter  10 value 135.739676
## iter  20 value 135.532635
## final  value 135.530684
## converged
## # weights:  92
## initial  value 244.838089
## iter  10 value 136.448865
## iter  20 value 135.502158
## iter  30 value 135.490481
## final  value 135.490474
## converged
## # weights:  105
## initial  value 254.670702
```

```
## iter  10 value 136.269826
## iter  20 value 135.499903
## iter  30 value 135.488974
## iter  40 value 135.469951
## final  value 135.469918
## converged
## # weights:  118
## initial  value 306.513281
## iter  10 value 137.173061
## iter  20 value 135.497795
## iter  30 value 135.467242
## iter  40 value 135.459486
## final  value 135.459473
## converged
## # weights:  131
## initial  value 328.909175
## iter  10 value 137.242229
## iter  20 value 135.513367
## iter  30 value 135.448436
## iter  40 value 135.440346
## final  value 135.440096
## converged
## # weights:  14
## initial  value 161.006398
## iter  10 value 137.499394
## iter  20 value 137.470563
## final  value 137.470541
## converged
## # weights:  27
## initial  value 167.609393
## iter  10 value 137.179680
## iter  20 value 136.859878
## final  value 136.859706
## converged
## # weights:  40
## initial  value 180.595882
## iter  10 value 136.811919
## iter  20 value 136.549186
## iter  30 value 136.547536
## iter  30 value 136.547535
## iter  30 value 136.547534
## final  value 136.547534
## converged
## # weights:  53
## initial  value 203.825275
## iter  10 value 136.871899
## iter  20 value 136.373368
## iter  30 value 136.370229
## iter  30 value 136.370228
## iter  30 value 136.370228
## final  value 136.370228
## converged
## # weights:  66
## initial  value 249.145914
```

```
## iter  10 value 136.602378
## iter  20 value 136.266363
## iter  30 value 136.262875
## final  value 136.262871
## converged
## # weights:  79
## initial  value 242.074826
## iter  10 value 139.083879
## iter  20 value 136.269099
## iter  30 value 136.195393
## final  value 136.194826
## converged
## # weights:  92
## initial  value 231.239112
## iter  10 value 136.397721
## iter  20 value 136.150265
## final  value 136.150136
## converged
## # weights:  105
## initial  value 239.451127
## iter  10 value 139.317435
## iter  20 value 136.144270
## iter  30 value 136.119943
## final  value 136.119921
## converged
## # weights:  118
## initial  value 270.578166
## iter  10 value 136.696574
## iter  20 value 136.100871
## final  value 136.098985
## converged
## # weights:  131
## initial  value 300.759362
## iter  10 value 136.598747
## iter  20 value 136.100220
## iter  30 value 136.084239
## final  value 136.084185
## converged
## # weights:  14
## initial  value 145.425404
## iter  10 value 138.079318
## final  value 138.063235
## converged
## # weights:  27
## initial  value 187.497186
## iter  10 value 142.081410
## iter  20 value 137.474504
## final  value 137.473094
## converged
## # weights:  40
## initial  value 230.507648
## iter  10 value 137.569031
## iter  20 value 137.131487
## final  value 137.130625
```

```
## converged
## # weights:  53
## initial  value 233.340385
## iter  10 value 137.442998
## iter  20 value 136.912090
## final  value 136.910739
## converged
## # weights:  66
## initial  value 254.590264
## iter  10 value 137.294791
## iter  20 value 136.767290
## iter  30 value 136.759903
## final  value 136.759898
## converged
## # weights:  79
## initial  value 254.959619
## iter  10 value 136.905597
## iter  20 value 136.654614
## final  value 136.651249
## converged
## # weights:  92
## initial  value 241.756340
## iter  10 value 136.819633
## iter  20 value 136.571291
## iter  30 value 136.569958
## final  value 136.569950
## converged
## # weights:  105
## initial  value 306.012090
## iter  10 value 136.926716
## iter  20 value 136.508981
## final  value 136.507209
## converged
## # weights:  118
## initial  value 291.079141
## iter  10 value 138.103823
## iter  20 value 136.461371
## iter  30 value 136.457549
## final  value 136.457539
## converged
## # weights:  131
## initial  value 398.424709
## iter  10 value 141.433221
## iter  20 value 136.559929
## iter  30 value 136.417750
## iter  40 value 136.417377
## iter  40 value 136.417376
## iter  40 value 136.417376
## final  value 136.417376
## converged
## # weights:  14
## initial  value 152.500172
## iter  10 value 138.529155
## iter  20 value 138.517663
```

