Heart Disease Prediction

Introduction: It is a well known fact that Heart Diseases are currently the leading cause of death across the globe. The development of a computational system that can predict the presence of heart diseases in patients will significantly reduce the mortality rates and substantially reduce the costs of healthcare. Machine learning is used accross many spheres around the world. Especially it is gaining more popularity in the healthcare industry. Machine learning can play an essential role in predicting presense or absence of a critical disease, for an instance, Heart disease, etc. If such information is predicted well in advance, can provide important insights to the doctors, who can then carry out the treatments of the patients accordingly and efficiently. The following R notebook demonstrates an exploratory data analysis of the popular Heart Disease UCI database. In addition to that, heart disease prediction is carried out using different approaches such as logistic regression, Random Forest and Neural Networks.

Dataset: The dataset used in the following R notebook can be found on "http://archive.ics.uci.edu/ml/datasets/heart+disease". Each dataset(cleveland.data, hungarian.data, switzerland.data 7 long-beach-va.data) consisted of 76 attributes but it is recommended to use only 14 for our analysis. In this notebook classifiers were built using one combined dataset and the performance evaluation is carried out using cross-validation techniques.

Features:

1. Age: Age in years.
2. Gender: 1 = male, 0 = female
3. Cp: Chest Pain Type –> Value 1: Typical Angina, Value 2: Atypical Angina, Value 3: Non-Anginal Pain, Value 4: Asymptomatic
4. Trestbps: Resting Blood-Pressure (in mm Hg)
5. Chol: Serum Cholestrol (in mg/dl)
6. Fbs: Fasting Blood Sugar > 120 mg/dl –> 1 = true, 0 = Flase
7. Restecg: Resting Electro-cardio-Graph results –> Value 0: Normal, Value 1: Having ST-T wave abnormality, Value 2: showing probable or definite left ventricular hypertropy by Estes criteria
8. Thalach: Maximum heart rate achieved in beats per minute (bpm)
9. Exang: Exercise Induced Angina –> 1 = yes, 0 = no
10. Oldpeak: ST depression induced by exercise relative to rest
11. Slope: the slope of the peak exercise ST segment –> Value 1: Unsloping, Value 2: Flat, Value 3: Down-Sloping
12. Ca: number of major vessels (0-3) colored by fluoroscopy
13. Thal: 3 = normal; 6 = fixed defect; 7 = reversible defect
14. target: two classes and hence a binary classification problem.

Goal: To predict whether a person has a heart-disease or not.

```
#Importing essential libraries
knitr::opts_chunk$set(echo = TRUE)
library(broom)
library(ggthemes)
library(caret)
```

```
## Loading required package: lattice
```

```
## Loading required package: ggplot2
```

```
library(bindrcpp)
library(RColorBrewer)
library(caTools)
library(ggplot2)
```

```
library(GGally)
library(rpart.plot)
```

```
## Loading required package: rpart
```

```
library(rattle)
```

```
## Rattle: A free graphical interface for data science with R.
## Version 5.2.0 Copyright (c) 2006-2018 Togaware Pty Ltd.
## Type 'rattle()' to shake, rattle, and roll your data.
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following object is masked from 'package:GGally':
##
##     nasa
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(nnet)
```

Reading the dataset and checking for missing entries

```
heartDiseaseData<-read.csv("/home/maharsh/Desktop/DAV/heart-disease-uci/heart.csv")
#printing the head values
head(heartDiseaseData)
```

```
##   age sex cp trestbps chol fbs restecg thalach exang oldpeak slope ca thal
## 1  52   1  0      125  212   0       1     168     0     1.0     2  2    3
## 2  53   1  0      140  203   1       0     155     1     3.1     0  0    3
## 3  70   1  0      145  174   0       1     125     1     2.6     0  0    3
## 4  61   1  0      148  203   0       1     161     0     0.0     2  1    3
## 5  62   0  0      138  294   1       1     106     0     1.9     1  3    2
## 6  58   0  0      100  248   0       0     122     0     1.0     1  0    2
##   target
## 1      0
## 2      0
## 3      0
## 4      0
## 5      0
## 6      1
```

```
sum(is.na(heartDiseaseData))
```

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

```
colnames(heartDiseaseData)[1]<-"age"
str(heartDiseaseData)
```

```
## 'data.frame':    1025 obs. of  14 variables:
##  $ age     : int  52 53 70 61 62 58 58 55 46 54 ...
```

```
##  $ sex     : int  1 1 1 1 0 0 1 1 1 1 ...
##  $ cp      : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ trestbps: int  125 140 145 148 138 100 114 160 120 122 ...
##  $ chol    : int  212 203 174 203 294 248 318 289 249 286 ...
##  $ fbs     : int  0 1 0 0 1 0 0 0 0 0 ...
##  $ restecg : int  1 0 1 1 1 0 2 0 0 0 ...
##  $ thalach : int  168 155 125 161 106 122 140 145 144 116 ...
##  $ exang   : int  0 1 1 0 0 0 0 1 0 1 ...
##  $ oldpeak : num  1 3.1 2.6 0 1.9 1 4.4 0.8 0.8 3.2 ...
##  $ slope   : int  2 0 0 2 1 1 0 1 2 1 ...
##  $ ca      : int  2 0 0 1 3 0 3 1 0 2 ...
##  $ thal    : int  3 3 3 3 2 2 1 3 3 2 ...
##  $ target  : int  0 0 0 0 0 1 0 0 0 0 ...
```

Data-Preprocessing

```
#Factoring the features
#Target
heartDiseaseData$target<-as.factor(heartDiseaseData$target)
levels(heartDiseaseData$target)[levels(heartDiseaseData$target)==0] <- "Healthy"
levels(heartDiseaseData$target)[levels(heartDiseaseData$target)==1] <- "Heart Disease"
#Chest Pain
heartDiseaseData$cp<-as.factor(heartDiseaseData$cp)
levels(heartDiseaseData$cp)[levels(heartDiseaseData$cp)==0] <- "Chest Pain Type 0"
levels(heartDiseaseData$cp)[levels(heartDiseaseData$cp)==1] <- "Chest Pain Type 1"
levels(heartDiseaseData$cp)[levels(heartDiseaseData$cp)==2] <- "Chest Pain Type 2"
levels(heartDiseaseData$cp)[levels(heartDiseaseData$cp)==3] <- "Chest Pain Type 3"
#Sex
heartDiseaseData$sex<-as.factor(heartDiseaseData$sex)
levels(heartDiseaseData$sex)[levels(heartDiseaseData$sex)==0] <- "Female"
levels(heartDiseaseData$sex)[levels(heartDiseaseData$sex)==1] <- "Male"
#Thalassemia
heartDiseaseData$thal<-as.factor(heartDiseaseData$thal)
levels(heartDiseaseData$thal)[levels(heartDiseaseData$thal)==0] <- "No Thalassemia"
levels(heartDiseaseData$thal)[levels(heartDiseaseData$thal)==1] <- "Normal Thalassemia"
levels(heartDiseaseData$thal)[levels(heartDiseaseData$thal)==2] <- "Fixed Defect Thalassemia"
levels(heartDiseaseData$thal)[levels(heartDiseaseData$thal)==3] <- "Reversible Defect Thalassemia"
#Fasting Blood Sugar
heartDiseaseData$fbs<-as.factor(heartDiseaseData$fbs)
levels(heartDiseaseData$fbs)[levels(heartDiseaseData$fbs)==0] <- "Fasting Blood Sugar <= 120"
levels(heartDiseaseData$fbs)[levels(heartDiseaseData$fbs)==1] <- "Fasting Blood Sugar > 120"
#Exercise Induced Angina
heartDiseaseData$exang<-as.factor(heartDiseaseData$exang)
levels(heartDiseaseData$exang)[levels(heartDiseaseData$exang)==1] <- "Exercise Induced Angina"
levels(heartDiseaseData$exang)[levels(heartDiseaseData$exang)==0] <- "No Exercise Induced Angina"
#ECG
heartDiseaseData$restecg<-as.factor(heartDiseaseData$restecg)
levels(heartDiseaseData$restecg)[levels(heartDiseaseData$restecg)==0] <- "Rest ECG 0"
levels(heartDiseaseData$restecg)[levels(heartDiseaseData$restecg)==1] <- "Rest ECG 1"
levels(heartDiseaseData$restecg)[levels(heartDiseaseData$restecg)==2] <- "Rest ECG 2"
#ST Slope
heartDiseaseData$slope<-as.factor(heartDiseaseData$slope)
levels(heartDiseaseData$slope)[levels(heartDiseaseData$slope)==0] <- "Peak Excercise ST Slope 0"
levels(heartDiseaseData$slope)[levels(heartDiseaseData$slope)==1] <- "Peak Excercise ST Slope 1"
levels(heartDiseaseData$slope)[levels(heartDiseaseData$slope)==2] <- "Peak Excercise ST Slope 2"
```

```r
str(heartDiseaseData)
```

```
## 'data.frame':    1025 obs. of  14 variables:
##  $ age     : int  52 53 70 61 62 58 58 55 46 54 ...
##  $ sex     : Factor w/ 2 levels "Female","Male": 2 2 2 2 1 1 2 2 2 2 ...
##  $ cp      : Factor w/ 4 levels "Chest Pain Type 0",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ trestbps: int  125 140 145 148 138 100 114 160 120 122 ...
##  $ chol    : int  212 203 174 203 294 248 318 289 249 286 ...
##  $ fbs     : Factor w/ 2 levels "Fasting Blood Sugar <= 120",..: 1 2 1 1 2 1 1 1 1 1 ...
##  $ restecg : Factor w/ 3 levels "Rest ECG 0","Rest ECG 1",..: 2 1 2 2 2 1 3 1 1 1 ...
##  $ thalach : int  168 155 125 161 106 122 140 145 144 116 ...
##  $ exang   : Factor w/ 2 levels "No Exercise Induced Angina",..: 1 2 2 1 1 1 1 2 1 2 ...
##  $ oldpeak : num  1 3.1 2.6 0 1.9 1 4.4 0.8 0.8 3.2 ...
##  $ slope   : Factor w/ 3 levels "Peak Excercise ST Slope 0",..: 3 1 1 3 2 2 1 2 3 2 ...
##  $ ca      : int  2 0 0 1 3 0 3 1 0 2 ...
##  $ thal    : Factor w/ 4 levels "No Thalassemia",..: 4 4 4 4 3 3 2 4 4 3 ...
##  $ target  : Factor w/ 2 levels "Healthy","Heart Disease": 1 1 1 1 1 2 1 1 1 1 ...
```

Checking for missing values

```r
sum(is.na(heartDiseaseData))
```

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

Summary of the data

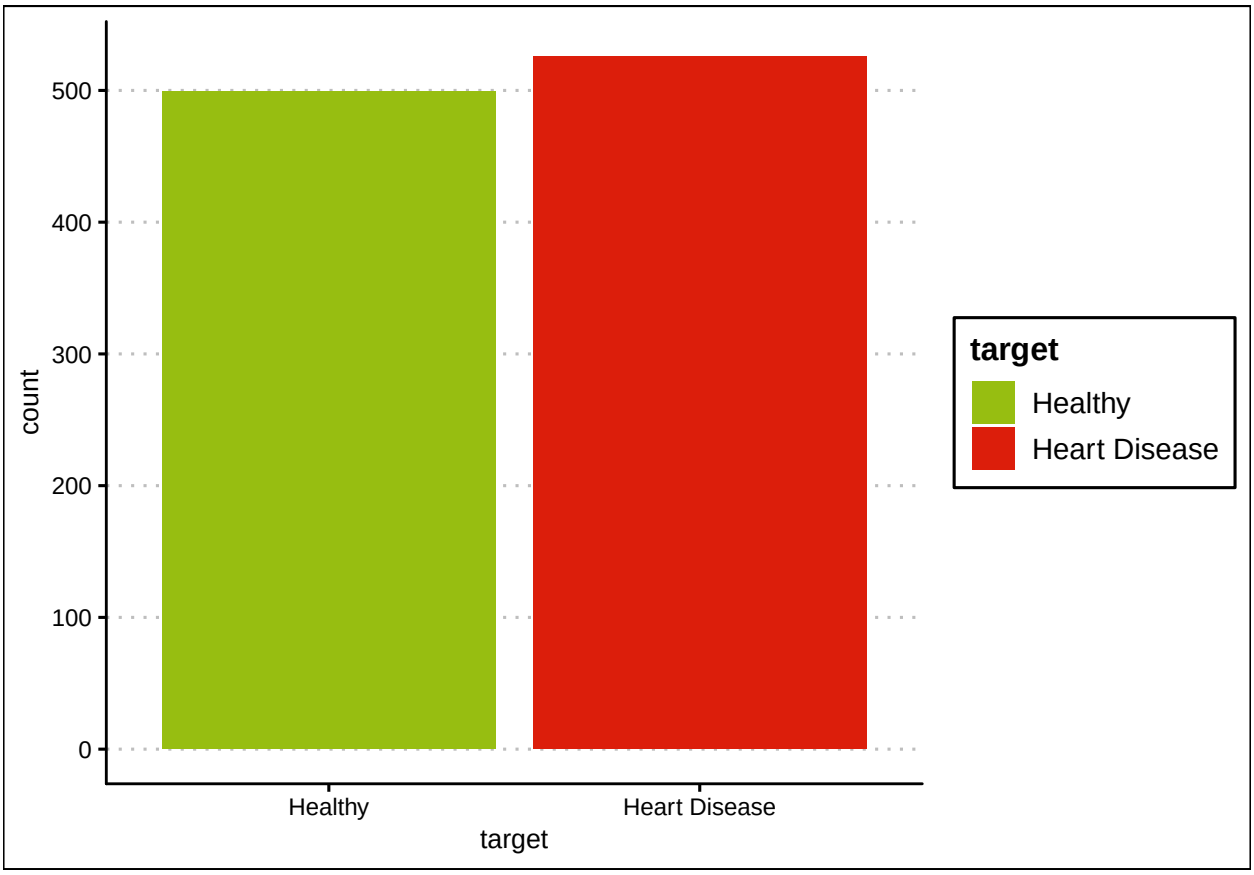
```r
summary(heartDiseaseData)
```

```
##       age            sex                       cp         trestbps
##  Min.   :29.00   Female:312   Chest Pain Type 0:497   Min.   : 94.0
##  1st Qu.:48.00   Male  :713   Chest Pain Type 1:167   1st Qu.:120.0
##  Median :56.00                Chest Pain Type 2:284   Median :130.0
##  Mean   :54.43                Chest Pain Type 3: 77   Mean   :131.6
##  3rd Qu.:61.00                                        3rd Qu.:140.0
##  Max.   :77.00                                        Max.   :200.0
##       chol                              fbs            restecg
##  Min.   :126   Fasting Blood Sugar <= 120:872   Rest ECG 0:497
##  1st Qu.:211   Fasting Blood Sugar > 120 :153   Rest ECG 1:513
##  Median :240                                    Rest ECG 2: 15
##  Mean   :246
##  3rd Qu.:275
##  Max.   :564
##     thalach                             exang        oldpeak
##  Min.   : 71.0   No Exercise Induced Angina:680   Min.   :0.000
##  1st Qu.:132.0   Exercise Induced Angina   :345   1st Qu.:0.000
##  Median :152.0                                    Median :0.800
##  Mean   :149.1                                    Mean   :1.072
##  3rd Qu.:166.0                                    3rd Qu.:1.800
##  Max.   :202.0                                    Max.   :6.200
##                         slope           ca
##  Peak Excercise ST Slope 0: 74   Min.   :0.0000
##  Peak Excercise ST Slope 1:482   1st Qu.:0.0000
##  Peak Excercise ST Slope 2:469   Median :0.0000
##                                  Mean   :0.7541
##                                  3rd Qu.:1.0000
##                                  Max.   :4.0000
```

```
##                               thal                target
##  No Thalassemia                 :  7   Healthy      :499
##  Normal Thalassemia             : 64   Heart Disease:526
##  Fixed Defect Thalassemia       :544
##  Reversible Defect Thalassemia:410
##
##
```

Total number of observations of heathy people and people suffering from heart disease.

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") + theme_clean()  +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```

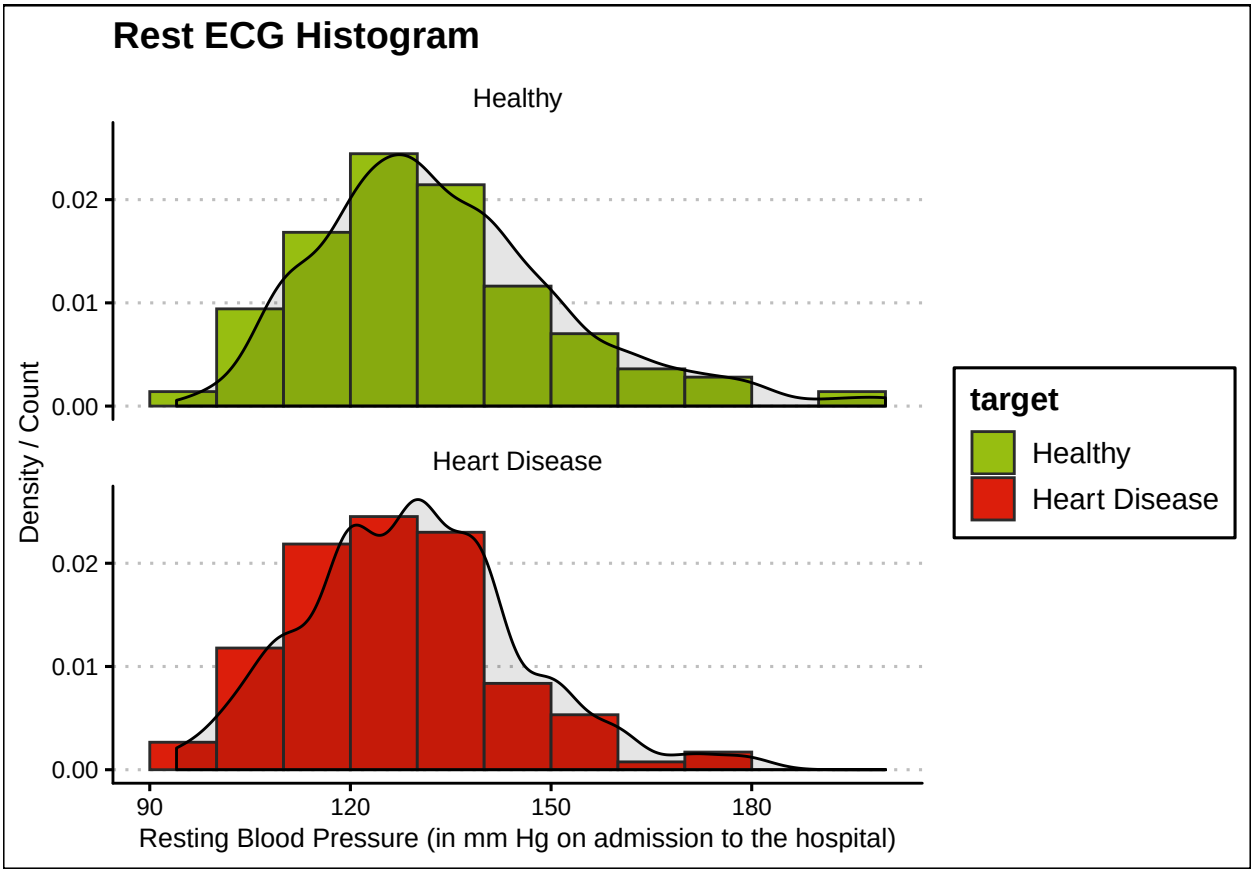


Heart diseases among females are higher as compared to males

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~sex, ncol=2,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```