```
## iter  20 value 138.517661
## iter  20 value 138.517661
## final  value 138.517661
## converged
## # weights:  27
## initial  value 185.074706
## iter  10 value 138.090183
## iter  20 value 137.935858
## final  value 137.935856
## converged
## # weights:  40
## initial  value 221.378327
## iter  10 value 138.630483
## iter  20 value 137.570786
## final  value 137.570082
## converged
## # weights:  53
## initial  value 241.239947
## iter  10 value 137.393465
## iter  20 value 137.319607
## final  value 137.319565
## converged
## # weights:  66
## initial  value 243.984321
## iter  10 value 137.382054
## iter  20 value 137.138867
## final  value 137.137965
## converged
## # weights:  79
## initial  value 233.768187
## iter  10 value 137.251137
## iter  20 value 137.001019
## final  value 137.000745
## converged
## # weights:  92
## initial  value 497.003960
## iter  10 value 137.691236
## iter  20 value 136.900678
## iter  30 value 136.893717
## final  value 136.893679
## converged
## # weights:  105
## initial  value 315.299382
## iter  10 value 138.891016
## iter  20 value 136.827946
## iter  30 value 136.807980
## final  value 136.807977
## converged
## # weights:  118
## initial  value 349.619319
## iter  10 value 137.230389
## iter  20 value 136.741239
## final  value 136.737919
## converged
```

```
## # weights:  131
## initial  value 341.576158
## iter  10 value 137.667334
## iter  20 value 136.694312
## iter  30 value 136.679662
## final  value 136.679632
## converged
## # weights:  14
## initial  value 165.796167
## iter  10 value 138.997564
## final  value 138.889945
## converged
## # weights:  27
## initial  value 176.695740
## iter  10 value 138.814494
## iter  20 value 138.310330
## iter  20 value 138.310329
## iter  20 value 138.310329
## final  value 138.310329
## converged
## # weights:  40
## initial  value 233.018689
## iter  10 value 141.654222
## iter  20 value 137.929109
## final  value 137.926129
## converged
## # weights:  53
## initial  value 238.597148
## iter  10 value 137.717208
## iter  20 value 137.652373
## final  value 137.652355
## converged
## # weights:  66
## initial  value 268.942128
## iter  10 value 140.256651
## iter  20 value 137.454403
## final  value 137.447635
## converged
## # weights:  79
## initial  value 284.854770
## iter  10 value 154.803917
## iter  20 value 137.562095
## iter  30 value 137.289766
## final  value 137.288630
## converged
## # weights:  92
## initial  value 314.550413
## iter  10 value 139.071177
## iter  20 value 137.170389
## iter  30 value 137.161923
## final  value 137.161917
## converged
## # weights:  105
## initial  value 323.690580
```