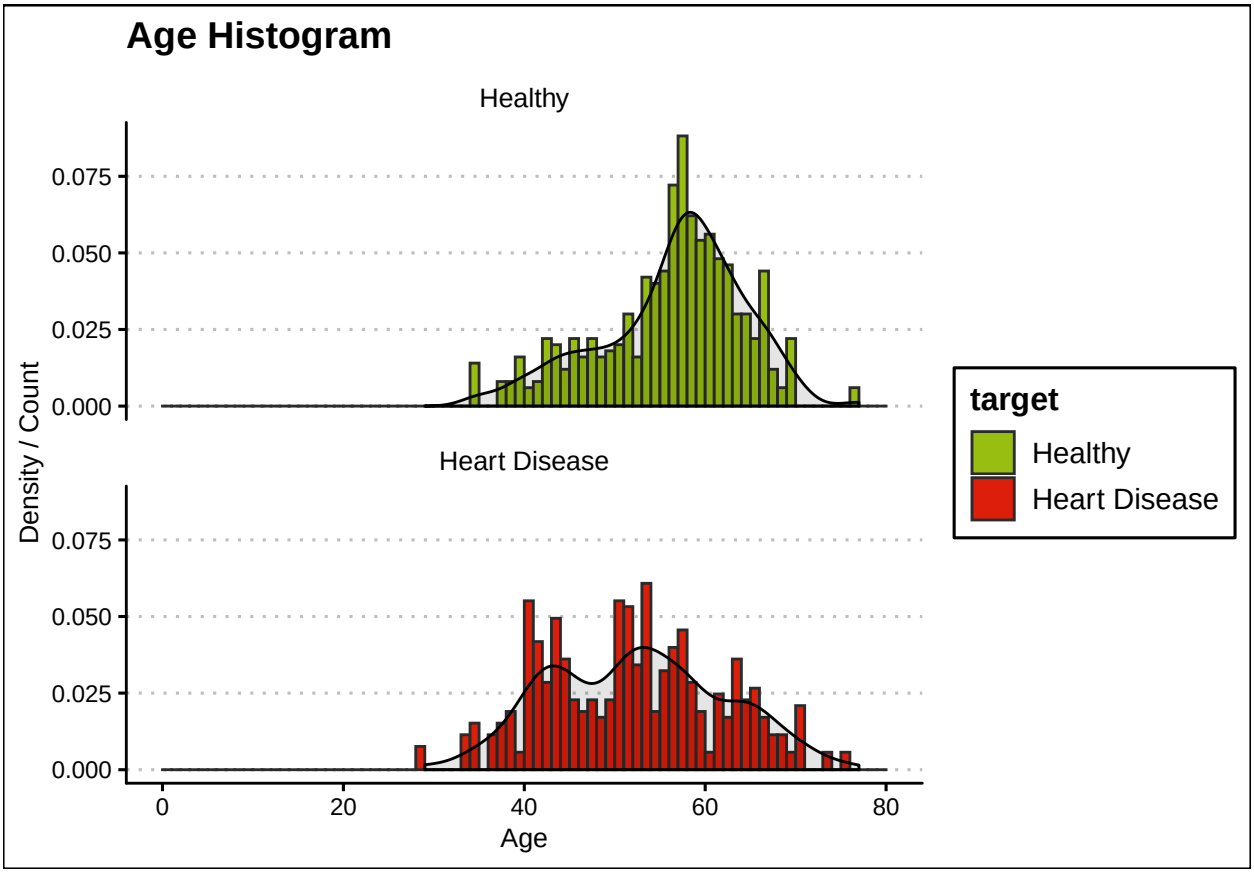
It can be observed that there is no major difference between the distributions of Rest ECG of healthy people and the ones exhibiting heart diseases.

```
ggplot(heartDiseaseData,aes(trestbps, fill=target)) +
  geom_histogram(aes(y=..density..),breaks=seq(90, 200, by=10), color="grey17") +
  geom_density(alpha=.1, fill="black") +
  facet_wrap(~target, ncol=1,scale="fixed") +
  theme_clean()  +
  scale_fill_manual(values=c("#97BE11","#DC1E0B")) +
  xlab("Resting Blood Pressure (in mm Hg on admission to the hospital)") +
  ylab("Density / Count") +
  ggtitle("Rest ECG Histogram")
```

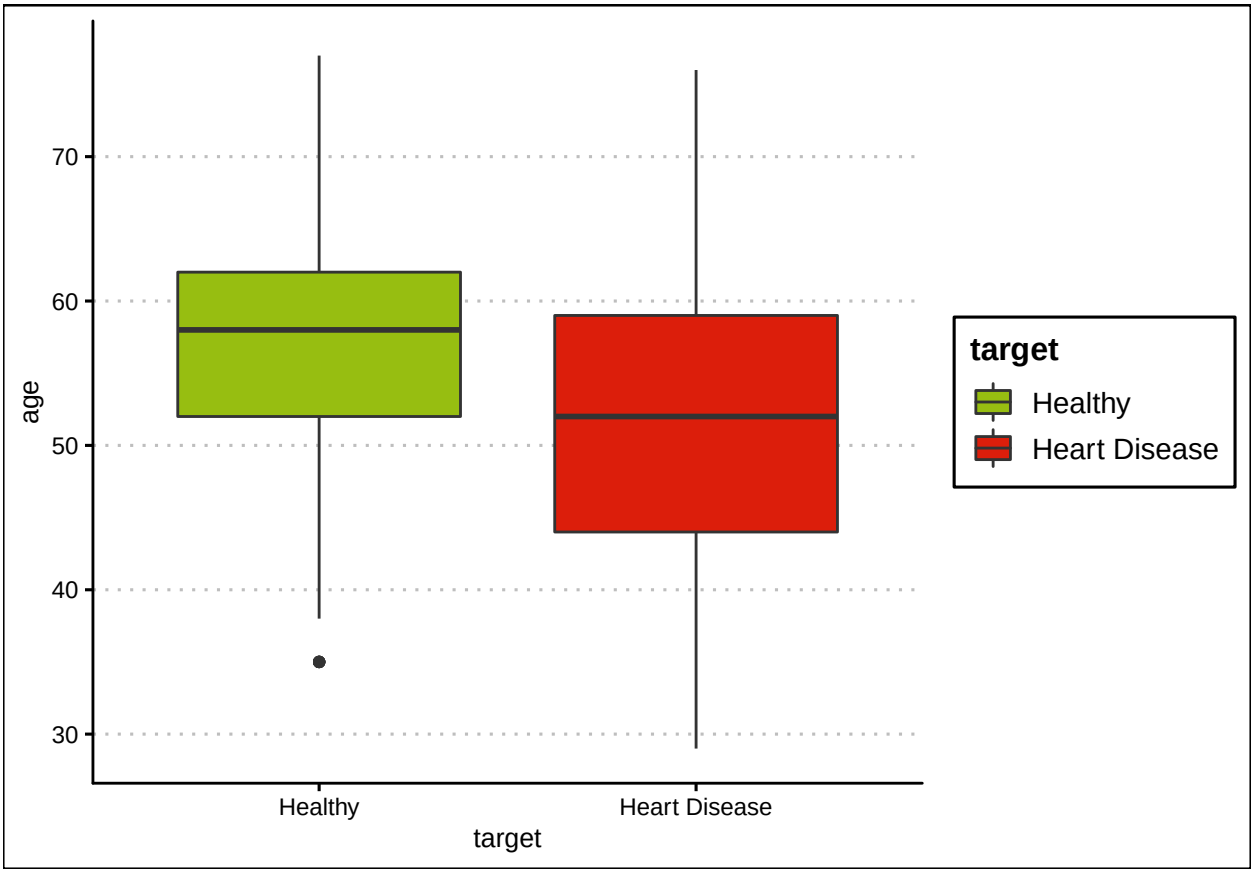


It can be observed that heart disease is uniformly spread out across age. In addtion to that the median age for patients estimated was 56 with youngest and oldest being 29 and 77 respectively. It can be observed from the plots that the median age of the people exhibiting heart diseases is less than the healthy ones. Moreover, it can be observed that the distribution of patients exhibiting heart diseases is slighly skewed. Hence, we can use age as an predictive feature.

```
ggplot(heartDiseaseData,aes(age, fill=target)) +
  geom_histogram(aes(y=..density..),breaks=seq(0, 80, by=1), color="grey17") +
  geom_density(alpha=.1, fill="black")+ facet_wrap(~target, ncol=1,scale="fixed") +
  theme_clean()  + scale_fill_manual(values=c("#97BE11","#DC1E0B"))+ xlab("Age") +
  ylab("Density / Count") +
  ggtitle("Age Histogram")
```

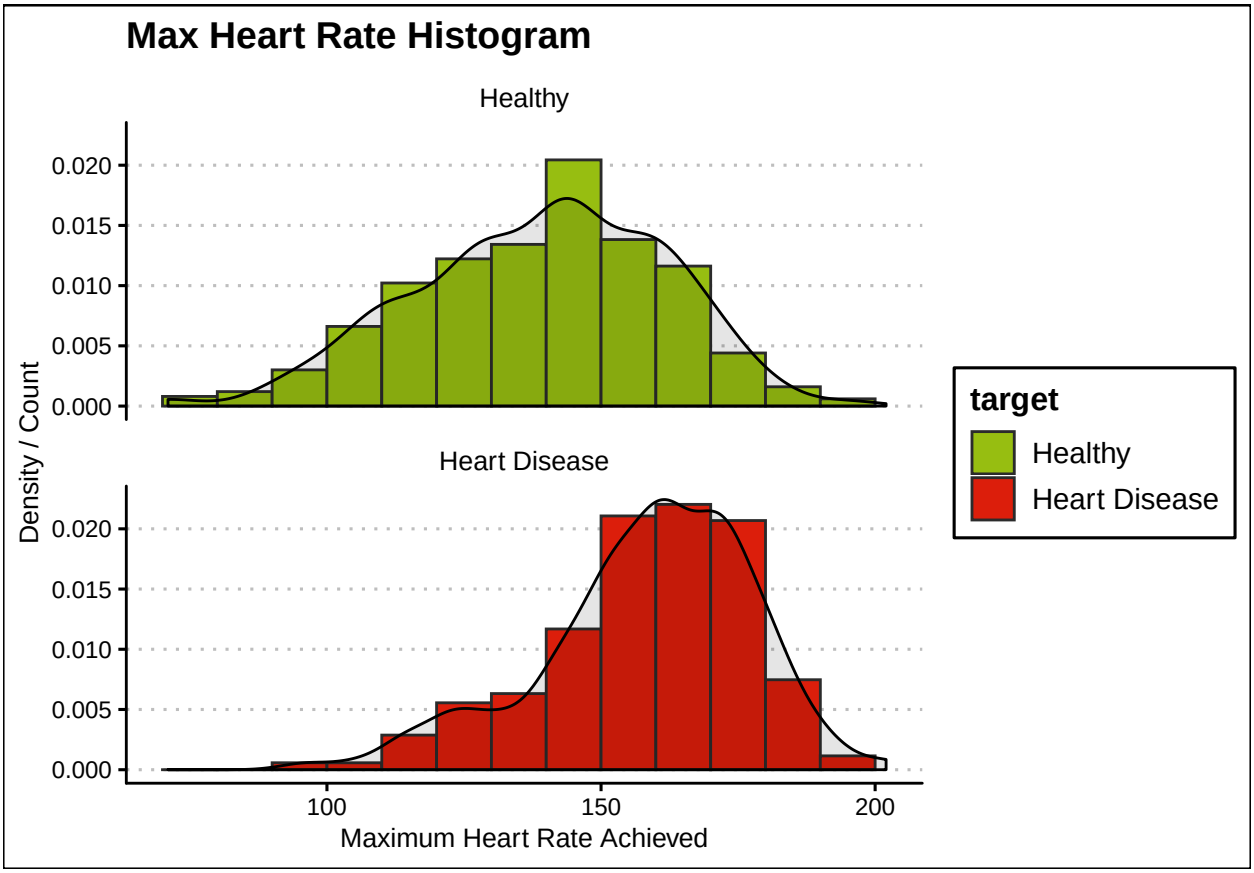



```
ggplot(heartDiseaseData,aes(x=target, y=age, fill=target)) +
  geom_boxplot() +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```



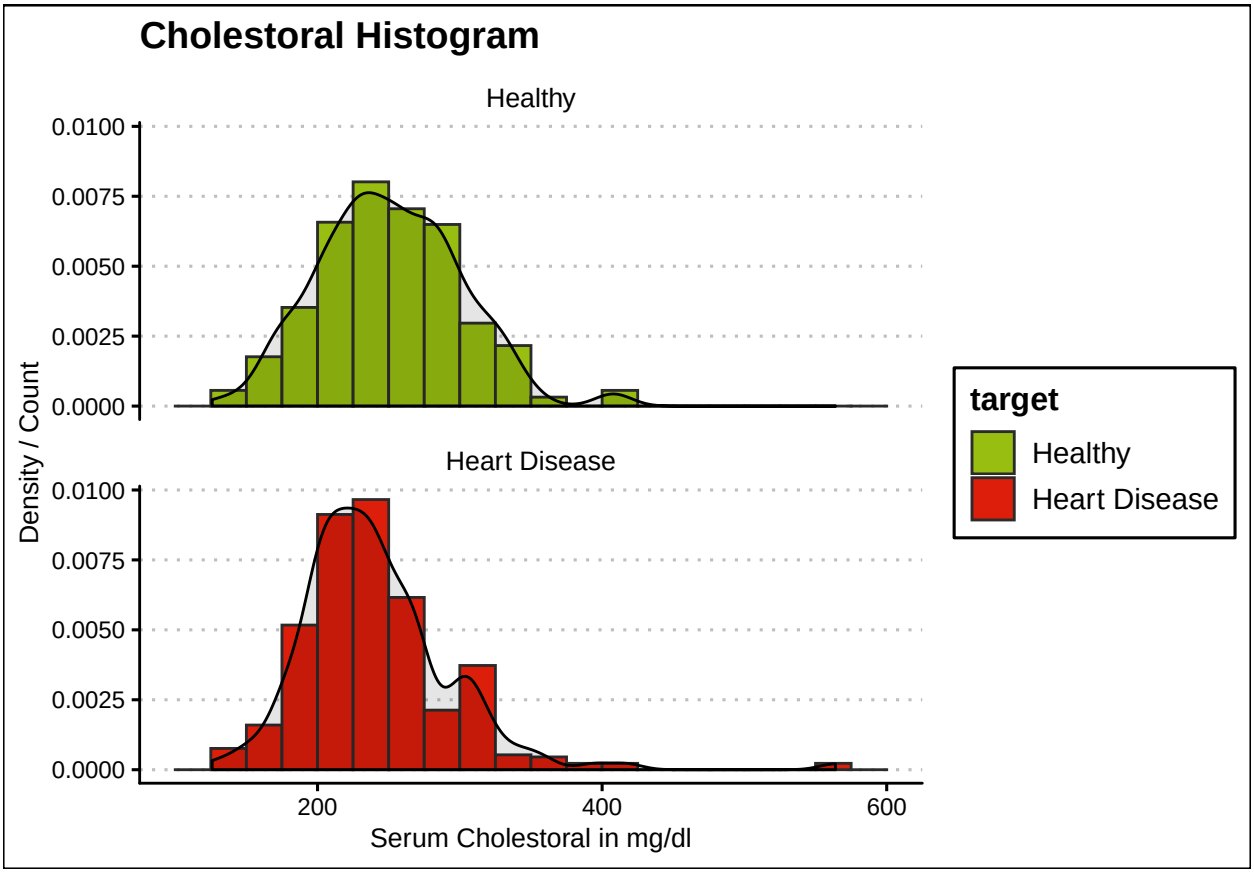
Additionally, People exhibiting heart diseases generally have higher maximum heart rates as compared to healthy people.

```
ggplot(heartDiseaseData,aes(thalach, fill=target)) +
  geom_histogram(aes(y=..density..),breaks=seq(70, 205, by=10), color="grey17") +
  geom_density(alpha=.1, fill="black") +
  facet_wrap(~target, ncol=1,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B")) +
  xlab("Maximum Heart Rate Achieved") +
  ylab("Density / Count") +
  ggtitle("Max Heart Rate Histogram")
```



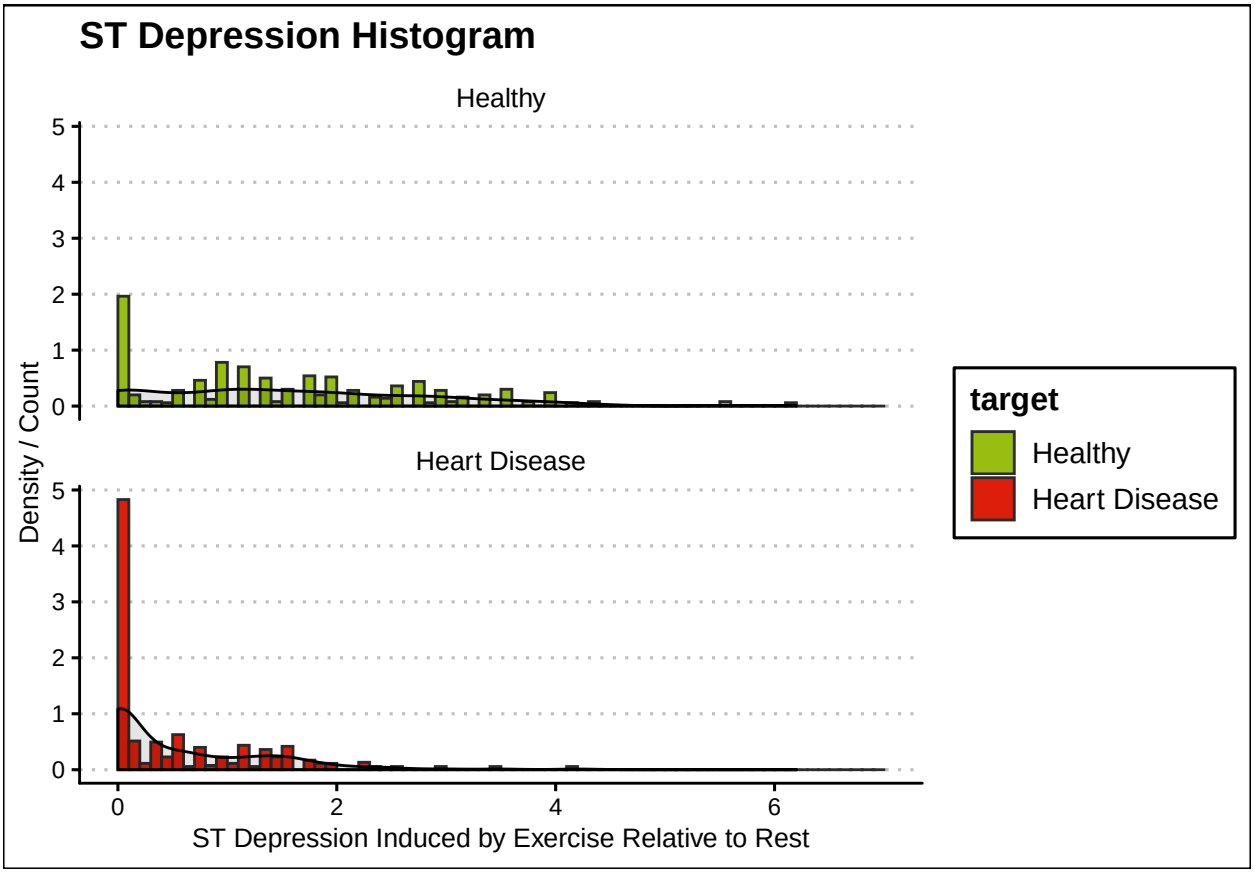
Moroever, it can be observed here that majority of the people exhibiting heart diseases have their serum cholestrol in the range of 200 - 300 mg/dl

```
ggplot(heartDiseaseData,aes(chol, fill=target)) +
  geom_histogram(aes(y=..density..),breaks=seq(100, 600, by=25), color="grey17") +
  geom_density(alpha=.1, fill="black") +
  facet_wrap(~target, ncol=1,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B")) +
  xlab("Serum Cholestoral in mg/dl") +
  ylab("Density / Count") +
  ggtitle("Cholestoral Histogram")
```



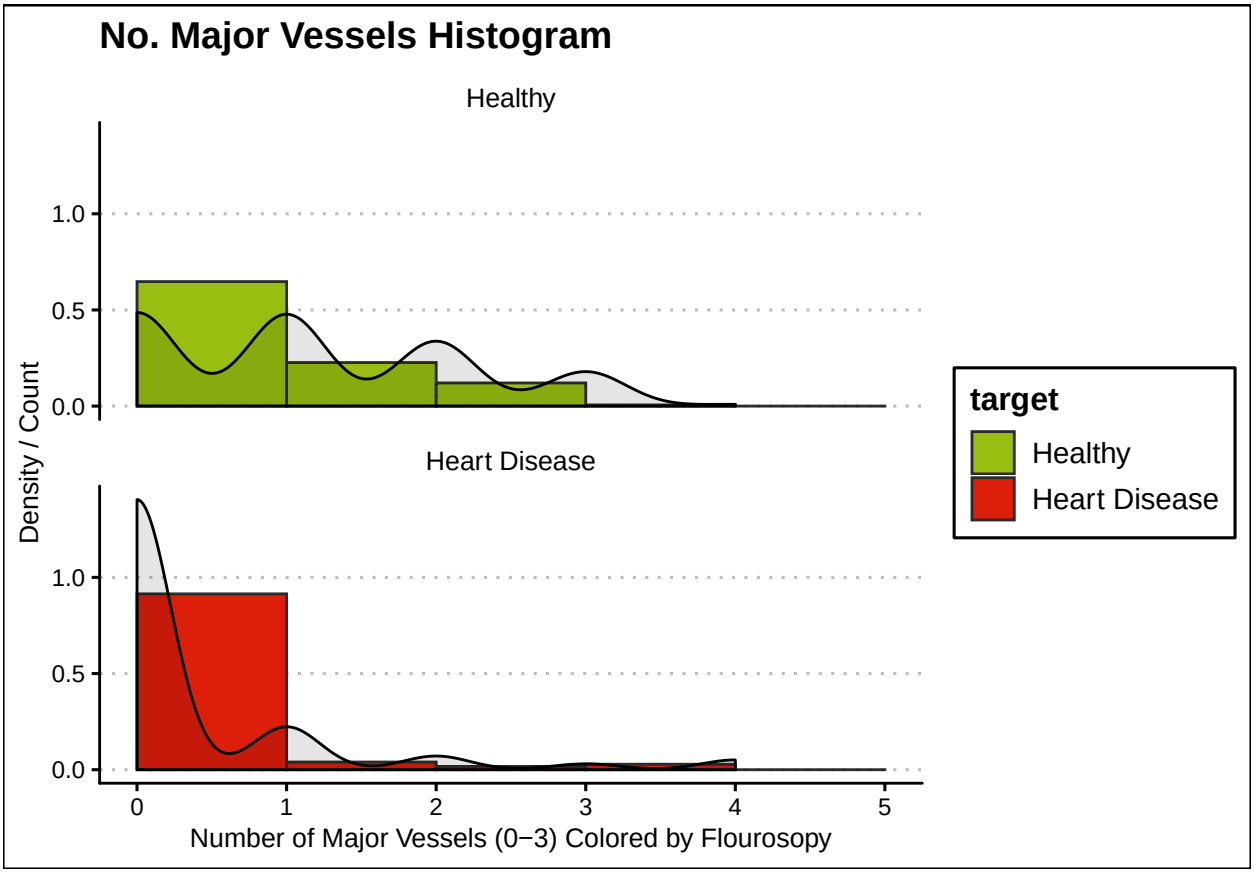
Majority of heart diseased patients have ST-Depression of 0.1