```
## iter  10 value 141.062180
## iter  20 value 137.073957
## iter  30 value 137.058780
## final  value 137.058579
## converged
## # weights:  118
## initial  value 351.455884
## iter  10 value 137.092373
## iter  20 value 136.973322
## final  value 136.972747
## converged
## # weights:  131
## initial  value 357.555782
## iter  10 value 138.888481
## iter  20 value 136.902580
## final  value 136.900352
## converged
## # weights:  14
## initial  value 141.854688
## iter  10 value 115.879365
## iter  20 value 114.968135
## final  value 114.967085
## converged
## # weights:  27
## initial  value 143.502021
## iter  10 value 119.705906
## iter  20 value 117.623526
## iter  30 value 117.289652
## iter  40 value 117.264132
## final  value 117.264125
## converged
## # weights:  40
## initial  value 144.925600
## iter  10 value 111.735715
## iter  20 value 110.923430
## iter  30 value 110.912007
## final  value 110.911926
## converged
## # weights:  53
## initial  value 181.315861
## iter  10 value 112.976639
## iter  20 value 111.996068
## iter  30 value 111.959481
## iter  40 value 111.957774
## final  value 111.957765
## converged
## # weights:  66
## initial  value 147.580068
## iter  10 value 111.635122
## iter  20 value 110.138572
## iter  30 value 110.085705
## iter  40 value 110.082290
## final  value 110.082263
## converged
```

```
## # weights:  79
## initial  value 210.094926
## iter  10 value 112.473448
## iter  20 value 110.153207
## iter  30 value 109.991328
## iter  40 value 109.949554
## iter  50 value 109.946510
## final  value 109.946491
## converged
## # weights:  92
## initial  value 154.113070
## iter  10 value 115.544775
## iter  20 value 110.134261
## iter  30 value 109.977907
## iter  40 value 109.909931
## iter  50 value 109.901702
## iter  60 value 109.901586
## final  value 109.901580
## converged
## # weights:  105
## initial  value 163.203956
## iter  10 value 110.393969
## iter  20 value 109.533480
## iter  30 value 109.492524
## iter  40 value 109.488601
## final  value 109.488544
## converged
## # weights:  118
## initial  value 181.426497
## iter  10 value 112.771534
## iter  20 value 109.687617
## iter  30 value 109.603461
## iter  40 value 109.582988
## iter  50 value 109.582545
## final  value 109.582538
## converged
## # weights:  131
## initial  value 156.324531
## iter  10 value 110.943418
## iter  20 value 109.377351
## iter  30 value 109.282479
## iter  40 value 109.279056
## final  value 109.278926
## converged
## # weights:  14
## initial  value 161.457041
## iter  10 value 124.409138
## iter  20 value 124.098592
## final  value 124.098552
## converged
## # weights:  27
## initial  value 142.374515
## iter  10 value 122.818222
## iter  20 value 122.081220
```

```
## final  value 122.080167
## converged
## # weights:  40
## initial  value 159.965085
## iter  10 value 120.653085
## iter  20 value 120.520443
## final  value 120.520243
## converged
## # weights:  53
## initial  value 158.365911
## iter  10 value 121.426629
## iter  20 value 120.355056
## iter  30 value 119.933287
## iter  40 value 119.930316
## final  value 119.930313
## converged
## # weights:  66
## initial  value 177.086441
## iter  10 value 120.044681
## iter  20 value 119.523827
## iter  30 value 119.513588
## final  value 119.513542
## converged
## # weights:  79
## initial  value 178.977958
## iter  10 value 121.125270
## iter  20 value 119.201899
## iter  30 value 119.169017
## iter  40 value 119.168082
## final  value 119.168074
## converged
## # weights:  92
## initial  value 182.076869
## iter  10 value 119.404507
## iter  20 value 119.012912
## iter  30 value 119.006750
## final  value 119.006639
## converged
## # weights:  105
## initial  value 174.629911
## iter  10 value 119.733126
## iter  20 value 118.785525
## iter  30 value 118.776208
## final  value 118.776169
## converged
## # weights:  118
## initial  value 167.266171
## iter  10 value 119.126891
## iter  20 value 118.653286
## iter  30 value 118.645372
## final  value 118.645290
## converged
## # weights:  131
## initial  value 211.472091
```