```
ggplot(heartDiseaseData,aes(oldpeak, fill=target)) +
  geom_histogram(aes(y=..density..),breaks=seq(0, 7, by=0.1), color="grey17") +
  geom_density(alpha=.1, fill="black") +
  facet_wrap(~target, ncol=1,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B")) +
  ggtitle("ST Depression Histogram") +
  xlab("ST Depression Induced by Exercise Relative to Rest") +
  ylab("Density / Count")
```



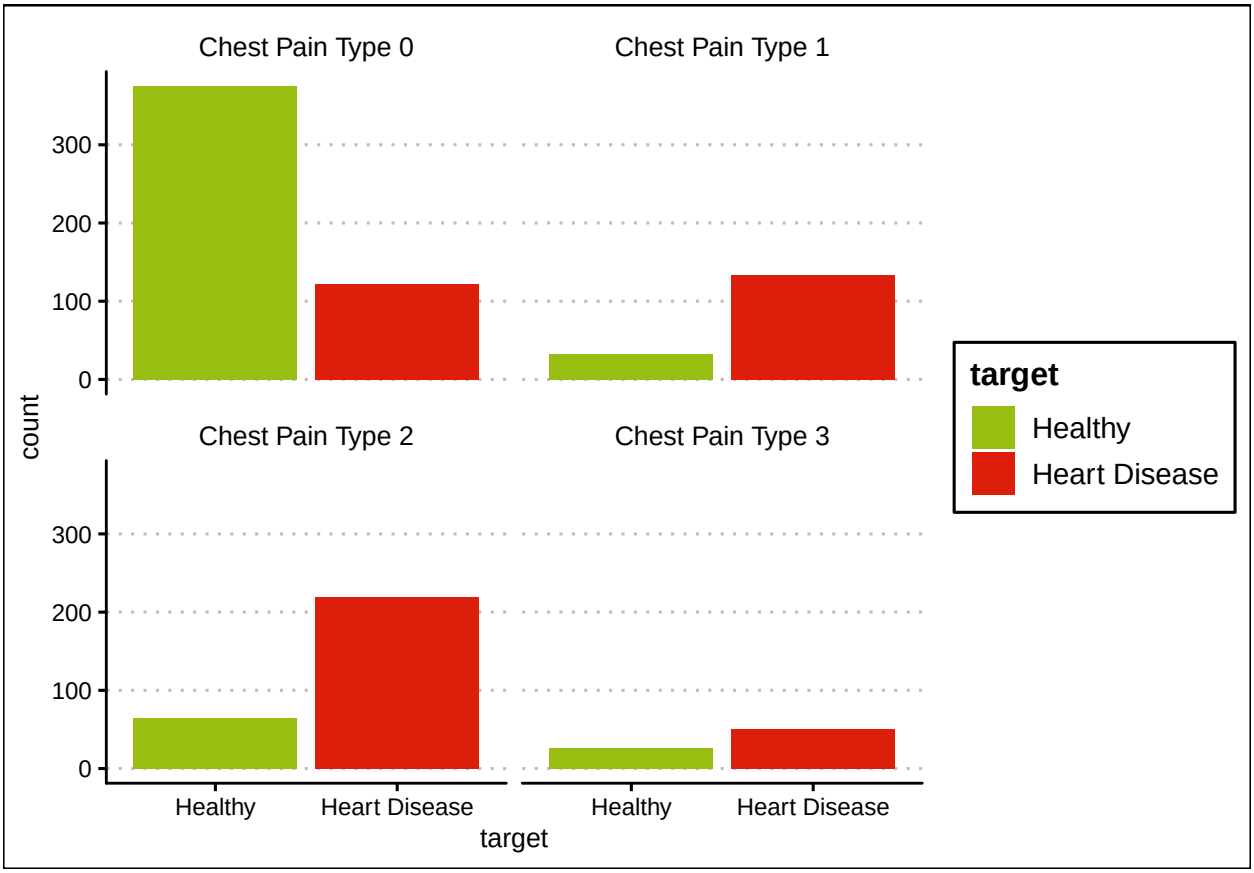
Most of the people who have 0-Major vessels are suffering from heart diseases

```
ggplot(heartDiseaseData,aes(ca, fill=target)) +
  geom_histogram(aes(y=..density..),breaks=seq(0, 5, by=1), color="grey17") +
  geom_density(alpha=.1, fill="black") +
  facet_wrap(~target, ncol=1,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B")) +
  ggtitle("No. Major Vessels Histogram") +
  xlab("Number of Major Vessels (0-3) Colored by Flourosopy") +
  ylab("Density / Count")
```



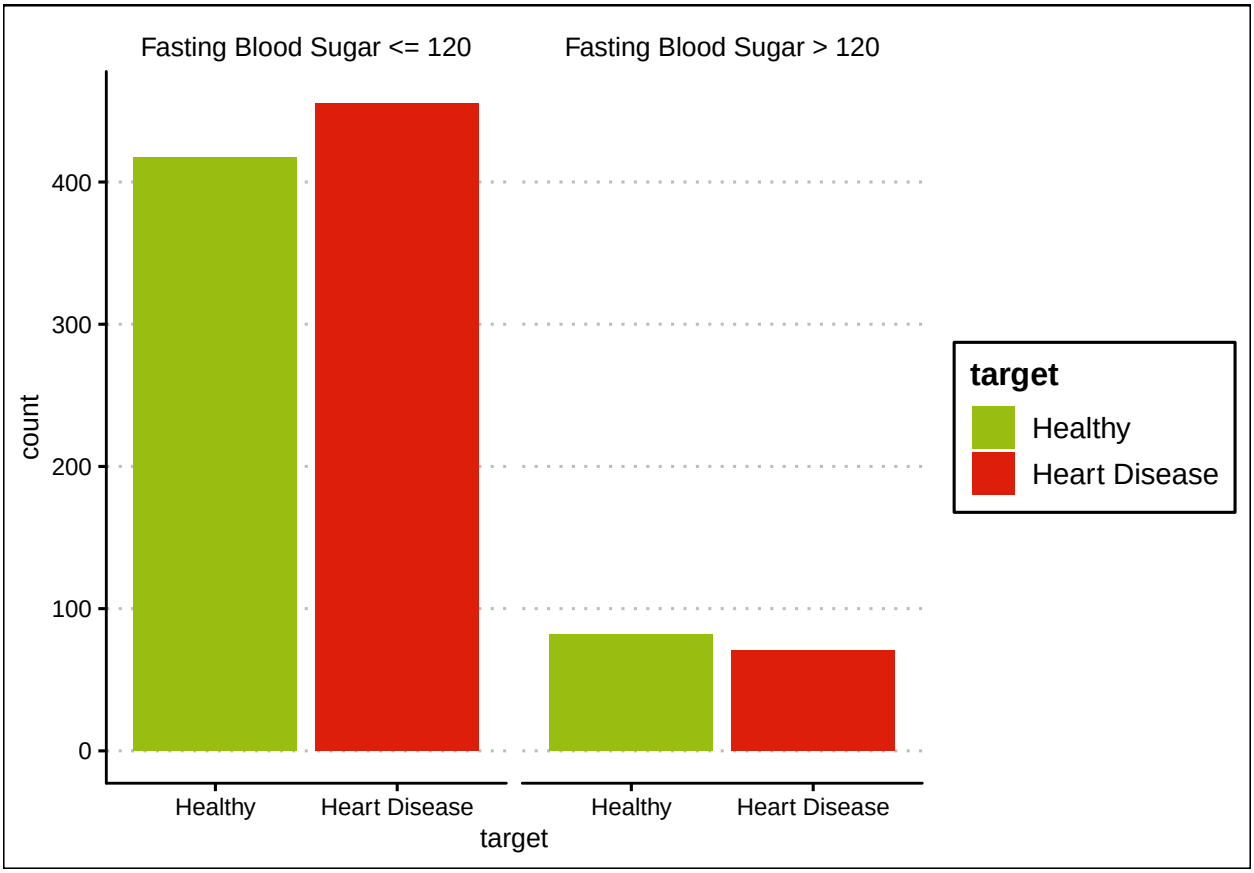
Majority of people suffering from heart diseases have chest pains of type 1 or 2.

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~cp, ncol=2,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```



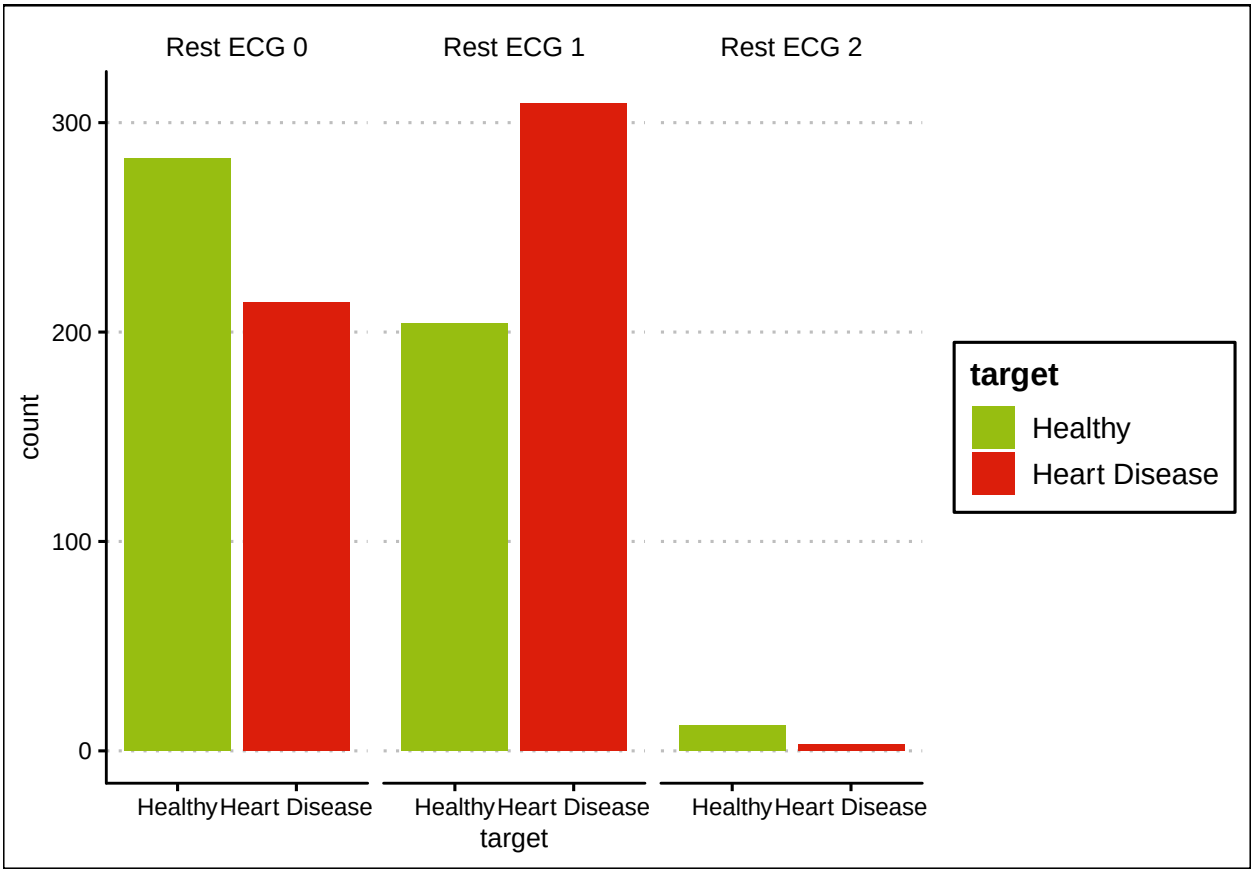
No major difference in fasting blood sugar

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~fbs, ncol=2,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```



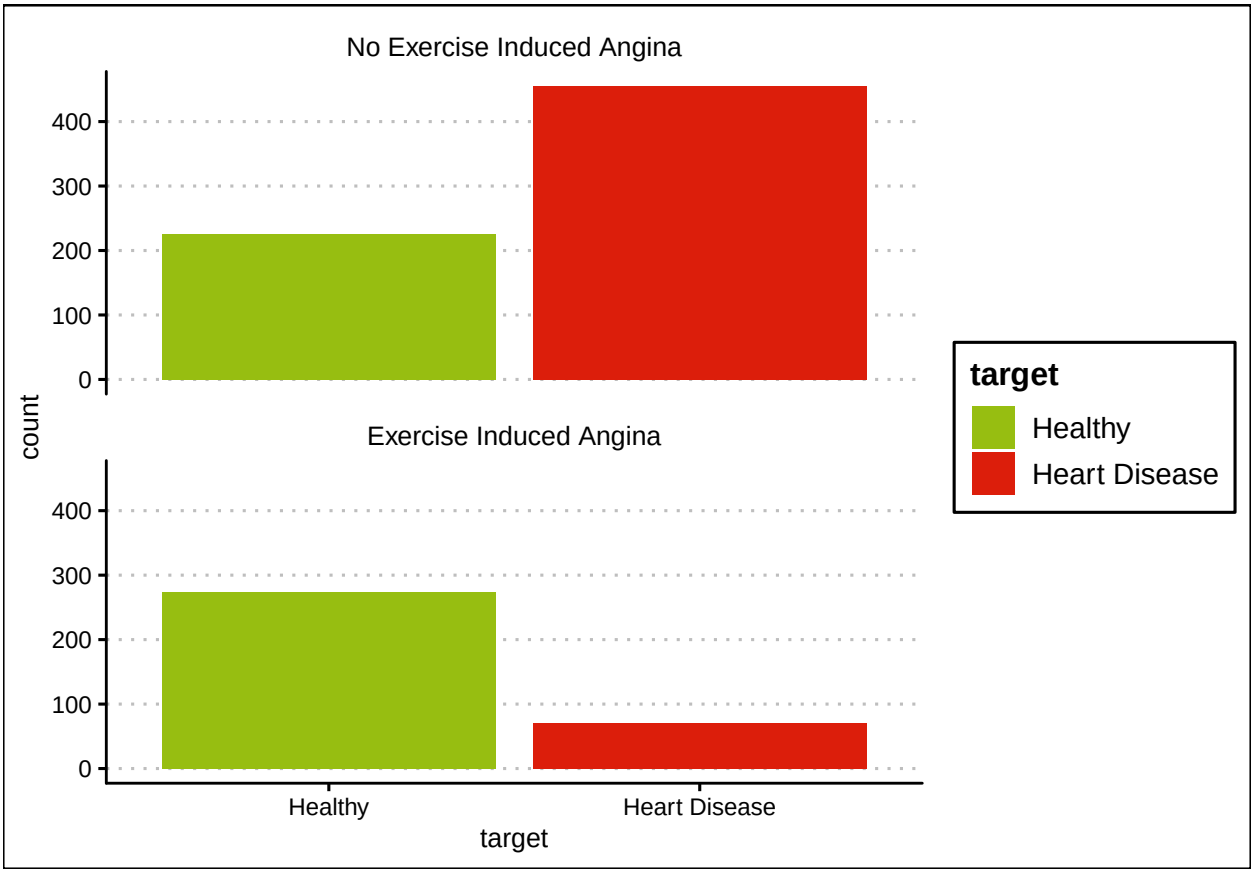
People having Rest ECG-1 have a higher probability of suffering from heart diseases

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~restecg, ncol=3,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```



People with No exercise induced angina have a higher probability of getting heart diseases

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~exang, ncol=1,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```

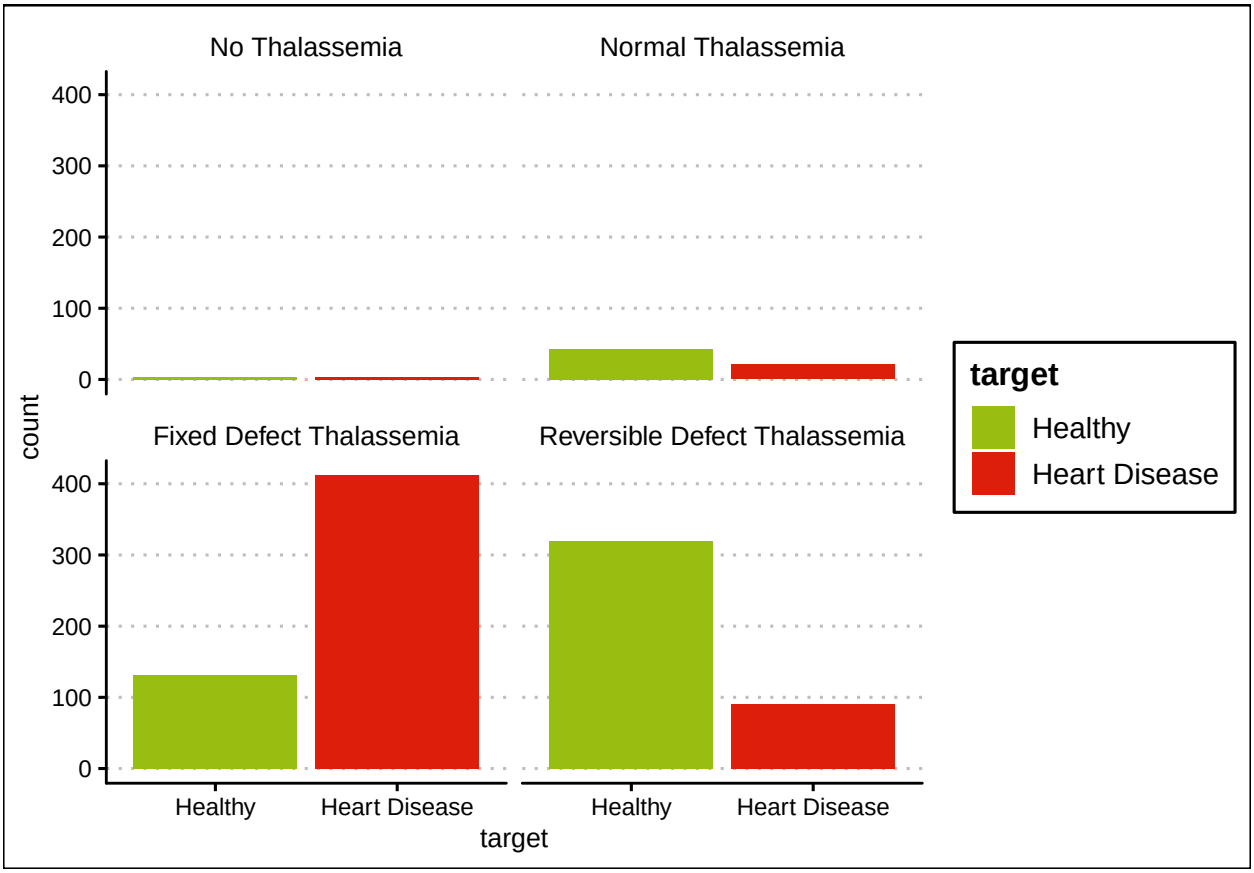


People with Peak Exercise slope 2 have a higher probability of exhibiting heart diseases

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~slope, ncol=1,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```

People with fixed defect Thalassemia have a higher probability to suffer from heart diseases

```
ggplot(heartDiseaseData,aes(target, fill=target)) +
  geom_bar(stat="count") +
  facet_wrap(~thal, ncol=2,scale="fixed") +
  theme_clean() +
  scale_fill_manual(values=c("#97BE11","#DC1E0B"))
```



It can be observed that only a few parameters such as Chest pain type, Gender, Exercise induced angina, Number of vessels, and ST depression have a significant effect. Hence, dropping other parameters

```
log<-glm(target~., data=heartDiseaseData, family=binomial)
summary(log)
```

```
##
## Call:
## glm(formula = target ~ ., family = binomial, data = heartDiseaseData)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.6847  -0.3666   0.1285   0.5176   2.6693
##
## Coefficients:
##                                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)                      0.974938   1.843806   0.529 0.596969
## age                             -0.004314   0.012820  -0.337 0.736479
## sexMale                         -1.610703   0.283425  -5.683 1.32e-08
## cpChest Pain Type 1              1.061225   0.301235   3.523 0.000427
## cpChest Pain Type 2              1.963836   0.257085   7.639 2.19e-14
## cpChest Pain Type 3              1.989568   0.352181   5.649 1.61e-08
## trestbps                        -0.014901   0.005819  -2.561 0.010443
## chol                            -0.005541   0.002130  -2.602 0.009277
## fbsFasting Blood Sugar > 120     0.048261   0.304550   0.158 0.874090
## restecgRest ECG 1                0.511138   0.202653   2.522 0.011661
## restecgRest ECG 2               -0.402546   1.224640  -0.329 0.742378
```

```
## thalach                             0.018227   0.005859   3.111 0.001865
## exangExercise Induced Angina       -0.751473   0.233353  -3.220 0.001280
## oldpeak                            -0.506650   0.122129  -4.148 3.35e-05
## slopePeak Excercise ST Slope 1     -0.540297   0.456438  -1.184 0.236522
## slopePeak Excercise ST Slope 2      0.269358   0.492490   0.547 0.584427
## ca                                 -0.813103   0.109901  -7.399 1.38e-13
## thalNormal Thalassemia              1.918293   1.306918   1.468 0.142159
## thalFixed Defect Thalassemia        1.855539   1.263123   1.469 0.141831
## thalReversible Defect Thalassemia   0.523928   1.268851   0.413 0.679668
##
## (Intercept)
## age
## sexMale                            ***
## cpChest Pain Type 1                ***
## cpChest Pain Type 2                ***
## cpChest Pain Type 3                ***
## trestbps                           *
## chol                               **
## fbsFasting Blood Sugar > 120
## restecgRest ECG 1                  *
## restecgRest ECG 2
## thalach                            **
## exangExercise Induced Angina       **
## oldpeak                            ***
## slopePeak Excercise ST Slope 1
## slopePeak Excercise ST Slope 2
## ca                                 ***
## thalNormal Thalassemia
## thalFixed Defect Thalassemia
## thalReversible Defect Thalassemia
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1420.24  on 1024  degrees of freedom
## Residual deviance:  688.48  on 1005  degrees of freedom
## AIC: 728.48
##
## Number of Fisher Scoring iterations: 6
```

Summary of the significant features