```
## iter  10 value 119.329718
## iter  20 value 118.677577
## iter  30 value 118.672764
## final  value 118.672722
## converged
## # weights:  14
## initial  value 147.455855
## iter  10 value 134.228452
## iter  20 value 134.083720
## final  value 134.083679
## converged
## # weights:  27
## initial  value 150.323153
## iter  10 value 128.075304
## iter  20 value 127.873697
## final  value 127.873653
## converged
## # weights:  40
## initial  value 216.814931
## iter  10 value 127.115804
## iter  20 value 126.744943
## final  value 126.743396
## converged
## # weights:  53
## initial  value 168.255027
## iter  10 value 126.841877
## iter  20 value 126.168571
## final  value 126.168172
## converged
## # weights:  66
## initial  value 239.794427
## iter  10 value 127.540631
## iter  20 value 126.053587
## iter  30 value 125.935893
## final  value 125.933899
## converged
## # weights:  79
## initial  value 252.751959
## iter  10 value 132.208522
## iter  20 value 125.661631
## iter  30 value 125.569205
## iter  40 value 125.568178
## final  value 125.568165
## converged
## # weights:  92
## initial  value 246.420107
## iter  10 value 126.725272
## iter  20 value 125.496471
## iter  30 value 125.473433
## final  value 125.473381
## converged
## # weights:  105
## initial  value 204.889948
## iter  10 value 127.650360
```

```
## iter  20 value 125.324956
## iter  30 value 125.241708
## iter  40 value 125.239272
## final  value 125.239190
## converged
## # weights:  118
## initial  value 227.829768
## iter  10 value 126.625102
## iter  20 value 125.108344
## iter  30 value 125.105115
## final  value 125.105070
## converged
## # weights:  131
## initial  value 204.784345
## iter  10 value 125.287928
## iter  20 value 125.034485
## iter  30 value 125.030671
## final  value 125.030660
## converged
## # weights:  14
## initial  value 215.132004
## iter  10 value 132.643357
## iter  20 value 132.278406
## final  value 132.278042
## converged
## # weights:  27
## initial  value 155.539268
## iter  10 value 132.354897
## iter  20 value 132.125039
## final  value 132.124788
## converged
## # weights:  40
## initial  value 183.625914
## iter  10 value 131.327295
## iter  20 value 130.851110
## final  value 130.849425
## converged
## # weights:  53
## initial  value 193.859228
## iter  10 value 130.632058
## iter  20 value 130.340442
## iter  30 value 130.338287
## iter  30 value 130.338286
## iter  30 value 130.338285
## final  value 130.338285
## converged
## # weights:  66
## initial  value 181.603336
## iter  10 value 130.614719
## iter  20 value 130.259501
## iter  30 value 130.258871
## iter  30 value 130.258871
## iter  30 value 130.258871
## final  value 130.258871
```

```
## converged
## # weights:  79
## initial  value 193.908366
## iter  10 value 130.528357
## iter  20 value 129.989522
## iter  30 value 129.946291
## final  value 129.946191
## converged
## # weights:  92
## initial  value 221.270921
## iter  10 value 130.437202
## iter  20 value 130.030390
## final  value 130.029627
## converged
## # weights:  105
## initial  value 216.900579
## iter  10 value 130.349372
## iter  20 value 129.710255
## iter  30 value 129.700020
## final  value 129.699973
## converged
## # weights:  118
## initial  value 258.574355
## iter  10 value 132.999259
## iter  20 value 129.751821
## iter  30 value 129.702428
## iter  40 value 129.701914
## final  value 129.701904
## converged
## # weights:  131
## initial  value 272.902319
## iter  10 value 138.024471
## iter  20 value 129.687969
## iter  30 value 129.521804
## iter  40 value 129.518474
## final  value 129.518426
## converged
## # weights:  14
## initial  value 177.299473
## iter  10 value 134.366468
## iter  20 value 134.224712
## iter  20 value 134.224711
## iter  20 value 134.224711
## final  value 134.224711
## converged
## # weights:  27
## initial  value 188.974167
## iter  10 value 133.777127
## iter  20 value 133.421893
## final  value 133.421347
## converged
## # weights:  40
## initial  value 205.309826
## iter  10 value 133.608768
```