```
d<-heartDiseaseData[,c(2,3,9,10,12,14)]
summary(d)
```

```
##      sex                      cp                                exang
##  Female:312   Chest Pain Type 0:497   No Exercise Induced Angina:680
##  Male  :713   Chest Pain Type 1:167   Exercise Induced Angina   :345
##               Chest Pain Type 2:284
##               Chest Pain Type 3: 77
##
##
##     oldpeak            ca                   target
##  Min.   :0.000   Min.   :0.0000   Healthy      :499
```

```
##  1st Qu.:0.000   1st Qu.:0.0000   Heart Disease:526
##  Median :0.800   Median :0.0000
##  Mean   :1.072   Mean   :0.7541
##  3rd Qu.:1.800   3rd Qu.:1.0000
##  Max.   :6.200   Max.   :4.0000
```

Logistic Regression

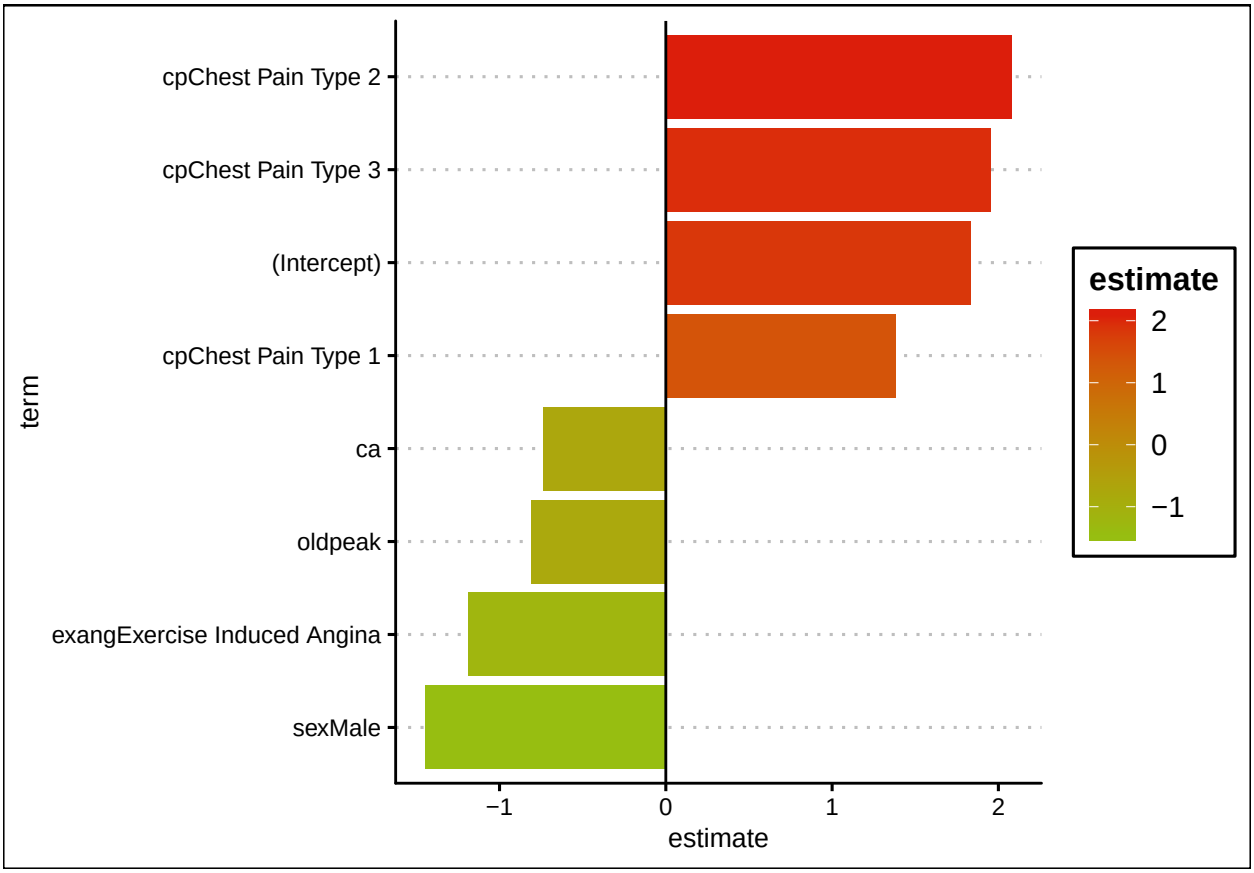
```
log<-glm(target~., data=d, family=binomial)
summary(log)
```

```
##
## Call:
## glm(formula = target ~ ., family = binomial, data = d)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.2611  -0.5287   0.1985   0.5618   2.5538
##
## Coefficients:
##                               Estimate Std. Error z value Pr(>|z|)
## (Intercept)                    1.83497    0.23512   7.804 5.98e-15 ***
## sexMale                       -1.44810    0.21159  -6.844 7.70e-12 ***
## cpChest Pain Type 1            1.37939    0.26083   5.289 1.23e-07 ***
## cpChest Pain Type 2            2.08254    0.22601   9.215  < 2e-16 ***
## cpChest Pain Type 3            1.95453    0.32787   5.961 2.50e-09 ***
## exangExercise Induced Angina -1.18874    0.20450  -5.813 6.14e-09 ***
## oldpeak                       -0.80667    0.09880  -8.165 3.22e-16 ***
## ca                            -0.73873    0.08973  -8.233  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1420.24  on 1024  degrees of freedom
## Residual deviance:  811.27  on 1017  degrees of freedom
## AIC: 827.27
##
## Number of Fisher Scoring iterations: 5
```

```
log.df<-tidy(log)
```

Observations portray that if an individual has the chest pain of type-2 or 3, there is a higher chances of heart diseases. Higher the value of number of blood vessels, exercise induced angina, st-depression and sex male, lower are the chances of heart diseases.

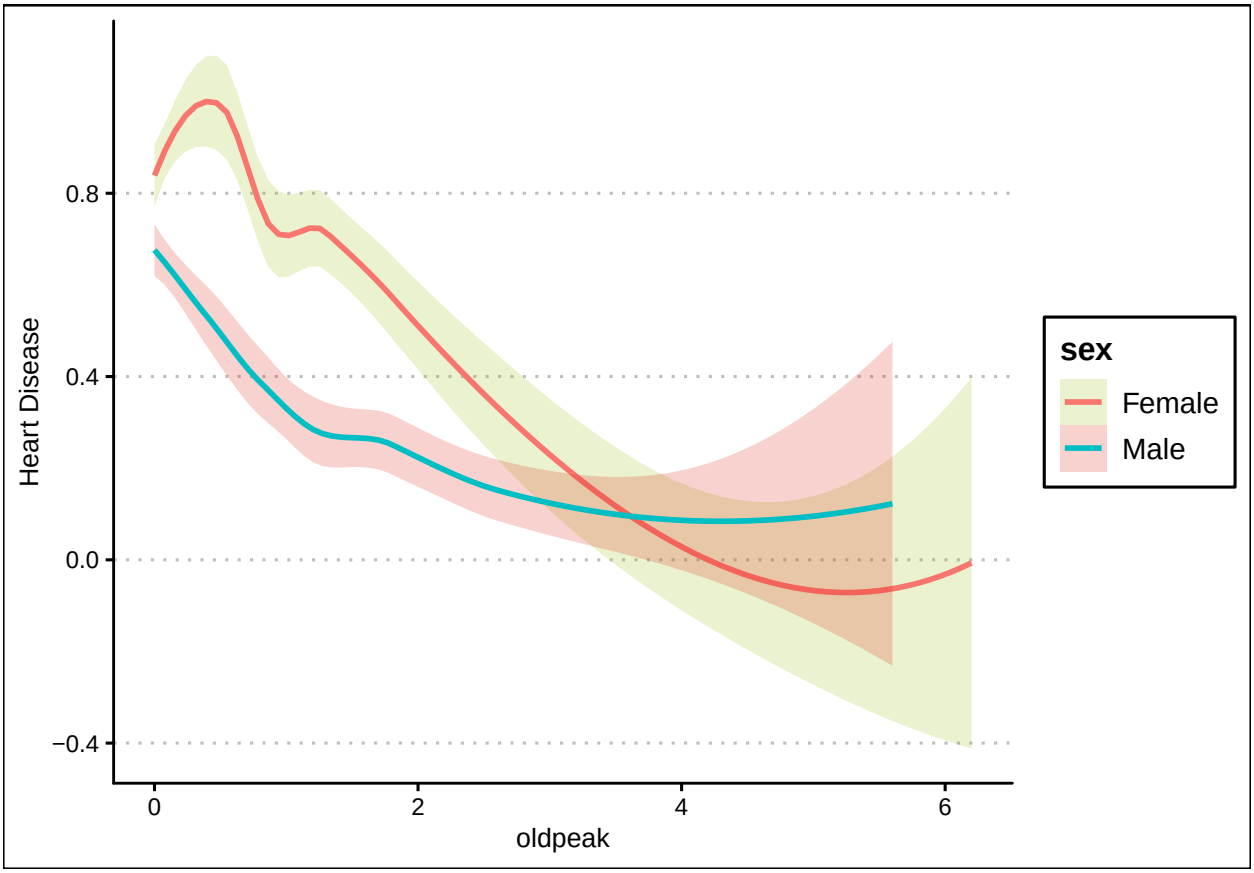
```
log.df %>%
  mutate(term=reorder(term,estimate)) %>%
  ggplot( aes(term,estimate, fill=estimate)) +
  geom_bar(stat="identity") +
  scale_fill_gradient(low = "#97BE11",high = "#DC1E0B") +
  theme_clean() +
  geom_hline(yintercept=0) +
  coord_flip()
```



As the value of oldpeak –> ST depression increases, the probability of heart disease decreases

```
ggplot(heartDiseaseData, aes(oldpeak, as.numeric(target)-1, color=sex)) +
  stat_smooth(formula=y~x,
              alpha=0.2, size=1, aes(fill=sex)) + scale_fill_manual(values=c("#97BE11","#DC1E0B"))+
  theme_clean() + ylab("Heart Disease")
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
  ylim(-1,1)
```

```
## <ScaleContinuousPosition>
##  Range:
##  Limits:   -1 --    1
```

As the number of blood vessels rises, the probability of heart disease in females decreses, while it increases for males

```
ggplot(heartDiseaseData, aes(ca, as.numeric(target)-1, color=sex)) +
  stat_smooth(formula=y~x,
              alpha=0.2, size=1, aes(fill=sex)) + scale_fill_manual(values=c("#97BE11","#DC1E0B"))+
  theme_clean() +
  ylim(-1,1)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

```
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : pseudoinverse used at -0.015
```

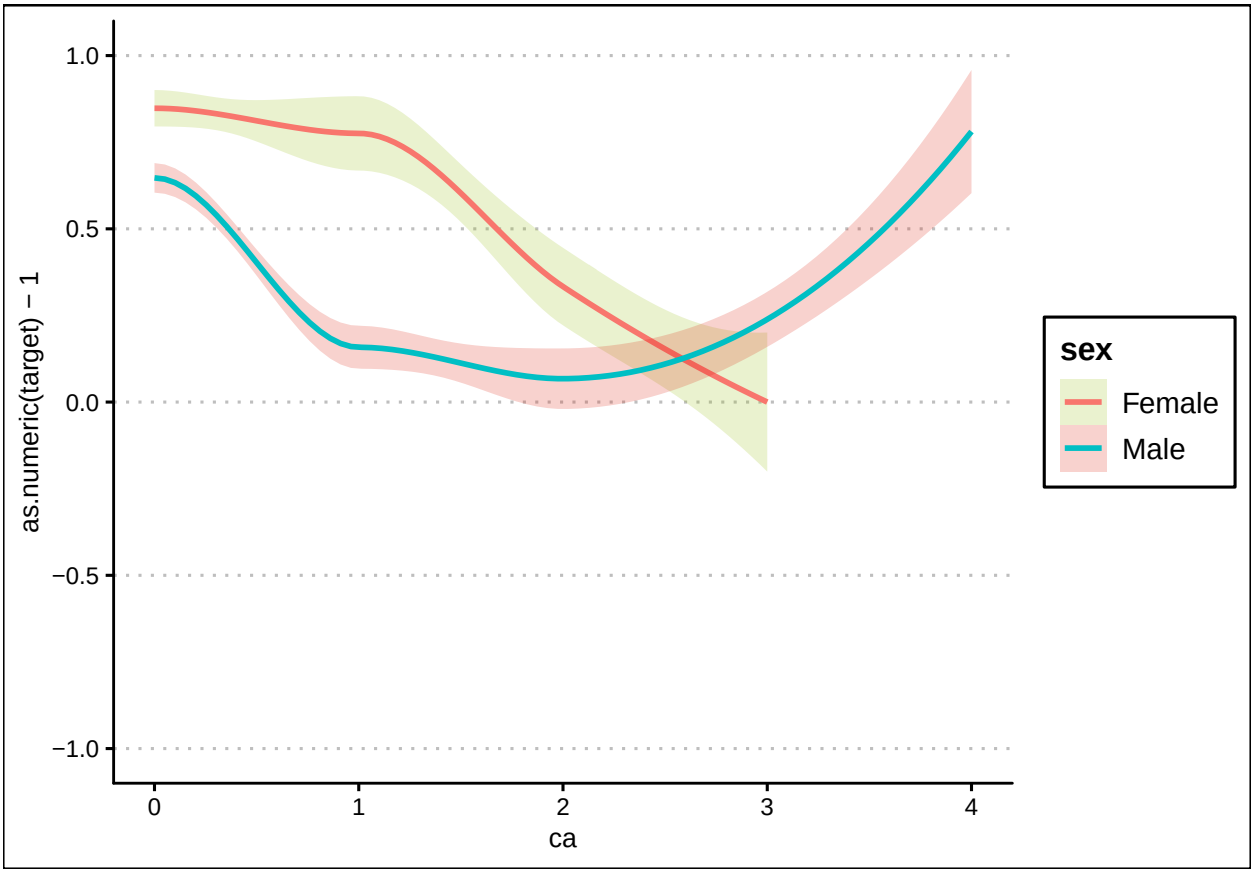
```
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : neighborhood radius 1.015
```

```
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : reciprocal condition number 0
```

```
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : There are other near singularities as well. 1
```

```
## Warning in predLoess(object$y, object$x, newx = if
```

```
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : pseudoinverse used
## at -0.015

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : neighborhood radius
## 1.015

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : reciprocal
## condition number 0

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : There are other
## near singularities as well. 1

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : pseudoinverse used at -0.02

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : neighborhood radius 1.02

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : reciprocal condition number 0

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : There are other near singularities as well. 1

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : pseudoinverse used
## at -0.02

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : neighborhood radius
## 1.02

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : reciprocal
## condition number 0

## Warning in predLoess(object$y, object$x, newx = if
## (is.null(newdata)) object$x else if (is.data.frame(newdata))
## as.matrix(model.frame(delete.response(terms(object)), : There are other
## near singularities as well. 1
```



Logistic Regression

```
data<-d
set.seed(1237)
train <- sample(nrow(data), .8*nrow(data), replace = FALSE)
TrainSet <- data[train,]
ValidSet <- data[-train,]

#Tuning parameters
fitControl <- trainControl(method = "repeatedcv",
                           number = 10,
                           repeats = 10,
                           classProbs = TRUE,
                           summaryFunction = twoClassSummary)



TrainSet$target<-make.names(TrainSet$target)
set.seed(142)
TrainSet$target<-as.factor(TrainSet$target)
```

```
gbm.ada.1 <- caret::train(target ~ .,
                                    data = TrainSet ,
                                    method = "glm",
                                    trControl = fitControl,
                                    metric="ROC")
```

```
gbm.ada.1
```

```
## Generalized Linear Model
##
## 820 samples
##   5 predictor
##   2 classes: 'Healthy', 'Heart.Disease'
##
## No pre-processing
## Resampling: Cross-Validated (10 fold, repeated 10 times)
## Summary of sample sizes: 738, 738, 737, 738, 738, 738, ...
## Resampling results:
##
##   ROC        Sens       Spec
##   0.9031278  0.8220577  0.8476024
```

ST Depression is the most significant feature followed by chest paint type - 2 and so on

```
varImp(gbm.ada.1)
```

```
## glm variable importance
##
##                                Overall
## `cpChest Pain Type 2`           100.00
## oldpeak                          92.00
## ca                               64.84
## sexMale                          63.22
## `cpChest Pain Type 3`            20.26
## `cpChest Pain Type 1`            10.43
## `exangExercise Induced Angina`    0.00
```

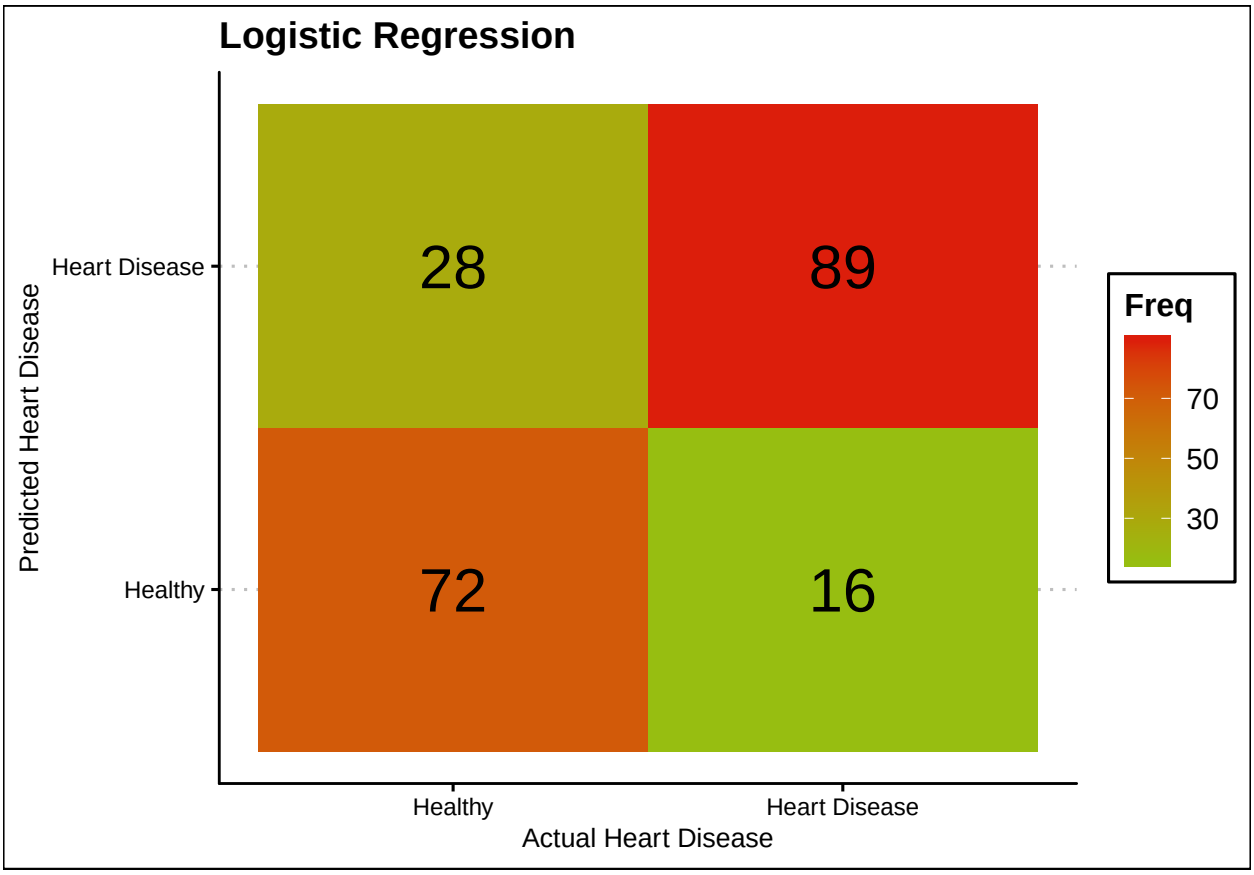
```
pred <- predict(gbm.ada.1,ValidSet)
levels(pred)[2] <- "Heart Disease"
t<-table(pred, ValidSet$target)
t.df<-as.data.frame(t)

res<-caret::confusionMatrix(t, positive="Heart Disease")
res
```

```
## Confusion Matrix and Statistics
##
##
## pred            Healthy Heart Disease
##   Healthy            72            16
##   Heart Disease      28            89
##
##                Accuracy : 0.7854
##                  95% CI : (0.7228, 0.8395)
##     No Information Rate : 0.5122
##     P-Value [Acc > NIR] : 5.96e-16
##
##                   Kappa : 0.5692
##
##  Mcnemar's Test P-Value : 0.09725
##
##             Sensitivity : 0.8476
```

```
##             Specificity : 0.7200
##          Pos Pred Value : 0.7607
##          Neg Pred Value : 0.8182
##              Prevalence : 0.5122
##          Detection Rate : 0.4341
##    Detection Prevalence : 0.5707
##       Balanced Accuracy : 0.7838
##
##        'Positive' Class : Heart Disease
##
```

Confusion Matrix

```
ggplot(data = t.df, aes(x = Var2, y = pred, label=Freq)) +
  geom_tile(aes(fill = Freq)) +
  scale_fill_gradient(low="#97BE11",high="#DC1E0B") +
  theme_clean() +
  xlab("Actual Heart Disease") +
  ylab("Predicted Heart Disease") +
  geom_text(size=8) +
  ggtitle("Logistic Regression")
```



Random Forest

```
gbm.ada.1 <- caret::train(target ~ .,
                                    data = TrainSet ,
                                    method = "rf",
                                    trControl = fitControl,
```

```
                                        metric="ROC")

gbm.ada.1
```

```
## Random Forest
##
## 820 samples
##   5 predictor
##   2 classes: 'Healthy', 'Heart.Disease'
##
## No pre-processing
## Resampling: Cross-Validated (10 fold, repeated 10 times)
## Summary of sample sizes: 737, 739, 738, 738, 738, 738, ...
## Resampling results across tuning parameters:
##
##   mtry  ROC        Sens       Spec
##   2     0.9514831  0.8364295  0.9482171
##   4     0.9683115  0.8927885  0.9508250
##   7     0.9721075  0.9165962  0.9451052
##
## ROC was used to select the optimal model using the largest value.
## The final value used for the model was mtry = 7.
```

Feature Importance

```
varImp(gbm.ada.1)
```

```
## rf variable importance
##
##                               Overall
## oldpeak                       100.000
## ca                             62.815
## exangExercise Induced Angina  28.875
## sexMale                       15.453
## cpChest Pain Type 2           12.702
## cpChest Pain Type 3            3.989
## cpChest Pain Type 1            0.000
```

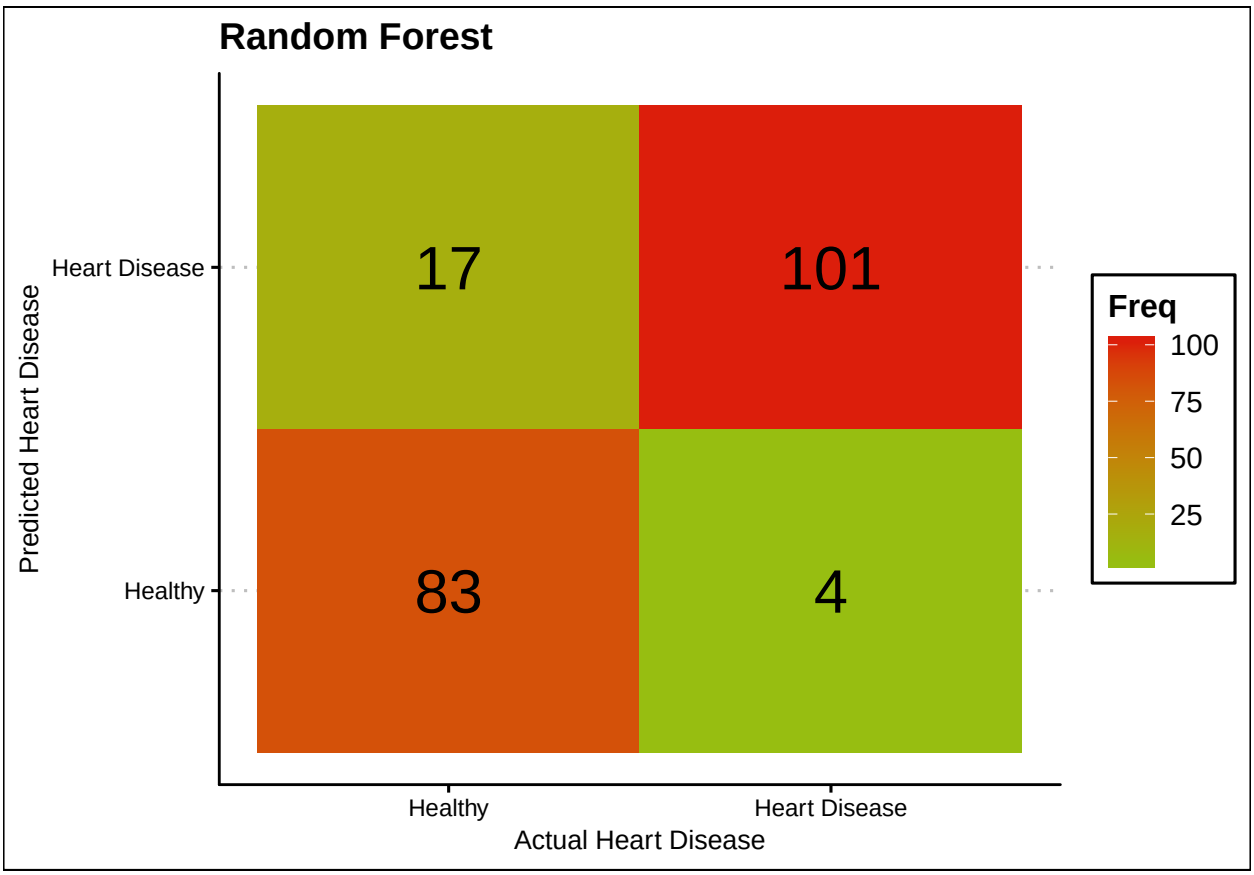
```
pred <- predict(gbm.ada.1,ValidSet)
levels(pred)[2] <- "Heart Disease"
t<-table(ValidSet$target, pred)
t.df<-as.data.frame(t)
res<-caret::confusionMatrix(t, positive="Heart Disease")
res
```

```
## Confusion Matrix and Statistics
##
##                pred
##                 Healthy Heart Disease
##   Healthy            83            17
##   Heart Disease       4           101
##
##                Accuracy : 0.8976
##                  95% CI : (0.8477, 0.9355)
##     No Information Rate : 0.5756
##     P-Value [Acc > NIR] : < 2.2e-16
```

```
##
##                   Kappa : 0.7944
##
##  Mcnemar's Test P-Value : 0.008829
##
##             Sensitivity : 0.8559
##             Specificity : 0.9540
##          Pos Pred Value : 0.9619
##          Neg Pred Value : 0.8300
##              Prevalence : 0.5756
##          Detection Rate : 0.4927
##    Detection Prevalence : 0.5122
##       Balanced Accuracy : 0.9050
##
##        'Positive' Class : Heart Disease
##
```

Confusion Matrix

```
ggplot(data = t.df, aes(x = Var1, y = pred, label=Freq)) +
  geom_tile(aes(fill = Freq)) +
  scale_fill_gradient(low = "#97BE11",high = "#DC1E0B") +
  theme_clean() +
  xlab("Actual Heart Disease") +
  ylab("Predicted Heart Disease") +
  geom_text(size=8) +
  ggtitle("Random Forest")
```



Plotting Decision Tree

```
gbmGrid <-  expand.grid(cp=c(0.01))
fitControl <- trainControl(method = "repeatedcv",
                           number = 10,
                           repeats = 10,
                           classProbs = TRUE,
                           summaryFunction = twoClassSummary)
d$target<-make.names(d$target)
system.time(gbm.ada.1 <- caret::train(target ~ .,
                                      data = d ,
                                      method = "rpart",
                                      trControl = fitControl,
                                      metric="ROC",
                                      tuneGrid=gbmGrid))
```

```
##    user  system elapsed
##   2.883   0.000   1.695
```

```
gbm.ada.1
```

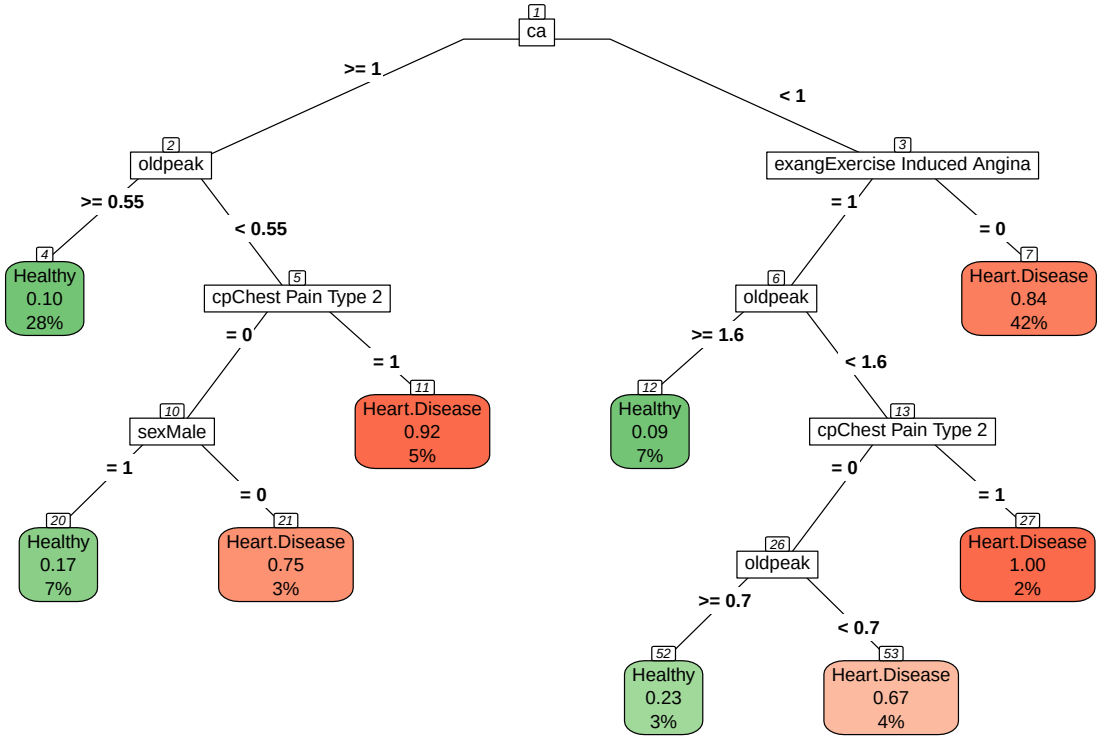
```
## CART
##
## 1025 samples
##    5 predictor
##    2 classes: 'Healthy', 'Heart.Disease'
##
## No pre-processing
## Resampling: Cross-Validated (10 fold, repeated 10 times)
## Summary of sample sizes: 922, 923, 923, 922, 922, 923, ...
## Resampling results:
##
##   ROC        Sens       Spec
##   0.8667657  0.8119347  0.8746045
##
## Tuning parameter 'cp' was held constant at a value of 0.01
```

```
varImp(gbm.ada.1)
```

```
## rpart variable importance
##
##                                 Overall
## oldpeak                        100.0000
## exangExercise Induced Angina    85.3950
## cpChest Pain Type 2             67.5191
## ca                              63.1697
## sexMale                         48.8267
## cpChest Pain Type 1              7.4876
## cpChest Pain Type 3              0.5601
## `exangExercise Induced Angina`   0.0000
## `cpChest Pain Type 1`            0.0000
## `cpChest Pain Type 2`            0.0000
## `cpChest Pain Type 3`            0.0000
```

```
rpart.plot(gbm.ada.1$finalModel,
           type=5,
           fallen.leaves = FALSE,
```

```
           box.palette = "GnRd",
           nn=TRUE)
```