```
## iter  20 value 133.160841
## iter  30 value 133.158732
## final  value 133.158726
## converged
## # weights:  53
## initial  value 183.567032
## iter  10 value 133.231703
## iter  20 value 133.019531
## iter  30 value 133.016730
## final  value 133.016723
## converged
## # weights:  66
## initial  value 243.430811
## iter  10 value 133.224180
## iter  20 value 132.958987
## iter  30 value 132.825061
## iter  40 value 132.820719
## final  value 132.820716
## converged
## # weights:  79
## initial  value 270.013874
## iter  10 value 133.643753
## iter  20 value 132.756334
## iter  30 value 132.732040
## final  value 132.731980
## converged
## # weights:  92
## initial  value 241.027966
## iter  10 value 133.352557
## iter  20 value 132.669783
## iter  30 value 132.657277
## final  value 132.657220
## converged
## # weights:  105
## initial  value 238.267875
## iter  10 value 133.010674
## iter  20 value 132.660434
## iter  30 value 132.586186
## iter  40 value 132.580854
## final  value 132.580827
## converged
## # weights:  118
## initial  value 342.630239
## iter  10 value 134.785252
## iter  20 value 132.593001
## iter  30 value 132.551072
## final  value 132.550668
## converged
## # weights:  131
## initial  value 314.209140
## iter  10 value 134.370218
## iter  20 value 132.560868
## iter  30 value 132.548671
## final  value 132.548562
```

```
## converged
## # weights:  14
## initial  value 149.797090
## iter  10 value 135.526076
## iter  20 value 135.494984
## final  value 135.494855
## converged
## # weights:  27
## initial  value 168.333710
## iter  10 value 134.927053
## iter  20 value 134.800333
## final  value 134.800073
## converged
## # weights:  40
## initial  value 170.161022
## iter  10 value 134.713949
## iter  20 value 134.514751
## final  value 134.508490
## converged
## # weights:  53
## initial  value 228.642013
## iter  10 value 134.808455
## iter  20 value 134.398249
## iter  30 value 134.383206
## iter  30 value 134.383206
## iter  30 value 134.383206
## final  value 134.383206
## converged
## # weights:  66
## initial  value 265.103156
## iter  10 value 134.806549
## iter  20 value 134.340473
## iter  30 value 134.336805
## final  value 134.336748
## converged
## # weights:  79
## initial  value 238.943169
## iter  10 value 134.847174
## iter  20 value 134.342538
## iter  30 value 134.329864
## final  value 134.329811
## converged
## # weights:  92
## initial  value 232.519348
## iter  10 value 134.554878
## iter  20 value 134.341597
## iter  30 value 134.271320
## final  value 134.270053
## converged
## # weights:  105
## initial  value 268.875040
## iter  10 value 135.369733
## iter  20 value 134.273356
## iter  30 value 134.248838
```

```
## final  value 134.247371
## converged
## # weights:  118
## initial  value 282.213619
## iter  10 value 134.317522
## iter  20 value 134.233649
## iter  30 value 134.232214
## final  value 134.232200
## converged
## # weights:  131
## initial  value 293.808236
## iter  10 value 134.762186
## iter  20 value 134.238096
## iter  30 value 134.210517
## final  value 134.210273
## converged
## # weights:  14
## initial  value 159.365297
## iter  10 value 136.449858
## iter  20 value 136.357853
## iter  20 value 136.357852
## iter  20 value 136.357852
## final  value 136.357852
## converged
## # weights:  27
## initial  value 179.337533
## iter  10 value 135.841677
## iter  20 value 135.715267
## final  value 135.715227
## converged
## # weights:  40
## initial  value 190.809105
## iter  10 value 135.729524
## iter  20 value 135.388837
## final  value 135.388512
## converged
## # weights:  53
## initial  value 201.595473
## iter  10 value 135.395562
## iter  20 value 135.206070
## final  value 135.204296
## converged
## # weights:  66
## initial  value 220.800680
## iter  10 value 135.773231
## iter  20 value 135.100419
## iter  30 value 135.093994
## final  value 135.093949
## converged
## # weights:  79
## initial  value 264.142295
## iter  10 value 135.336206
## iter  20 value 135.028014
## final  value 135.025058
```