Neural Network

```
fitControl <- trainControl(method = "repeatedcv",
                           number = 10,
                           repeats = 10,
                           classProbs = TRUE,
                           summaryFunction = twoClassSummary)
gbm.ada.1 <- caret::train(target ~ .,
                                    data = TrainSet ,
                                    method = "nnet",
                                    trControl = fitControl,
                                    metric="ROC")
```

```
## # weights:  10
## initial  value 513.300036
## iter  10 value 292.270043
## iter  20 value 276.909017
## iter  30 value 275.732884
## iter  40 value 274.411246
## iter  50 value 274.191649
## iter  60 value 274.042510
## iter  70 value 273.989829
## iter  80 value 273.966227
## iter  90 value 273.928680
## iter 100 value 273.919069
## final  value 273.919069
## stopped after 100 iterations
## # weights:  28
## initial  value 507.367746
```

```
## iter  10 value 271.592088
## iter  20 value 241.584618
## iter  30 value 228.716175
## iter  40 value 225.343261
## iter  50 value 217.518804
## iter  60 value 215.428094
## iter  70 value 214.416240
## iter  80 value 213.737707
## iter  90 value 213.236036
## iter 100 value 213.055757
## final  value 213.055757
## stopped after 100 iterations
## # weights:  46
## initial  value 506.360930
## iter  10 value 261.679319
## iter  20 value 210.530465
## iter  30 value 186.373485
## iter  40 value 170.292947
## iter  50 value 163.011759
## iter  60 value 155.139530
## iter  70 value 152.635022
## iter  80 value 151.121639
## iter  90 value 150.448009
## iter 100 value 149.727443
## final  value 149.727443
## stopped after 100 iterations
## # weights:  10
## initial  value 584.084962
## iter  10 value 347.300551
## iter  20 value 296.852075
## iter  30 value 285.860128
## iter  40 value 284.755837
## final  value 284.755707
## converged
## # weights:  28
## initial  value 513.502310
## iter  10 value 298.628013
## iter  20 value 259.318228
## iter  30 value 247.378918
## iter  40 value 241.387151
## iter  50 value 239.272856
## iter  60 value 238.899335
## iter  70 value 238.892312
## iter  80 value 238.891821
## iter  80 value 238.891820
## iter  80 value 238.891820
## final  value 238.891820
## converged
## # weights:  46
## initial  value 527.253857
## iter  10 value 322.247046
## iter  20 value 270.375421
## iter  30 value 241.241227
## iter  40 value 230.521339
```

```
## iter  50 value 227.441218
## iter  60 value 226.002536
## iter  70 value 221.781629
## iter  80 value 219.658379
## iter  90 value 219.377661
## iter 100 value 219.359428
## final  value 219.359428
## stopped after 100 iterations
## # weights:  10
## initial  value 518.469240
## iter  10 value 315.390111
## iter  20 value 297.020822
## iter  30 value 286.981173
## iter  40 value 282.776251
## iter  50 value 276.186164
## iter  60 value 274.879694
## iter  70 value 274.272734
## iter  80 value 274.165479
## iter  90 value 274.061331
## iter 100 value 274.032781
## final  value 274.032781
## stopped after 100 iterations
## # weights:  28
## initial  value 533.712750
## iter  10 value 304.286709
## iter  20 value 257.908077
## iter  30 value 237.305626
## iter  40 value 225.607634
## iter  50 value 215.353422
## iter  60 value 214.091166
## iter  70 value 213.702248
## iter  80 value 213.448683
## iter  90 value 213.319312
## iter 100 value 213.140885
## final  value 213.140885
## stopped after 100 iterations
## # weights:  46
## initial  value 518.910052
## iter  10 value 268.126541
## iter  20 value 222.480467
## iter  30 value 209.095940
## iter  40 value 192.904411
## iter  50 value 182.412115
## iter  60 value 177.711753
## iter  70 value 177.210993
## iter  80 value 177.052076
## iter  90 value 176.822876
## iter 100 value 176.707817
## final  value 176.707817
## stopped after 100 iterations
## # weights:  10
## initial  value 495.962955
## iter  10 value 288.780478
## iter  20 value 281.355839
```

```
## iter  30 value 279.694778
## iter  40 value 278.363573
## iter  50 value 278.173535
## iter  60 value 277.998364
## iter  70 value 277.931989
## iter  80 value 277.901170
## iter  90 value 277.850063
## iter 100 value 277.844045
## final  value 277.844045
## stopped after 100 iterations
## # weights:  28
## initial  value 548.528840
## iter  10 value 280.687801
## iter  20 value 249.322025
## iter  30 value 232.298927
## iter  40 value 216.860994
## iter  50 value 208.799738
## iter  60 value 207.538002
## iter  70 value 207.387337
## iter  80 value 207.238004
## iter  90 value 206.506860
## iter 100 value 205.863630
## final  value 205.863630
## stopped after 100 iterations
## # weights:  46
## initial  value 489.941608
## iter  10 value 284.557749
## iter  20 value 231.946871
## iter  30 value 208.785899
## iter  40 value 192.597514
## iter  50 value 181.551187
## iter  60 value 176.739113
## iter  70 value 170.602740
## iter  80 value 165.186847
## iter  90 value 159.182923
## iter 100 value 155.770238
## final  value 155.770238
## stopped after 100 iterations
## # weights:  10
## initial  value 506.119853
## iter  10 value 329.309993
## iter  20 value 298.111591
## iter  30 value 290.294680
## iter  40 value 287.618472
## final  value 287.618462
## converged
## # weights:  28
## initial  value 551.619181
## iter  10 value 288.102541
## iter  20 value 262.029603
## iter  30 value 248.524065
## iter  40 value 244.543422
## iter  50 value 242.417731
## iter  60 value 240.647130
```

```
## iter  70 value 239.542385
## final  value 239.460925
## converged
## # weights:  46
## initial  value 500.091974
## iter  10 value 284.654024
## iter  20 value 245.763018
## iter  30 value 237.639142
## iter  40 value 232.789453
## iter  50 value 230.878127
## iter  60 value 230.425656
## iter  70 value 230.315324
## iter  80 value 230.306288
## iter  90 value 230.244265
## iter 100 value 230.088581
## final  value 230.088581
## stopped after 100 iterations
## # weights:  10
## initial  value 506.861146
## iter  10 value 308.388410
## iter  20 value 299.143723
## iter  30 value 294.978083
## iter  40 value 294.883884
## iter  50 value 294.730067
## final  value 294.729948
## converged
## # weights:  28
## initial  value 502.486244
## iter  10 value 275.818573
## iter  20 value 238.167227
## iter  30 value 228.707118
## iter  40 value 226.883860
## iter  50 value 224.363878
## iter  60 value 221.521878
## iter  70 value 217.882518
## iter  80 value 217.229188
## iter  90 value 216.227456
## iter 100 value 215.813155
## final  value 215.813155
## stopped after 100 iterations
## # weights:  46
## initial  value 558.250906
## iter  10 value 272.909963
## iter  20 value 229.231292
## iter  30 value 202.267946
## iter  40 value 189.211333
## iter  50 value 182.528311
## iter  60 value 179.887539
## iter  70 value 175.225042
## iter  80 value 171.104350
## iter  90 value 170.168083
## iter 100 value 169.779762
## final  value 169.779762
## stopped after 100 iterations
```

```
## # weights:  10
## initial  value 510.601819
## iter  10 value 315.827058
## iter  20 value 290.522914
## iter  30 value 285.628180
## iter  40 value 280.845758
## iter  50 value 280.842345
## iter  60 value 280.782963
## iter  70 value 280.763939
## iter  80 value 280.742716
## iter  90 value 280.727661
## iter 100 value 280.723693
## final  value 280.723693
## stopped after 100 iterations
## # weights:  28
## initial  value 514.221785
## iter  10 value 280.000248
## iter  20 value 243.693583
## iter  30 value 229.658938
## iter  40 value 219.787846
## iter  50 value 213.727498
## iter  60 value 212.952300
## iter  70 value 212.655127
## iter  80 value 212.646916
## final  value 212.646595
## converged
## # weights:  46
## initial  value 568.688950
## iter  10 value 275.412761
## iter  20 value 242.319696
## iter  30 value 218.588812
## iter  40 value 207.367873
## iter  50 value 189.799679
## iter  60 value 177.280539
## iter  70 value 168.953261
## iter  80 value 166.148761
## iter  90 value 165.056705
## iter 100 value 164.764828
## final  value 164.764828
## stopped after 100 iterations
## # weights:  10
## initial  value 521.225940
## iter  10 value 321.505332
## iter  20 value 289.495885
## iter  30 value 288.978328
## final  value 288.970715
## converged
## # weights:  28
## initial  value 548.348597
## iter  10 value 326.678040
## iter  20 value 276.236656
## iter  30 value 266.191069
## iter  40 value 260.016439
## iter  50 value 256.092835
```

```
## iter  60 value 248.966482
## iter  70 value 247.364456
## iter  80 value 246.916904
## final  value 246.913108
## converged
## # weights:  46
## initial  value 554.269665
## iter  10 value 329.330251
## iter  20 value 276.825258
## iter  30 value 257.953460
## iter  40 value 249.959517
## iter  50 value 245.087163
## iter  60 value 242.214053
## iter  70 value 241.683626
## iter  80 value 241.596321
## iter  90 value 241.344756
## iter 100 value 241.165270
## final  value 241.165270
## stopped after 100 iterations
## # weights:  10
## initial  value 502.767070
## iter  10 value 298.472984
## iter  20 value 282.674712
## iter  30 value 281.285149
## iter  40 value 280.984429
## iter  50 value 280.824839
## iter  60 value 280.822496
## iter  70 value 280.792261
## final  value 280.792142
## converged
## # weights:  28
## initial  value 644.306648
## iter  10 value 298.054897
## iter  20 value 258.607497
## iter  30 value 241.417909
## iter  40 value 233.603134
## iter  50 value 226.020275
## iter  60 value 225.652590
## iter  70 value 225.572806
## iter  80 value 225.526224
## iter  90 value 225.467607
## iter 100 value 225.373616
## final  value 225.373616
## stopped after 100 iterations
## # weights:  46
## initial  value 509.847879
## iter  10 value 286.690967
## iter  20 value 233.920621
## iter  30 value 209.593237
## iter  40 value 199.464937
## iter  50 value 189.813451
## iter  60 value 187.822718
## iter  70 value 187.562789
## iter  80 value 186.628902
```

```
## iter  90 value 186.434707
## iter 100 value 186.406099
## final  value 186.406099
## stopped after 100 iterations
## # weights:  10
## initial  value 537.533805
## iter  10 value 326.521714
## iter  20 value 293.768724
## iter  30 value 287.933632
## iter  40 value 277.818314
## iter  50 value 270.698399
## iter  60 value 270.656631
## iter  70 value 270.560643
## iter  80 value 269.966422
## iter  90 value 269.775909
## iter 100 value 269.749694
## final  value 269.749694
## stopped after 100 iterations
## # weights:  28
## initial  value 508.279629
## iter  10 value 311.800397
## iter  20 value 254.527420
## iter  30 value 239.574893
## iter  40 value 235.403004
## iter  50 value 233.758797
## iter  60 value 233.289481
## iter  70 value 233.233466
## iter  80 value 233.114805
## iter  90 value 233.092236
## iter 100 value 233.089827
## final  value 233.089827
## stopped after 100 iterations
## # weights:  46
## initial  value 575.784763
## iter  10 value 292.571123
## iter  20 value 233.876830
## iter  30 value 212.674445
## iter  40 value 197.384068
## iter  50 value 183.190137
## iter  60 value 176.884067
## iter  70 value 173.197019
## iter  80 value 169.153179
## iter  90 value 166.680438
## iter 100 value 165.307603
## final  value 165.307603
## stopped after 100 iterations
## # weights:  10
## initial  value 517.183426
## iter  10 value 309.459157
## iter  20 value 289.879936
## iter  30 value 288.327683
## final  value 288.297420
## converged
## # weights:  28
```

```
## initial  value 522.096726
## iter  10 value 301.058885
## iter  20 value 261.421859
## iter  30 value 254.224396
## iter  40 value 252.421188
## iter  50 value 252.104169
## iter  60 value 251.999695
## iter  70 value 251.913014
## iter  80 value 251.867793
## final  value 251.857758
## converged
## # weights:  46
## initial  value 534.265323
## iter  10 value 285.897911
## iter  20 value 255.738814
## iter  30 value 248.425414
## iter  40 value 245.423879
## iter  50 value 239.715571
## iter  60 value 235.414835
## iter  70 value 231.353783
## iter  80 value 230.146907
## iter  90 value 229.582227
## iter 100 value 229.527613
## final  value 229.527613
## stopped after 100 iterations
## # weights:  10
## initial  value 536.849762
## iter  10 value 313.254050
## iter  20 value 285.549373
## iter  30 value 282.042027
## iter  40 value 280.087808
## iter  50 value 279.533173
## iter  60 value 279.423152
## iter  70 value 279.273360
## iter  80 value 279.255578
## iter  90 value 279.223612
## iter 100 value 279.222366
## final  value 279.222366
## stopped after 100 iterations
## # weights:  28
## initial  value 529.254197
## iter  10 value 294.631953
## iter  20 value 260.499128
## iter  30 value 232.899960
## iter  40 value 228.523864
## iter  50 value 221.381001
## iter  60 value 219.712034
## iter  70 value 218.593740
## iter  80 value 218.228813
## iter  90 value 217.950797
## iter 100 value 217.765186
## final  value 217.765186
## stopped after 100 iterations
## # weights:  46
```

```
## initial  value 785.883262
## iter  10 value 276.140183
## iter  20 value 231.971500
## iter  30 value 210.161926
## iter  40 value 193.974998
## iter  50 value 177.302220
## iter  60 value 174.720626
## iter  70 value 173.335108
## iter  80 value 171.481565
## iter  90 value 170.736332
## iter 100 value 168.747907
## final  value 168.747907
## stopped after 100 iterations
## # weights:  10
## initial  value 508.594760
## iter  10 value 326.539696
## iter  20 value 305.541885
## iter  30 value 304.307316
## iter  40 value 298.702947
## iter  50 value 297.924516
## iter  60 value 297.879780
## final  value 297.879692
## converged
## # weights:  28
## initial  value 513.725158
## iter  10 value 297.397483
## iter  20 value 241.822330
## iter  30 value 228.891752
## iter  40 value 220.898254
## iter  50 value 213.240723
## iter  60 value 210.621854
## iter  70 value 209.505993
## iter  80 value 209.126319
## iter  90 value 208.840958
## iter 100 value 208.595005
## final  value 208.595005
## stopped after 100 iterations
## # weights:  46
## initial  value 559.041367
## iter  10 value 272.055673
## iter  20 value 235.828865
## iter  30 value 220.201158
## iter  40 value 208.824206
## iter  50 value 199.917829
## iter  60 value 197.479791
## iter  70 value 195.832041
## iter  80 value 194.620245
## iter  90 value 193.764364
## iter 100 value 193.246333
## final  value 193.246333
## stopped after 100 iterations
## # weights:  10
## initial  value 517.566200
## iter  10 value 337.608258
```

```
## iter  20 value 297.573666
## iter  30 value 294.097370
## iter  40 value 293.381136
## iter  40 value 293.381135
## iter  40 value 293.381135
## final  value 293.381135
## converged
## # weights:  28
## initial  value 555.448414
## iter  10 value 315.160871
## iter  20 value 278.635696
## iter  30 value 266.506478
## iter  40 value 260.981887
## iter  50 value 255.870351
## iter  60 value 255.331098
## iter  70 value 254.173008
## iter  80 value 250.162768
## iter  90 value 249.823479
## final  value 249.819769
## converged
## # weights:  46
## initial  value 484.395111
## iter  10 value 281.654991
## iter  20 value 256.364766
## iter  30 value 252.155418
## iter  40 value 247.066583
## iter  50 value 240.587341
## iter  60 value 234.571388
## iter  70 value 233.067186
## iter  80 value 232.705623
## iter  90 value 232.695495
## iter 100 value 232.693977
## final  value 232.693977
## stopped after 100 iterations
## # weights:  10
## initial  value 523.865130
## iter  10 value 336.911437
## iter  20 value 289.241052
## iter  30 value 285.754779
## iter  40 value 283.156672
## iter  50 value 282.756900
## iter  60 value 282.440538
## iter  70 value 282.286971
## iter  80 value 282.254883
## iter  90 value 282.165647
## iter 100 value 282.160870
## final  value 282.160870
## stopped after 100 iterations
## # weights:  28
## initial  value 520.941559
## iter  10 value 355.322717
## iter  20 value 306.728748
## iter  30 value 275.031578
## iter  40 value 261.233797
```

```
## iter  50 value 253.893034
## iter  60 value 250.909553
## iter  70 value 249.736349
## iter  80 value 249.396730
## iter  90 value 249.224357
## iter 100 value 249.212293
## final  value 249.212293
## stopped after 100 iterations
## # weights:  46
## initial  value 521.231088
## iter  10 value 275.610242
## iter  20 value 234.368141
## iter  30 value 202.405624
## iter  40 value 186.290626
## iter  50 value 180.651745
## iter  60 value 176.983342
## iter  70 value 171.636751
## iter  80 value 168.544038
## iter  90 value 165.171408
## iter 100 value 164.322603
## final  value 164.322603
## stopped after 100 iterations
## # weights:  10
## initial  value 515.224610
## iter  10 value 308.718305
## iter  20 value 300.818171
## iter  30 value 299.942781
## iter  40 value 293.995066
## iter  50 value 293.831242
## iter  60 value 293.827129
## final  value 293.825042
## converged
## # weights:  28
## initial  value 522.967585
## iter  10 value 297.608170
## iter  20 value 255.670254
## iter  30 value 239.316459
## iter  40 value 229.830193
## iter  50 value 227.356097
## iter  60 value 226.812171
## iter  70 value 226.805767
## iter  80 value 226.725079
## iter  90 value 226.713922
## iter 100 value 226.709909
## final  value 226.709909
## stopped after 100 iterations
## # weights:  46
## initial  value 561.887735
## iter  10 value 282.400073
## iter  20 value 238.618605
## iter  30 value 214.388439
## iter  40 value 198.174470
## iter  50 value 187.055355
## iter  60 value 184.282221
```

```
## iter  70 value 180.776220
## iter  80 value 179.908438
## iter  90 value 178.847285
## iter 100 value 175.840420
## final  value 175.840420
## stopped after 100 iterations
## # weights:  10
## initial  value 510.312146
## iter  10 value 371.645081
## iter  20 value 305.054799
## iter  30 value 294.492693
## iter  40 value 294.339570
## final  value 294.339249
## converged
## # weights:  28
## initial  value 537.738652
## iter  10 value 328.759106
## iter  20 value 281.216837
## iter  30 value 262.298085
## iter  40 value 259.599342
## iter  50 value 258.826964
## iter  60 value 258.307460
## iter  70 value 258.264808
## iter  80 value 258.258143
## final  value 258.258095
## converged
## # weights:  46
## initial  value 552.730421
## iter  10 value 288.950871
## iter  20 value 249.003516
## iter  30 value 236.903555
## iter  40 value 232.917779
## iter  50 value 232.181239
## iter  60 value 231.864335
## iter  70 value 231.704153
## iter  80 value 231.687227
## final  value 231.687221
## converged
## # weights:  10
## initial  value 520.837967
## iter  10 value 304.536947
## iter  20 value 287.154579
## iter  30 value 286.361644
## iter  40 value 284.806968
## iter  50 value 284.333407
## iter  60 value 284.275932
## iter  70 value 284.139379
## iter  80 value 284.130806
## iter  90 value 284.098639
## iter 100 value 284.097289
## final  value 284.097289
## stopped after 100 iterations
## # weights:  28
## initial  value 519.120923
```

```
## iter  10 value 284.599387
## iter  20 value 254.826266
## iter  30 value 236.926580
## iter  40 value 234.170802
## iter  50 value 231.009339
## iter  60 value 228.893312
## iter  70 value 228.471530
## iter  80 value 228.317664
## iter  90 value 228.217894
## iter 100 value 228.106622
## final  value 228.106622
## stopped after 100 iterations
## # weights:  46
## initial  value 549.683055
## iter  10 value 303.070956
## iter  20 value 224.179011
## iter  30 value 207.206477
## iter  40 value 190.637527
## iter  50 value 177.038710
## iter  60 value 171.632084
## iter  70 value 168.762141
## iter  80 value 167.492239
## iter  90 value 161.444728
## iter 100 value 159.754342
## final  value 159.754342
## stopped after 100 iterations
## # weights:  10
## initial  value 564.929414
## iter  10 value 327.424740
## iter  20 value 293.413189
## iter  30 value 287.826285
## iter  40 value 285.200996
## iter  50 value 279.941287
## iter  60 value 277.349928
## iter  70 value 276.253402
## iter  80 value 275.896671
## iter  90 value 275.827949
## iter 100 value 275.669861
## final  value 275.669861
## stopped after 100 iterations
## # weights:  28
## initial  value 571.033308
## iter  10 value 307.627251
## iter  20 value 262.308750
## iter  30 value 241.785393
## iter  40 value 231.971163
## iter  50 value 222.334909
## iter  60 value 219.931896
## iter  70 value 217.902225
## iter  80 value 212.251521
## iter  90 value 210.856579
## iter 100 value 210.677567
## final  value 210.677567
## stopped after 100 iterations
```

```
## # weights:  46
## initial  value 634.584592
## iter  10 value 266.863686
## iter  20 value 205.407480
## iter  30 value 179.041053
## iter  40 value 169.624244
## iter  50 value 167.558019
## iter  60 value 165.650607
## iter  70 value 164.960469
## iter  80 value 164.930526
## final  value 164.929724
## converged
## # weights:  10
## initial  value 506.747172
## iter  10 value 298.015365
## iter  20 value 285.543605
## iter  30 value 285.275954
## final  value 285.235178
## converged
## # weights:  28
## initial  value 525.695206
## iter  10 value 312.636752
## iter  20 value 262.201746
## iter  30 value 248.942435
## iter  40 value 247.727587
## iter  50 value 247.642426
## iter  60 value 247.564783
## iter  70 value 247.532490
## iter  80 value 247.526820
## final  value 247.526761
## converged
## # weights:  46
## initial  value 530.479842
## iter  10 value 300.613055
## iter  20 value 257.147935
## iter  30 value 244.208671
## iter  40 value 233.987941
## iter  50 value 226.539527
## iter  60 value 224.047624
## iter  70 value 223.364430
## iter  80 value 222.958638
## iter  90 value 222.700914
## iter 100 value 222.201529
## final  value 222.201529
## stopped after 100 iterations
## # weights:  10
## initial  value 533.535183
## iter  10 value 335.053970
## iter  20 value 287.038279
## iter  30 value 280.673320
## iter  40 value 276.981564
## iter  50 value 276.478850
## iter  60 value 275.917925
## iter  70 value 275.810744
```

```
## iter  80 value 275.752610
## iter  90 value 275.713055
## final  value 275.712824
## converged
## # weights:  28
## initial  value 512.884806
## iter  10 value 286.485663
## iter  20 value 243.126867
## iter  30 value 224.353802
## iter  40 value 216.124728
## iter  50 value 208.424658
## iter  60 value 206.346774
## iter  70 value 204.434174
## iter  80 value 201.792974
## iter  90 value 200.714300
## iter 100 value 200.371168
## final  value 200.371168
## stopped after 100 iterations
## # weights:  46
## initial  value 509.684491
## iter  10 value 282.562739
## iter  20 value 235.019990
## iter  30 value 193.979741
## iter  40 value 180.960772
## iter  50 value 172.994463
## iter  60 value 167.682657
## iter  70 value 164.238806
## iter  80 value 162.829354
## iter  90 value 160.925764
## iter 100 value 159.184306
## final  value 159.184306
## stopped after 100 iterations
## # weights:  10
## initial  value 521.511599
## iter  10 value 322.287264
## iter  20 value 293.773154
## iter  30 value 282.592964
## iter  40 value 277.086258
## iter  50 value 275.831490
## iter  60 value 274.972842
## iter  70 value 274.937140
## iter  80 value 274.762072
## iter  90 value 274.743322
## iter 100 value 274.684779
## final  value 274.684779
## stopped after 100 iterations
## # weights:  28
## initial  value 563.887852
## iter  10 value 311.822869
## iter  20 value 239.513958
## iter  30 value 221.849208
## iter  40 value 220.410001
## iter  50 value 219.194818
## iter  60 value 217.439663
```

```