```
## converged
## # weights:  92
## initial  value 273.619717
## iter  10 value 135.229845
## iter  20 value 134.983984
## iter  30 value 134.980712
## final  value 134.980709
## converged
## # weights:  105
## initial  value 263.147539
## iter  10 value 135.154930
## iter  20 value 134.951970
## final  value 134.951483
## converged
## # weights:  118
## initial  value 319.011880
## iter  10 value 137.339573
## iter  20 value 134.988139
## iter  30 value 134.935571
## iter  40 value 134.931863
## iter  40 value 134.931862
## iter  40 value 134.931862
## final  value 134.931862
## converged
## # weights:  131
## initial  value 284.707951
## iter  10 value 135.956073
## iter  20 value 134.924649
## iter  30 value 134.918525
## iter  30 value 134.918524
## iter  30 value 134.918523
## final  value 134.918523
## converged
## # weights:  14
## initial  value 211.862533
## iter  10 value 137.110941
## final  value 136.978213
## converged
## # weights:  27
## initial  value 169.377317
## iter  10 value 137.082337
## iter  20 value 136.360878
## final  value 136.359171
## converged
## # weights:  40
## initial  value 199.881829
## iter  10 value 136.650160
## iter  20 value 136.005713
## final  value 136.002287
## converged
## # weights:  53
## initial  value 246.664518
## iter  10 value 136.219833
## iter  20 value 135.774880
```

```
## final  value 135.774570
## converged
## # weights:  66
## initial  value 252.859863
## iter  10 value 135.929053
## iter  20 value 135.620578
## final  value 135.619338
## converged
## # weights:  79
## initial  value 249.095714
## iter  10 value 135.931085
## iter  20 value 135.512220
## final  value 135.508236
## converged
## # weights:  92
## initial  value 254.680557
## iter  10 value 136.527863
## iter  20 value 135.447503
## iter  30 value 135.425836
## final  value 135.425618
## converged
## # weights:  105
## initial  value 249.453465
## iter  10 value 138.737109
## iter  20 value 135.400136
## iter  30 value 135.362546
## final  value 135.362243
## converged
## # weights:  118
## initial  value 311.114664
## iter  10 value 135.628028
## iter  20 value 135.318574
## iter  30 value 135.312366
## final  value 135.312357
## converged
## # weights:  131
## initial  value 295.712483
## iter  10 value 135.709301
## iter  20 value 135.273087
## iter  30 value 135.272236
## final  value 135.272229
## converged
## # weights:  14
## initial  value 157.833420
## iter  10 value 137.559768
## iter  20 value 137.455105
## iter  20 value 137.455105
## final  value 137.455103
## converged
## # weights:  27
## initial  value 194.973543
## iter  10 value 137.738305
## iter  20 value 136.851393
## final  value 136.846168
```