## iter  70 value 215.279177
## iter  80 value 214.318411
## iter  90 value 214.234188
## iter 100 value 214.218574
## final  value 214.218574
## stopped after 100 iterations
## # weights:  46
## initial  value 669.014298
## iter  10 value 264.374146
## iter  20 value 218.997567
## iter  30 value 201.454246
## iter  40 value 190.644104
## iter  50 value 176.236491
## iter  60 value 166.410808
## iter  70 value 162.315074
## iter  80 value 161.809458
## iter  90 value 160.640068
## iter 100 value 160.620089
## final  value 160.620089
## stopped after 100 iterations
## # weights:  10
## initial  value 520.291707
## iter  10 value 336.447622
## iter  20 value 295.195883
## iter  30 value 284.928120
## iter  40 value 284.365148
## final  value 284.363983
## converged
## # weights:  28
## initial  value 510.743535
## iter  10 value 329.165142
## iter  20 value 287.379542
## iter  30 value 264.861203
## iter  40 value 253.860288
## iter  50 value 248.604886
## iter  60 value 247.898658
## iter  70 value 247.614425
## iter  80 value 247.577499
## final  value 247.577164
## converged
## # weights:  46
## initial  value 525.790736
## iter  10 value 294.365991
## iter  20 value 250.226867
## iter  30 value 238.617382
## iter  40 value 233.971972
## iter  50 value 230.246400
## iter  60 value 228.754938
## iter  70 value 228.548057
## iter  80 value 228.528342
## iter  90 value 228.516697
## iter 100 value 228.515260
## final  value 228.515260
## stopped after 100 iterations
```

```
## # weights:  10
## initial  value 522.316415
## iter  10 value 334.193259
## iter  20 value 282.690063
## iter  30 value 279.362149
## iter  40 value 276.081957
## iter  50 value 275.410045
## iter  60 value 274.923017
## iter  70 value 274.863637
## iter  80 value 274.794855
## iter  90 value 274.754048
## iter 100 value 274.748407
## final  value 274.748407
## stopped after 100 iterations
## # weights:  28
## initial  value 531.260444
## iter  10 value 277.297768
## iter  20 value 235.594721
## iter  30 value 224.267764
## iter  40 value 217.753365
## iter  50 value 213.263094
## iter  60 value 211.819311
## iter  70 value 210.642237
## iter  80 value 205.232088
## iter  90 value 202.306639
## iter 100 value 202.061599
## final  value 202.061599
## stopped after 100 iterations
## # weights:  46
## initial  value 498.276070
## iter  10 value 270.508571
## iter  20 value 235.806165
## iter  30 value 215.098548
## iter  40 value 193.261290
## iter  50 value 189.295010
## iter  60 value 187.897528
## iter  70 value 187.437178
## iter  80 value 187.161262
## iter  90 value 187.028281
## iter 100 value 186.984197
## final  value 186.984197
## stopped after 100 iterations
## # weights:  10
## initial  value 499.134525
## iter  10 value 321.731384
## iter  20 value 304.750967
## iter  30 value 299.982988
## iter  40 value 298.799955
## iter  50 value 292.708639
## iter  60 value 292.136318
## iter  70 value 292.130531
## final  value 292.129560
## converged
## # weights:  28
```

```
## initial  value 543.682124
## iter  10 value 299.073456
## iter  20 value 262.813610
## iter  30 value 234.951517
## iter  40 value 220.045793
## iter  50 value 210.976829
## iter  60 value 205.980428
## iter  70 value 205.537637
## iter  80 value 205.480161
## iter  90 value 205.450681
## iter 100 value 205.437897
## final  value 205.437897
## stopped after 100 iterations
## # weights:  46
## initial  value 578.631832
## iter  10 value 285.508742
## iter  20 value 234.853959
## iter  30 value 214.708967
## iter  40 value 206.775284
## iter  50 value 201.013741
## iter  60 value 194.367573
## iter  70 value 192.491007
## iter  80 value 191.165598
## iter  90 value 189.138990
## iter 100 value 188.886180
## final  value 188.886180
## stopped after 100 iterations
## # weights:  10
## initial  value 533.951998
## iter  10 value 373.323503
## iter  20 value 331.735312
## iter  30 value 296.140554
## iter  40 value 280.913619
## iter  50 value 280.561590
## final  value 280.561251
## converged
## # weights:  28
## initial  value 533.183237
## iter  10 value 323.500656
## iter  20 value 270.451110
## iter  30 value 247.525887
## iter  40 value 237.750962
## iter  50 value 236.323064
## iter  60 value 236.290592
## final  value 236.290445
## converged
## # weights:  46
## initial  value 512.394745
## iter  10 value 299.882785
## iter  20 value 262.867848
## iter  30 value 245.482631
## iter  40 value 233.228085
## iter  50 value 226.349907
## iter  60 value 224.419388
```

```
## iter  70 value 223.724710
## iter  80 value 223.276104
## iter  90 value 223.270842
## final  value 223.270821
## converged
## # weights:  10
## initial  value 553.248698
## iter  10 value 318.505174
## iter  20 value 276.225239
## iter  30 value 271.470346
## iter  40 value 270.922022
## iter  50 value 270.706765
## iter  60 value 270.615070
## iter  70 value 270.599630
## iter  80 value 270.572312
## iter  90 value 270.570105
## iter 100 value 270.565485
## final  value 270.565485
## stopped after 100 iterations
## # weights:  28
## initial  value 506.743759
## iter  10 value 268.030219
## iter  20 value 233.456173
## iter  30 value 216.579259
## iter  40 value 210.112044
## iter  50 value 208.705870
## iter  60 value 208.287094
## iter  70 value 208.162416
## iter  80 value 207.941230
## iter  90 value 207.749937
## iter 100 value 207.654744
## final  value 207.654744
## stopped after 100 iterations
## # weights:  46
## initial  value 518.723074
## iter  10 value 281.826395
## iter  20 value 214.225726
## iter  30 value 195.695991
## iter  40 value 176.717371
## iter  50 value 166.919010
## iter  60 value 164.356587
## iter  70 value 164.063704
## iter  80 value 163.609442
## iter  90 value 163.000302
## iter 100 value 162.929897
## final  value 162.929897
## stopped after 100 iterations
## # weights:  10
## initial  value 517.284609
## iter  10 value 312.547277
## iter  20 value 290.017487
## iter  30 value 288.938225
## iter  40 value 277.035195
## iter  50 value 275.382339
```

```
## iter  60 value 275.261606
## iter  70 value 275.212168
## iter  80 value 275.022977
## iter  90 value 274.963012
## iter 100 value 273.992494
## final  value 273.992494
## stopped after 100 iterations
## # weights:  28
## initial  value 536.047762
## iter  10 value 316.080533
## iter  20 value 252.280043
## iter  30 value 240.954391
## iter  40 value 235.569951
## iter  50 value 229.925941
## iter  60 value 229.542676
## iter  70 value 229.541593
## iter  80 value 229.540408
## final  value 229.540312
## converged
## # weights:  46
## initial  value 524.368140
## iter  10 value 272.022805
## iter  20 value 230.253548
## iter  30 value 200.763960
## iter  40 value 180.271348
## iter  50 value 162.086258
## iter  60 value 156.521608
## iter  70 value 155.837585
## iter  80 value 155.438352
## iter  90 value 155.243809
## iter 100 value 154.948871
## final  value 154.948871
## stopped after 100 iterations
## # weights:  10
## initial  value 515.407170
## iter  10 value 360.093290
## iter  20 value 308.405601
## iter  30 value 291.702753
## iter  40 value 290.625794
## final  value 290.608694
## converged
## # weights:  28
## initial  value 553.268351
## iter  10 value 340.918018
## iter  20 value 275.038912
## iter  30 value 256.637427
## iter  40 value 250.279577
## iter  50 value 247.568731
## iter  60 value 246.993103
## iter  70 value 245.242100
## iter  80 value 244.680003
## final  value 244.678698
## converged
## # weights:  46
```

```
## initial  value 543.117053
## iter  10 value 296.984881
## iter  20 value 263.015933
## iter  30 value 251.110940
## iter  40 value 238.898435
## iter  50 value 235.286479
## iter  60 value 233.140563
## iter  70 value 229.233283
## iter  80 value 227.990285
## iter  90 value 227.098298
## iter 100 value 227.023200
## final  value 227.023200
## stopped after 100 iterations
## # weights:  10
## initial  value 542.747680
## iter  10 value 424.364540
## iter  20 value 357.268383
## iter  30 value 346.706813
## iter  40 value 346.601858
## iter  50 value 343.995054
## iter  60 value 339.555039
## iter  70 value 339.485318
## iter  70 value 339.485318
## iter  80 value 339.484535
## iter  90 value 339.405216
## iter 100 value 338.885355
## final  value 338.885355
## stopped after 100 iterations
## # weights:  28
## initial  value 506.436182
## iter  10 value 291.760864
## iter  20 value 247.597471
## iter  30 value 237.569983
## iter  40 value 234.098134
## iter  50 value 228.337234
## iter  60 value 225.639855
## iter  70 value 225.323816
## iter  80 value 224.771427
## iter  90 value 223.521763
## iter 100 value 223.212251
## final  value 223.212251
## stopped after 100 iterations
## # weights:  46
## initial  value 529.827451
## iter  10 value 282.885048
## iter  20 value 236.000275
## iter  30 value 209.479452
## iter  40 value 199.720150
## iter  50 value 194.980741
## iter  60 value 191.075234
## iter  70 value 188.049557
## iter  80 value 186.739608
## iter  90 value 186.369234
## iter 100 value 186.129655
```

```
## final  value 186.129655
## stopped after 100 iterations
## # weights:  10
## initial  value 556.100343
## iter  10 value 358.343134
## iter  20 value 298.851422
## iter  30 value 297.054107
## iter  40 value 290.714249
## iter  50 value 283.602148
## iter  60 value 283.118720
## iter  70 value 282.667638
## iter  80 value 282.665702
## final  value 282.665627
## converged
## # weights:  28
## initial  value 530.759230
## iter  10 value 277.136398
## iter  20 value 241.506589
## iter  30 value 231.944078
## iter  40 value 221.110782
## iter  50 value 215.645804
## iter  60 value 215.539285
## final  value 215.539113
## converged
## # weights:  46
## initial  value 691.824456
## iter  10 value 277.841297
## iter  20 value 227.835351
## iter  30 value 194.060600
## iter  40 value 177.081319
## iter  50 value 170.103764
## iter  60 value 167.771400
## iter  70 value 163.961516
## iter  80 value 161.411852
## iter  90 value 160.281756
## iter 100 value 160.255548
## final  value 160.255548
## stopped after 100 iterations
## # weights:  10
## initial  value 543.442195
## iter  10 value 353.726449
## iter  20 value 308.872854
## iter  30 value 295.760834
## iter  40 value 293.938153
## iter  50 value 293.927309
## final  value 293.927208
## converged
## # weights:  28
## initial  value 489.888507
## iter  10 value 296.078966
## iter  20 value 260.322755
## iter  30 value 255.111674
## iter  40 value 253.859563
## iter  50 value 253.839371
```

```
## final  value 253.837939
## converged
## # weights:  46
## initial  value 513.313089
## iter  10 value 295.098075
## iter  20 value 266.786788
## iter  30 value 246.665789
## iter  40 value 241.429170
## iter  50 value 239.683510
## iter  60 value 238.765457
## iter  70 value 238.687765
## iter  80 value 238.685183
## iter  90 value 238.684463
## final  value 238.684311
## converged
## # weights:  10
## initial  value 525.619209
## iter  10 value 311.244768
## iter  20 value 294.414930
## iter  30 value 289.411170
## iter  40 value 285.697924
## iter  50 value 285.278281
## iter  60 value 284.982142
## iter  70 value 284.923903
## iter  80 value 284.862468
## iter  90 value 284.836244
## iter 100 value 284.827888
## final  value 284.827888
## stopped after 100 iterations
## # weights:  28
## initial  value 520.479371
## iter  10 value 292.413361
## iter  20 value 265.406912
## iter  30 value 251.745944
## iter  40 value 243.561965
## iter  50 value 238.946693
## iter  60 value 236.487524
## iter  70 value 236.290528
## iter  80 value 236.002518
## iter  90 value 235.928626
## iter 100 value 235.595087
## final  value 235.595087
## stopped after 100 iterations
## # weights:  46
## initial  value 505.113914
## iter  10 value 269.284729
## iter  20 value 227.808857
## iter  30 value 210.249256
## iter  40 value 201.230851
## iter  50 value 188.996620
## iter  60 value 185.139496
## iter  70 value 184.148639
## iter  80 value 183.624622
## iter  90 value 182.450075
```

```
## iter 100 value 182.032486
## final  value 182.032486
## stopped after 100 iterations
## # weights:  10
## initial  value 539.106812
## iter  10 value 345.252694
## iter  20 value 277.182406
## iter  30 value 275.340654
## iter  40 value 274.370203
## iter  50 value 274.208379
## iter  60 value 274.069655
## iter  70 value 274.022783
## iter  80 value 273.991511
## iter  90 value 273.968384
## iter 100 value 273.964795
## final  value 273.964795
## stopped after 100 iterations
## # weights:  28
## initial  value 513.999620
## iter  10 value 281.380846
## iter  20 value 235.812835
## iter  30 value 228.766985
## iter  40 value 226.261957
## iter  50 value 224.345799
## iter  60 value 223.251093
## iter  70 value 221.314842
## iter  80 value 218.620498
## iter  90 value 209.584584
## iter 100 value 205.131902
## final  value 205.131902
## stopped after 100 iterations
## # weights:  46
## initial  value 531.708218
## iter  10 value 282.358057
## iter  20 value 220.058917
## iter  30 value 191.040776
## iter  40 value 173.927861
## iter  50 value 166.565152
## iter  60 value 165.291350
## iter  70 value 163.222973
## iter  80 value 159.946200
## iter  90 value 156.602390
## iter 100 value 153.677572
## final  value 153.677572
## stopped after 100 iterations
## # weights:  10
## initial  value 509.939567
## iter  10 value 346.828254
## iter  20 value 292.011996
## iter  30 value 285.071273
## iter  40 value 283.442859
## final  value 283.441210
## converged
## # weights:  28
```

```
## initial  value 621.796554
## iter  10 value 313.084956
## iter  20 value 270.694026
## iter  30 value 249.196239
## iter  40 value 236.975178
## iter  50 value 236.141832
## iter  60 value 236.081517
## final  value 236.081154
## converged
## # weights:  46
## initial  value 519.931511
## iter  10 value 329.776082
## iter  20 value 281.519241
## iter  30 value 248.814556
## iter  40 value 241.782573
## iter  50 value 238.237360
## iter  60 value 234.453200
## iter  70 value 232.349415
## iter  80 value 230.883560
## iter  90 value 230.458135
## iter 100 value 230.314503
## final  value 230.314503
## stopped after 100 iterations
## # weights:  10
## initial  value 519.805406
## iter  10 value 326.880162
## iter  20 value 310.474823
## iter  30 value 295.303166
## iter  40 value 278.919819
## iter  50 value 275.923291
## iter  60 value 274.641375
## iter  70 value 274.406850
## iter  80 value 274.176827
## iter  90 value 274.109919
## iter 100 value 274.067699
## final  value 274.067699
## stopped after 100 iterations
## # weights:  28
## initial  value 517.235761
## iter  10 value 279.215395
## iter  20 value 241.877604
## iter  30 value 229.936483
## iter  40 value 228.286702
## iter  50 value 224.193291
## iter  60 value 222.906942
## iter  70 value 218.231532
## iter  80 value 213.528094
## iter  90 value 212.407885
## iter 100 value 210.596208
## final  value 210.596208
## stopped after 100 iterations
## # weights:  46
## initial  value 515.248396
## iter  10 value 281.083843
```

```
## iter  20 value 221.943254
## iter  30 value 191.108760
## iter  40 value 171.530605
## iter  50 value 161.398858
## iter  60 value 152.858458
## iter  70 value 151.771970
## iter  80 value 151.500172
## iter  90 value 151.273076
## iter 100 value 151.119736
## final  value 151.119736
## stopped after 100 iterations
## # weights:  10
## initial  value 510.121878
## iter  10 value 319.776804
## iter  20 value 285.602737
## iter  30 value 283.494402
## iter  40 value 283.319912
## iter  50 value 283.110509
## iter  60 value 283.050343
## iter  70 value 283.023584
## iter  80 value 282.994439
## iter  90 value 282.986467
## iter 100 value 282.968044
## final  value 282.968044
## stopped after 100 iterations
## # weights:  28
## initial  value 513.042609
## iter  10 value 263.504734
## iter  20 value 237.797593
## iter  30 value 226.026556
## iter  40 value 220.530884
## iter  50 value 216.489121
## iter  60 value 212.499166
## iter  70 value 210.690040
## iter  80 value 210.225953
## iter  90 value 210.137864
## iter 100 value 209.986106
## final  value 209.986106
## stopped after 100 iterations
## # weights:  46
## initial  value 496.525776
## iter  10 value 270.529271
## iter  20 value 233.754410
## iter  30 value 219.886542
## iter  40 value 197.913984
## iter  50 value 181.480466
## iter  60 value 174.492752
## iter  70 value 170.721021
## iter  80 value 169.882839
## iter  90 value 169.356659
## iter 100 value 168.681697
## final  value 168.681697
## stopped after 100 iterations
## # weights:  10
```

```
## initial  value 508.487733
## iter  10 value 334.048318
## iter  20 value 307.347207
## iter  30 value 294.142039
## iter  40 value 292.645306
## final  value 292.645295
## converged
## # weights:  28
## initial  value 505.540544
## iter  10 value 280.753616
## iter  20 value 252.804195
## iter  30 value 249.727079
## iter  40 value 246.406638
## iter  50 value 246.167619
## final  value 246.165743
## converged
## # weights:  46
## initial  value 501.787625
## iter  10 value 280.100662
## iter  20 value 250.495589
## iter  30 value 241.354263
## iter  40 value 238.337438
## iter  50 value 237.559636
## iter  60 value 237.435223
## iter  70 value 237.424943
## iter  80 value 237.422637
## final  value 237.422457
## converged
## # weights:  10
## initial  value 532.565716
## iter  10 value 352.104546
## iter  20 value 322.024248
## iter  30 value 321.699028
## iter  40 value 318.605852
## iter  50 value 318.596371
## final  value 318.596333
## converged
## # weights:  28
## initial  value 530.894997
## iter  10 value 324.797557
## iter  20 value 259.406342
## iter  30 value 246.771800
## iter  40 value 242.257802
## iter  50 value 235.413539
## iter  60 value 230.838412
## iter  70 value 229.831998
## iter  80 value 228.753106
## iter  90 value 226.979447
## iter 100 value 226.749474
## final  value 226.749474
## stopped after 100 iterations
## # weights:  46
## initial  value 522.981387
## iter  10 value 275.744313
```

```
## iter  20 value 234.038125
## iter  30 value 212.045022
## iter  40 value 196.065744
## iter  50 value 188.619773
## iter  60 value 183.110052
## iter  70 value 176.404330
## iter  80 value 170.276745
## iter  90 value 167.933811
## iter 100 value 166.258289
## final  value 166.258289
## stopped after 100 iterations
## # weights:  10
## initial  value 518.050903
## iter  10 value 340.493085
## iter  20 value 296.169405
## iter  30 value 283.741545
## iter  40 value 279.170652
## iter  50 value 278.915277
## iter  60 value 278.417036
## iter  70 value 278.349745
## iter  80 value 278.236487
## iter  90 value 278.211894
## iter 100 value 278.192751
## final  value 278.192751
## stopped after 100 iterations
## # weights:  28
## initial  value 569.337917
## iter  10 value 288.584784
## iter  20 value 268.616947
## iter  30 value 257.812814
## iter  40 value 254.691138
## iter  50 value 253.287653
## iter  60 value 252.474755
## iter  70 value 252.432875
## iter  80 value 252.185434
## iter  90 value 251.978625
## iter 100 value 251.912309
## final  value 251.912309
## stopped after 100 iterations
## # weights:  46
## initial  value 525.235881
## iter  10 value 299.002372
## iter  20 value 247.652412
## iter  30 value 214.089032
## iter  40 value 199.527170
## iter  50 value 185.021774
## iter  60 value 180.940636
## iter  70 value 175.888072
## iter  80 value 169.348678
## iter  90 value 167.912916
## iter 100 value 166.137816
## final  value 166.137816
## stopped after 100 iterations
## # weights:  10
```

```
## initial  value 521.673242
## iter  10 value 346.727422
## iter  20 value 311.465773
## iter  30 value 291.311243
## iter  40 value 287.617324
## iter  50 value 287.609199
## final  value 287.609151
## converged
## # weights:  28
## initial  value 511.010603
## iter  10 value 312.666243
## iter  20 value 269.245866
## iter  30 value 262.711545
## iter  40 value 261.812304
## iter  50 value 261.644614
## iter  60 value 261.034982
## iter  70 value 258.320952
## iter  80 value 256.505805
## iter  90 value 254.860359
## iter 100 value 250.039970
## final  value 250.039970
## stopped after 100 iterations
## # weights:  46
## initial  value 557.420589
## iter  10 value 295.932831
## iter  20 value 264.361559
## iter  30 value 249.082700
## iter  40 value 244.388703
## iter  50 value 241.530775
## iter  60 value 240.521267
## iter  70 value 239.801352
## iter  80 value 239.614894
## iter  90 value 239.463707
## iter 100 value 239.440096
## final  value 239.440096
## stopped after 100 iterations
## # weights:  10
## initial  value 525.467982
## iter  10 value 316.213450
## iter  20 value 284.288779
## iter  30 value 281.149999
## iter  40 value 278.813436
## iter  50 value 278.587994
## iter  60 value 278.369195
## iter  70 value 278.318844
## iter  80 value 278.272608
## iter  90 value 278.244126
## iter 100 value 278.238384
## final  value 278.238384
## stopped after 100 iterations
## # weights:  28
## initial  value 543.551270
## iter  10 value 297.046269
## iter  20 value 249.287884
```

```
## iter  30 value 245.052201
## iter  40 value 240.949185
## iter  50 value 238.862801
## iter  60 value 238.659724
## iter  70 value 238.587414
## iter  80 value 237.540832
## iter  90 value 236.104171
## iter 100 value 235.788789
## final  value 235.788789
## stopped after 100 iterations
## # weights:  46
## initial  value 553.900394
## iter  10 value 276.926363
## iter  20 value 230.172912
## iter  30 value 204.945251
## iter  40 value 192.876277
## iter  50 value 182.243122
## iter  60 value 172.466032
## iter  70 value 168.136530
## iter  80 value 165.815454
## iter  90 value 164.469252
## iter 100 value 164.305413
## final  value 164.305413
## stopped after 100 iterations
## # weights:  10
## initial  value 546.525523
## iter  10 value 345.621720
## iter  20 value 292.281825
## iter  30 value 289.612752
## iter  40 value 284.762271
## iter  50 value 284.348060
## iter  60 value 284.021614
## iter  70 value 283.999905
## iter  80 value 283.995862
## iter  90 value 283.988392
## iter 100 value 283.985600
## final  value 283.985600
## stopped after 100 iterations
## # weights:  28
## initial  value 522.878476
## iter  10 value 285.956076
## iter  20 value 245.309215
## iter  30 value 227.962038
## iter  40 value 224.918461
## iter  50 value 223.671063
## iter  60 value 219.383467
## iter  70 value 217.604380
## iter  80 value 215.185185
## iter  90 value 211.743373
## iter 100 value 203.658359
## final  value 203.658359
## stopped after 100 iterations
## # weights:  46
## initial  value 572.077891
```

```
## iter  10 value 271.626317
## iter  20 value 211.263311
## iter  30 value 179.092125
## iter  40 value 163.764221
## iter  50 value 153.299011
## iter  60 value 148.783314
## iter  70 value 144.055126
## iter  80 value 140.583812
## iter  90 value 140.167437
## iter 100 value 140.102611
## final  value 140.102611
## stopped after 100 iterations
## # weights:  10
## initial  value 517.272760
## iter  10 value 340.563306
## iter  20 value 295.137498
## iter  30 value 280.669260
## final  value 280.368601
## converged
## # weights:  28
## initial  value 577.478737
## iter  10 value 301.775223
## iter  20 value 276.050683
## iter  30 value 253.817741
## iter  40 value 242.735296
## iter  50 value 236.215439
## iter  60 value 234.138023
## iter  70 value 232.101937
## iter  80 value 232.089580
## final  value 232.089560
## converged
## # weights:  46
## initial  value 527.704013
## iter  10 value 308.458715
## iter  20 value 248.641759
## iter  30 value 234.315827
## iter  40 value 232.169689
## iter  50 value 229.724270
## iter  60 value 229.423311
## iter  70 value 229.365345
## iter  80 value 229.359773
## iter  90 value 229.359372
## final  value 229.359357
## converged
## # weights:  10
## initial  value 502.357156
## iter  10 value 293.574161
## iter  20 value 274.348551
## iter  30 value 273.197732
## iter  40 value 271.624858
## iter  50 value 271.383764
## iter  60 value 271.153611
## iter  70 value 271.105775
## iter  80 value 271.084227
```

```