```
## converged
## # weights:  40
## initial  value 255.207194
## iter  10 value 136.716596
## iter  20 value 136.465719
## final  value 136.465595
## converged
## # weights:  53
## initial  value 229.267583
## iter  10 value 136.957414
## iter  20 value 136.206920
## final  value 136.206138
## converged
## # weights:  66
## initial  value 267.616799
## iter  10 value 136.436176
## iter  20 value 136.019637
## final  value 136.018804
## converged
## # weights:  79
## initial  value 328.917617
## iter  10 value 135.947065
## iter  20 value 135.877808
## final  value 135.877750
## converged
## # weights:  92
## initial  value 282.001203
## iter  10 value 136.043668
## iter  20 value 135.768128
## final  value 135.768025
## converged
## # weights:  105
## initial  value 288.260181
## iter  10 value 140.196709
## iter  20 value 135.828503
## iter  30 value 135.680453
## final  value 135.680437
## converged
## # weights:  118
## initial  value 295.859095
## iter  10 value 135.674131
## iter  20 value 135.609304
## final  value 135.609011
## converged
## # weights:  131
## initial  value 361.360440
## iter  10 value 142.230011
## iter  20 value 135.838020
## iter  30 value 135.552196
## iter  40 value 135.549727
## iter  40 value 135.549726
## iter  40 value 135.549725
## final  value 135.549725
## converged
```

```
## # weights:  14
## initial  value 168.354639
## iter  10 value 137.996620
## iter  20 value 137.845564
## iter  20 value 137.845564
## iter  20 value 137.845564
## final  value 137.845564
## converged
## # weights:  27
## initial  value 204.146336
## iter  10 value 138.554130
## iter  20 value 137.239982
## final  value 137.239954
## converged
## # weights:  40
## initial  value 217.565951
## iter  10 value 137.031060
## iter  20 value 136.840487
## final  value 136.840476
## converged
## # weights:  53
## initial  value 257.662574
## iter  10 value 137.831182
## iter  20 value 136.557246
## final  value 136.556800
## converged
## # weights:  66
## initial  value 248.196617
## iter  10 value 137.388255
## iter  20 value 136.345969
## final  value 136.345124
## converged
## # weights:  79
## initial  value 256.853981
## iter  10 value 150.442894
## iter  20 value 136.308599
## iter  30 value 136.181850
## final  value 136.181313
## converged
## # weights:  92
## initial  value 314.657351
## iter  10 value 136.355328
## iter  20 value 136.051317
## final  value 136.050917
## converged
## # weights:  105
## initial  value 386.090959
## iter  10 value 136.617687
## iter  20 value 135.948024
## iter  30 value 135.944750
## iter  30 value 135.944750
## iter  30 value 135.944750
## final  value 135.944750
## converged
```

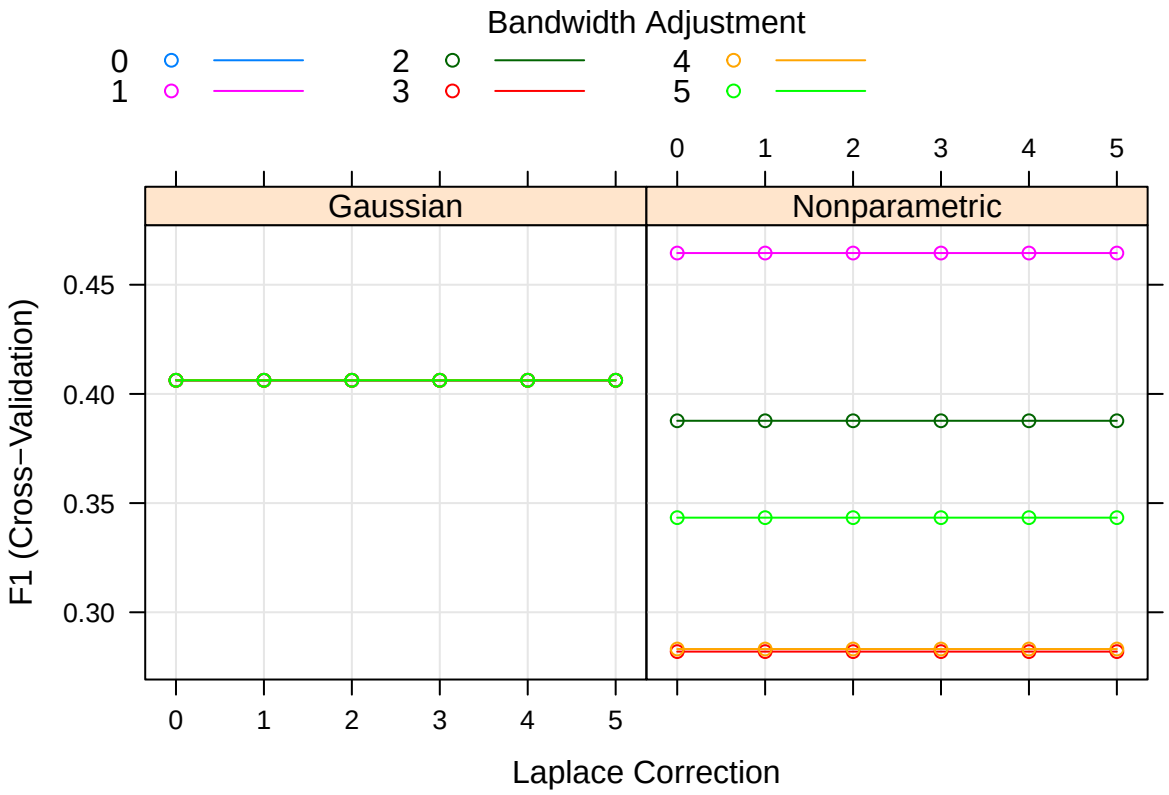
```
## # weights:  118
## initial  value 332.187150
## iter  10 value 146.899629
## iter  20 value 136.114935
## iter  30 value 135.858977
## final  value 135.856686
## converged
## # weights:  131
## initial  value 343.463698
## iter  10 value 150.206550
## iter  20 value 135.928066
## iter  30 value 135.782740
## final  value 135.782503
## converged
## # weights:  40
## initial  value 150.956113
## iter  10 value 122.826026
## iter  20 value 122.544269
## final  value 122.543600
## converged
```

```
df <- bind_rows(all_models[seq(3, 33, 3)], .id = "column_label")
rownames(df) <- NULL
df <- df[, -1]
df
```

```
##       method  F1_train        F1  accuracy
## 1         nb 0.4645088 0.6218487 0.8125000
## 2        glm 0.6414627 0.6666667 0.8083333
## 3        knn 0.5231535 0.6814815 0.8208333
## 4  svmLinear 0.5688434 0.6212121 0.7916667
## 5  svmRadial 0.6300821 0.7248322 0.8291667
## 6    svmPoly 0.6395327 0.6575342 0.7916667
## 7      rpart 0.6296626 0.7380952 0.8166667
## 8    treebag 0.5915256 0.9934641 0.9958333
## 9   adaboost 0.5462329 1.0000000 1.0000000
## 10        rf 0.6113828 1.0000000 1.0000000
## 11      nnet 0.5935858 0.6363636 0.8000000
```

3.2.3 Naive Bayes

```
plot(all_models[[1]])
```




```
all_models[[2]]
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  No Yes
##        No  158  40
##        Yes   5  37
##
##                Accuracy : 0.8125
##                  95% CI : (0.7573, 0.8598)
##     No Information Rate : 0.6792
##     P-Value [Acc > NIR] : 2.603e-06
##
##                   Kappa : 0.5111
##
##  Mcnemar's Test P-Value : 4.011e-07
##
##             Sensitivity : 0.4805
##             Specificity : 0.9693
##          Pos Pred Value : 0.8810
##          Neg Pred Value : 0.7980
##               Precision : 0.8810
##                  Recall : 0.4805
##                      F1 : 0.6218
```

```
##              Prevalence : 0.3208
##          Detection Rate : 0.1542
##    Detection Prevalence : 0.1750
##       Balanced Accuracy : 0.7249
##
##        'Positive' Class : Yes
##
```