## iter  90 value 271.064365
## final  value 271.064304
## converged
## # weights:  28
## initial  value 551.749962
## iter  10 value 326.417636
## iter  20 value 246.720719
## iter  30 value 238.544287
## iter  40 value 227.945635
## iter  50 value 214.873227
## iter  60 value 212.075382
## iter  70 value 211.154525
## iter  80 value 210.815096
## iter  90 value 210.418079
## iter 100 value 209.963212
## final  value 209.963212
## stopped after 100 iterations
## # weights:  46
## initial  value 490.001294
## iter  10 value 290.320158
## iter  20 value 235.146571
## iter  30 value 206.921510
## iter  40 value 192.127674
## iter  50 value 183.489575
## iter  60 value 182.032427
## iter  70 value 181.701194
## iter  80 value 181.335759
## iter  90 value 180.828526
## iter 100 value 180.792441
## final  value 180.792441
## stopped after 100 iterations
## # weights:  10
## initial  value 513.464581
## iter  10 value 321.261739
## iter  20 value 281.651754
## iter  30 value 278.442465
## iter  40 value 277.447038
## iter  50 value 276.941385
## iter  60 value 276.873517
## iter  70 value 276.714738
## iter  80 value 276.699197
## iter  90 value 276.645120
## iter 100 value 276.643070
## final  value 276.643070
## stopped after 100 iterations
## # weights:  28
## initial  value 525.726440
## iter  10 value 300.613135
## iter  20 value 253.045418
## iter  30 value 234.726675
## iter  40 value 211.636787
## iter  50 value 208.564172
## iter  60 value 206.300057
## iter  70 value 201.556361
```

```
## iter  80 value 200.778587
## iter  90 value 200.526970
## iter 100 value 199.389791
## final  value 199.389791
## stopped after 100 iterations
## # weights:  46
## initial  value 645.866590
## iter  10 value 270.342697
## iter  20 value 241.600683
## iter  30 value 218.751218
## iter  40 value 202.296697
## iter  50 value 187.686483
## iter  60 value 182.982005
## iter  70 value 182.634853
## iter  80 value 182.620005
## iter  90 value 182.612052
## iter 100 value 182.611390
## final  value 182.611390
## stopped after 100 iterations
## # weights:  10
## initial  value 519.345940
## iter  10 value 315.206485
## iter  20 value 287.859094
## iter  30 value 287.017224
## final  value 287.011061
## converged
## # weights:  28
## initial  value 496.739129
## iter  10 value 281.803282
## iter  20 value 254.293183
## iter  30 value 249.630992
## iter  40 value 247.067490
## iter  50 value 242.010274
## iter  60 value 240.852732
## iter  70 value 240.822739
## iter  80 value 240.814175
## final  value 240.814135
## converged
## # weights:  46
## initial  value 625.527999
## iter  10 value 272.794033
## iter  20 value 246.914528
## iter  30 value 235.967267
## iter  40 value 231.112723
## iter  50 value 229.220253
## iter  60 value 228.702973
## iter  70 value 228.469630
## iter  80 value 228.384197
## final  value 228.382655
## converged
## # weights:  10
## initial  value 532.752054
## iter  10 value 376.365713
## iter  20 value 332.934214
```

```
## iter  30 value 329.398159
## iter  40 value 317.716682
## iter  50 value 316.512142
## iter  60 value 316.507751
## iter  60 value 316.507749
## iter  60 value 316.507749
## final  value 316.507749
## converged
## # weights:  28
## initial  value 523.807472
## iter  10 value 328.170880
## iter  20 value 257.087637
## iter  30 value 249.542085
## iter  40 value 241.544445
## iter  50 value 240.614197
## iter  60 value 240.006611
## iter  70 value 239.965313
## iter  80 value 239.897485
## iter  90 value 239.836084
## iter 100 value 239.502027
## final  value 239.502027
## stopped after 100 iterations
## # weights:  46
## initial  value 540.074417
## iter  10 value 307.417036
## iter  20 value 238.354585
## iter  30 value 222.421339
## iter  40 value 202.763335
## iter  50 value 184.616552
## iter  60 value 179.343912
## iter  70 value 175.800720
## iter  80 value 175.609539
## iter  90 value 175.376904
## iter 100 value 175.211337
## final  value 175.211337
## stopped after 100 iterations
## # weights:  10
## initial  value 562.494431
## iter  10 value 341.653986
## iter  20 value 293.793532
## iter  30 value 287.234447
## iter  40 value 281.133100
## iter  50 value 280.850201
## iter  60 value 280.283552
## iter  70 value 280.149278
## iter  80 value 280.071259
## iter  90 value 279.959573
## iter 100 value 279.940935
## final  value 279.940935
## stopped after 100 iterations
## # weights:  28
## initial  value 574.012343
## iter  10 value 360.590291
## iter  20 value 256.412329
```

```
## iter  30 value 236.620845
## iter  40 value 232.811196
## iter  50 value 229.889732
## iter  60 value 229.303143
## iter  70 value 228.563699
## iter  80 value 228.080598
## iter  90 value 228.017550
## iter 100 value 227.772705
## final  value 227.772705
## stopped after 100 iterations
## # weights:  46
## initial  value 549.437532
## iter  10 value 275.200682
## iter  20 value 238.564684
## iter  30 value 221.985845
## iter  40 value 197.420043
## iter  50 value 189.980996
## iter  60 value 186.474317
## iter  70 value 182.492638
## iter  80 value 181.311395
## iter  90 value 180.041377
## iter 100 value 178.735164
## final  value 178.735164
## stopped after 100 iterations
## # weights:  10
## initial  value 508.776393
## iter  10 value 368.413764
## iter  20 value 305.678664
## iter  30 value 292.278942
## iter  40 value 290.234176
## iter  50 value 290.225500
## final  value 290.225385
## converged
## # weights:  28
## initial  value 576.244680
## iter  10 value 332.235010
## iter  20 value 281.151979
## iter  30 value 269.242067
## iter  40 value 253.525975
## iter  50 value 244.074314
## iter  60 value 241.684923
## iter  70 value 241.189760
## iter  80 value 241.167546
## final  value 241.167532
## converged
## # weights:  46
## initial  value 509.756970
## iter  10 value 308.613319
## iter  20 value 269.857924
## iter  30 value 247.031137
## iter  40 value 239.299506
## iter  50 value 233.969856
## iter  60 value 230.871842
## iter  70 value 225.977653
```

```
## iter  80 value 224.925368
## iter  90 value 224.638780
## iter 100 value 224.567263
## final  value 224.567263
## stopped after 100 iterations
## # weights:  10
## initial  value 507.963077
## iter  10 value 315.073259
## iter  20 value 293.590872
## iter  30 value 287.260829
## iter  40 value 280.552759
## iter  50 value 280.376598
## iter  60 value 280.146230
## iter  70 value 280.084902
## iter  80 value 280.040707
## iter  90 value 280.009695
## iter 100 value 279.998253
## final  value 279.998253
## stopped after 100 iterations
## # weights:  28
## initial  value 638.555463
## iter  10 value 333.085401
## iter  20 value 295.410374
## iter  30 value 279.128559
## iter  40 value 265.533388
## iter  50 value 261.257704
## iter  60 value 251.998703
## iter  70 value 247.665108
## iter  80 value 243.968476
## iter  90 value 241.435178
## iter 100 value 240.028863
## final  value 240.028863
## stopped after 100 iterations
## # weights:  46
## initial  value 496.815740
## iter  10 value 264.906114
## iter  20 value 227.318394
## iter  30 value 202.484512
## iter  40 value 168.768341
## iter  50 value 159.777660
## iter  60 value 157.735749
## iter  70 value 156.789019
## iter  80 value 154.778360
## iter  90 value 153.595678
## iter 100 value 152.980349
## final  value 152.980349
## stopped after 100 iterations
## # weights:  10
## initial  value 513.467488
## iter  10 value 357.024168
## iter  20 value 320.405263
## iter  30 value 296.531303
## iter  40 value 293.041565
## iter  50 value 287.325856
```

```
## iter  60 value 284.561991
## iter  70 value 283.045122
## iter  80 value 282.850579
## iter  90 value 282.570009
## iter 100 value 282.537258
## final  value 282.537258
## stopped after 100 iterations
## # weights:  28
## initial  value 550.267899
## iter  10 value 312.310389
## iter  20 value 265.794488
## iter  30 value 232.925389
## iter  40 value 225.047610
## iter  50 value 220.876540
## iter  60 value 219.596997
## iter  70 value 219.048811
## iter  80 value 217.788311
## iter  90 value 217.642243
## iter 100 value 217.549696
## final  value 217.549696
## stopped after 100 iterations
## # weights:  46
## initial  value 525.787365
## iter  10 value 267.622935
## iter  20 value 234.419956
## iter  30 value 204.126431
## iter  40 value 180.127644
## iter  50 value 172.583242
## iter  60 value 166.812515
## iter  70 value 162.202698
## iter  80 value 161.029144
## iter  90 value 159.604350
## iter 100 value 158.099719
## final  value 158.099719
## stopped after 100 iterations
## # weights:  10
## initial  value 532.485120
## iter  10 value 370.653356
## iter  20 value 303.942592
## iter  30 value 292.833988
## iter  40 value 291.980299
## final  value 291.980223
## converged
## # weights:  28
## initial  value 550.782601
## iter  10 value 313.886462
## iter  20 value 273.549465
## iter  30 value 260.148547
## iter  40 value 256.107408
## iter  50 value 254.498113
## iter  60 value 254.375829
## iter  70 value 254.217577
## iter  80 value 254.066214
## iter  90 value 254.048634
```

```
## final  value 254.048627
## converged
## # weights:  46
## initial  value 586.708460
## iter  10 value 296.662272
## iter  20 value 259.329880
## iter  30 value 243.283282
## iter  40 value 234.710210
## iter  50 value 230.452598
## iter  60 value 229.783900
## iter  70 value 229.641419
## iter  80 value 228.406354
## iter  90 value 228.146618
## iter 100 value 228.135447
## final  value 228.135447
## stopped after 100 iterations
## # weights:  10
## initial  value 510.107067
## iter  10 value 332.570631
## iter  20 value 309.724212
## iter  30 value 307.867201
## iter  40 value 298.752229
## iter  50 value 298.601610
## iter  60 value 298.579589
## final  value 298.578856
## converged
## # weights:  28
## initial  value 499.296539
## iter  10 value 279.284141
## iter  20 value 250.078251
## iter  30 value 232.747692
## iter  40 value 229.545073
## iter  50 value 228.415501
## iter  60 value 228.237791
## iter  70 value 227.552209
## iter  80 value 227.075379
## iter  90 value 226.964230
## iter 100 value 226.841173
## final  value 226.841173
## stopped after 100 iterations
## # weights:  46
## initial  value 562.348879
## iter  10 value 268.467966
## iter  20 value 223.004632
## iter  30 value 195.714881
## iter  40 value 186.008842
## iter  50 value 177.658155
## iter  60 value 176.479817
## iter  70 value 175.886028
## iter  80 value 174.904033
## iter  90 value 174.059195
## iter 100 value 173.832855
## final  value 173.832855
## stopped after 100 iterations
```

```
## # weights:  10
## initial  value 518.935839
## iter  10 value 311.591971
## iter  20 value 282.030338
## iter  30 value 279.722903
## iter  40 value 277.045403
## iter  50 value 276.980858
## iter  60 value 276.785759
## iter  70 value 276.761695
## iter  80 value 276.724056
## iter  90 value 276.713162
## iter 100 value 276.705395
## final  value 276.705395
## stopped after 100 iterations
## # weights:  28
## initial  value 505.964944
## iter  10 value 313.902046
## iter  20 value 277.815453
## iter  30 value 264.103345
## iter  40 value 259.703019
## iter  50 value 257.853696
## iter  60 value 254.692612
## iter  70 value 253.927483
## iter  80 value 253.111763
## iter  90 value 252.379499
## iter 100 value 252.275002
## final  value 252.275002
## stopped after 100 iterations
## # weights:  46
## initial  value 591.348075
## iter  10 value 274.874786
## iter  20 value 234.118885
## iter  30 value 205.260182
## iter  40 value 184.632849
## iter  50 value 176.382197
## iter  60 value 168.717945
## iter  70 value 166.051115
## iter  80 value 165.123342
## iter  90 value 163.860174
## iter 100 value 163.741452
## final  value 163.741452
## stopped after 100 iterations
## # weights:  10
## initial  value 539.483935
## iter  10 value 300.552918
## iter  20 value 289.348677
## iter  30 value 288.252741
## final  value 288.076445
## converged
## # weights:  28
## initial  value 602.680663
## iter  10 value 281.992572
## iter  20 value 254.279414
## iter  30 value 244.019568
```

```
## iter  40 value 237.859076
## iter  50 value 235.815102
## iter  60 value 235.759089
## final  value 235.759072
## converged
## # weights:  46
## initial  value 526.651486
## iter  10 value 293.752031
## iter  20 value 253.074554
## iter  30 value 241.044733
## iter  40 value 230.615962
## iter  50 value 228.239755
## iter  60 value 227.318291
## iter  70 value 227.089164
## iter  80 value 225.837747
## iter  90 value 224.453438
## iter 100 value 224.321940
## final  value 224.321940
## stopped after 100 iterations
## # weights:  10
## initial  value 536.906742
## iter  10 value 343.863163
## iter  20 value 295.289404
## iter  30 value 283.194625
## iter  40 value 278.462543
## iter  50 value 277.769030
## iter  60 value 277.159296
## iter  70 value 276.995574
## iter  80 value 276.938743
## iter  90 value 276.862310
## final  value 276.862238
## converged
## # weights:  28
## initial  value 561.884412
## iter  10 value 296.985569
## iter  20 value 266.981802
## iter  30 value 262.435550
## iter  40 value 259.481868
## iter  50 value 258.204590
## iter  60 value 257.999977
## iter  70 value 257.929138
## iter  80 value 257.888376
## iter  90 value 257.421474
## iter 100 value 256.735960
## final  value 256.735960
## stopped after 100 iterations
## # weights:  46
## initial  value 523.579833
## iter  10 value 262.981022
## iter  20 value 212.605613
## iter  30 value 180.426865
## iter  40 value 167.268540
## iter  50 value 163.780169
## iter  60 value 162.863994
```

```
## iter  70 value 162.720564
## iter  80 value 162.588594
## iter  90 value 162.327180
## iter 100 value 162.156361
## final  value 162.156361
## stopped after 100 iterations
## # weights:  10
## initial  value 508.630153
## iter  10 value 320.536708
## iter  20 value 276.973572
## iter  30 value 272.271307
## iter  40 value 271.563184
## iter  50 value 271.450841
## iter  60 value 271.377599
## iter  70 value 271.352238
## iter  80 value 271.327119
## iter  90 value 271.299669
## iter 100 value 271.295740
## final  value 271.295740
## stopped after 100 iterations
## # weights:  28
## initial  value 530.106583
## iter  10 value 271.959155
## iter  20 value 231.496609
## iter  30 value 222.809787
## iter  40 value 220.062307
## iter  50 value 213.725578
## iter  60 value 203.117720
## iter  70 value 202.143362
## iter  80 value 201.672333
## iter  90 value 201.627707
## iter  90 value 201.627707
## final  value 201.627707
## converged
## # weights:  46
## initial  value 553.344042
## iter  10 value 267.030609
## iter  20 value 223.319038
## iter  30 value 197.577414
## iter  40 value 181.208826
## iter  50 value 175.294485
## iter  60 value 170.560439
## iter  70 value 166.585655
## iter  80 value 165.352170
## iter  90 value 165.091351
## iter 100 value 165.082175
## final  value 165.082175
## stopped after 100 iterations
## # weights:  10
## initial  value 533.708117
## iter  10 value 305.190324
## iter  20 value 283.795083
## iter  30 value 280.921353
## final  value 280.906350
```

```
## converged
## # weights:  28
## initial  value 632.045312
## iter  10 value 312.507273
## iter  20 value 280.400802
## iter  30 value 265.531693
## iter  40 value 257.043739
## iter  50 value 246.201380
## iter  60 value 239.958900
## iter  70 value 238.926057
## iter  80 value 238.858649
## final  value 238.858589
## converged
## # weights:  46
## initial  value 512.296808
## iter  10 value 262.363010
## iter  20 value 240.949277
## iter  30 value 230.663343
## iter  40 value 227.541772
## iter  50 value 225.815592
## iter  60 value 225.165450
## iter  70 value 225.087639
## iter  80 value 225.085515
## iter  90 value 225.085191
## final  value 225.085160
## converged
## # weights:  10
## initial  value 512.003269
## iter  10 value 317.323163
## iter  20 value 287.115415
## iter  30 value 284.878620
## iter  40 value 272.245322
## iter  50 value 272.240612
## iter  50 value 272.240609
## iter  50 value 272.240609
## final  value 272.240609
## converged
## # weights:  28
## initial  value 509.092541
## iter  10 value 267.625213
## iter  20 value 256.359013
## iter  30 value 235.262512
## iter  40 value 213.697148
## iter  50 value 205.182959
## iter  60 value 203.202904
## iter  70 value 202.450060
## iter  80 value 201.701024
## iter  90 value 201.146111
## iter 100 value 200.198374
## final  value 200.198374
## stopped after 100 iterations
## # weights:  46
## initial  value 532.307492
## iter  10 value 266.791609
```

```
## iter  20 value 214.399214
## iter  30 value 205.395363
## iter  40 value 194.422500
## iter  50 value 185.634465
## iter  60 value 180.988416
## iter  70 value 180.320664
## iter  80 value 178.873234
## iter  90 value 177.464517
## iter 100 value 177.035474
## final  value 177.035474
## stopped after 100 iterations
## # weights:  10
## initial  value 510.941003
## iter  10 value 373.482303
## iter  20 value 321.173322
## iter  30 value 316.320785
## iter  40 value 303.401555
## iter  50 value 297.895252
## iter  60 value 292.106427
## iter  70 value 274.311671
## iter  80 value 273.773689
## iter  90 value 273.767801
## final  value 273.764328
## converged
## # weights:  28
## initial  value 500.866604
## iter  10 value 282.474880
## iter  20 value 240.474646
## iter  30 value 231.745145
## iter  40 value 226.295361
## iter  50 value 222.970323
## iter  60 value 222.503540
## iter  70 value 222.202085
## iter  80 value 221.914414
## iter  90 value 221.832532
## iter 100 value 221.606035
## final  value 221.606035
## stopped after 100 iterations
## # weights:  46
## initial  value 527.653697
## iter  10 value 292.209837
## iter  20 value 261.095994
## iter  30 value 228.722083
## iter  40 value 206.895682
## iter  50 value 188.727275
## iter  60 value 178.366549
## iter  70 value 172.051531
## iter  80 value 164.047835
## iter  90 value 160.570210
## iter 100 value 159.974773
## final  value 159.974773
## stopped after 100 iterations
## # weights:  10
## initial  value 551.325518
```

```
## iter  10 value 363.362945
## iter  20 value 312.516975
## iter  30 value 296.047145
## iter  40 value 294.059857
## final  value 294.053356
## converged
## # weights:  28
## initial  value 561.530101
## iter  10 value 305.137899
## iter  20 value 286.785472
## iter  30 value 266.104395
## iter  40 value 259.014893
## iter  50 value 252.367616
## iter  60 value 248.782217
## iter  70 value 248.663617
## iter  80 value 248.657624
## iter  80 value 248.657623
## iter  80 value 248.657623
## final  value 248.657623
## converged
## # weights:  46
## initial  value 522.488230
## iter  10 value 310.320732
## iter  20 value 264.778707
## iter  30 value 253.136411
## iter  40 value 249.970617
## iter  50 value 246.181321
## iter  60 value 236.753868
## iter  70 value 231.255761
## iter  80 value 230.129869
## iter  90 value 229.897916
## iter 100 value 229.875169
## final  value 229.875169
## stopped after 100 iterations
## # weights:  10
## initial  value 537.130988
## iter  10 value 296.844972
## iter  20 value 287.908248
## iter  30 value 285.411057
## iter  40 value 285.185603
## iter  50 value 284.770167
## iter  60 value 284.744231
## iter  70 value 284.642448
## final  value 284.638349
## converged
## # weights:  28
## initial  value 504.094651
## iter  10 value 319.554082
## iter  20 value 281.183045
## iter  30 value 254.140268
## iter  40 value 234.603917
## iter  50 value 231.369086
## iter  60 value 226.597960
## iter  70 value 225.872072
```

```
## iter  80 value 225.611720
## iter  90 value 224.850021
## iter 100 value 224.617087
## final  value 224.617087
## stopped after 100 iterations
## # weights:  46
## initial  value 485.174708
## iter  10 value 270.314478
## iter  20 value 227.285086
## iter  30 value 200.289637
## iter  40 value 188.885158
## iter  50 value 180.603400
## iter  60 value 179.630554
## iter  70 value 179.384327
## iter  80 value 179.286312
## iter  90 value 179.155065
## iter 100 value 179.040526
## final  value 179.040526
## stopped after 100 iterations
## # weights:  10
## initial  value 536.016453
## iter  10 value 321.976804
## iter  20 value 306.685936
## iter  30 value 306.529412
## iter  40 value 306.342962
## iter  50 value 305.572812
## iter  60 value 300.198494
## iter  70 value 300.110795
## iter  80 value 300.101126
## iter  90 value 300.096235
## iter 100 value 300.090552
## final  value 300.090552
## stopped after 100 iterations
## # weights:  28
## initial  value 536.298539
## iter  10 value 291.210994
## iter  20 value 256.840049
## iter  30 value 238.353520
## iter  40 value 229.471345
## iter  50 value 224.639602
## iter  60 value 222.545929
## iter  70 value 221.690875
## iter  80 value 221.351611
## iter  90 value 220.725318
## iter 100 value 220.397556
## final  value 220.397556
## stopped after 100 iterations
## # weights:  46
## initial  value 584.619446
## iter  10 value 290.338706
## iter  20 value 236.880337
## iter  30 value 209.730897
## iter  40 value 183.214704
## iter  50 value 172.420366
```

```
## iter  60 value 165.440324
## iter  70 value 161.434061
## iter  80 value 157.017049
## iter  90 value 156.117269
## iter 100 value 155.950543
## final  value 155.950543
## stopped after 100 iterations
## # weights:  10
## initial  value 539.829020
## iter  10 value 341.141595
## iter  20 value 298.330098
## iter  30 value 292.506167
## final  value 291.700943
## converged
## # weights:  28
## initial  value 526.387954
## iter  10 value 319.462305
## iter  20 value 268.396977
## iter  30 value 259.525973
## iter  40 value 256.736664
## iter  50 value 253.331586
## iter  60 value 252.329483
## iter  70 value 252.116907
## iter  80 value 252.007798
## final  value 252.003249
## converged
## # weights:  46
## initial  value 529.073071
## iter  10 value 294.825788
## iter  20 value 255.007884
## iter  30 value 243.908168
## iter  40 value 240.916434
## iter  50 value 235.956552
## iter  60 value 232.437087
## iter  70 value 231.973139
## iter  80 value 231.906013
## iter  90 value 231.898993
## iter 100 value 231.898404
## final  value 231.898404
## stopped after 100 iterations
## # weights:  10
## initial  value 537.814420
## iter  10 value 360.031825
## iter  20 value 312.556863
## iter  30 value 288.268187
## iter  40 value 283.709490
## iter  50 value 283.236147
## iter  60 value 282.802938
## iter  70 value 282.716174
## iter  80 value 282.639027
## iter  90 value 282.609816
## iter 100 value 282.600389
## final  value 282.600389
## stopped after 100 iterations
```

```
## # weights:  28
## initial  value 509.709153
## iter  10 value 285.460028
## iter  20 value 238.532558
## iter  30 value 224.516175
## iter  40 value 207.518875
## iter  50 value 201.975772
## iter  60 value 201.586510
## iter  70 value 201.295303
## iter  80 value 200.007431
## iter  90 value 199.399226
## iter 100 value 199.352322
## final  value 199.352322
## stopped after 100 iterations
## # weights:  46
## initial  value 500.438521
## iter  10 value 277.920735
## iter  20 value 239.582760
## iter  30 value 206.951261
## iter  40 value 188.501616
## iter  50 value 164.916924
## iter  60 value 159.303314
## iter  70 value 157.305208
## iter  80 value 156.794451
## iter  90 value 156.286967
## iter 100 value 155.997371
## final  value 155.997371
## stopped after 100 iterations
## # weights:  10
## initial  value 519.462882
## iter  10 value 310.204573
## iter  20 value 288.184188
## iter  30 value 285.431003
## iter  40 value 285.313561
## iter  50 value 285.022540
## iter  60 value 284.945553
## iter  70 value 282.087037
## iter  80 value 280.386053
## iter  90 value 280.360694
## final  value 280.348390
## converged
## # weights:  28
## initial  value 530.325997
## iter  10 value 297.705711
## iter  20 value 243.107488
## iter  30 value 234.537572
## iter  40 value 218.240486
## iter  50 value 208.313658
## iter  60 value 205.406138
## iter  70 value 205.245215
## iter  80 value 204.926295
## iter  90 value 204.769174
## iter 100 value 203.943885
## final  value 203.943885
```

```
## stopped after 100 iterations
## # weights:  46
## initial  value 499.928537
## iter  10 value 276.957525
## iter  20 value 224.780086
## iter  30 value 198.551199
## iter  40 value 178.239377
## iter  50 value 166.310852
## iter  60 value 164.441968
## iter  70 value 163.831397
## iter  80 value 161.586568
## iter  90 value 161.071132
## iter 100 value 160.987385
## final  value 160.987385
## stopped after 100 iterations
## # weights:  10
## initial  value 536.625587
## iter  10 value 354.321568
## iter  20 value 299.143491
## iter  30 value 283.922893
## iter  40 value 281.397343
## iter  50 value 281.394246
## final  value 281.394237
## converged
## # weights:  28
## initial  value 525.104631
## iter  10 value 312.191859
## iter  20 value 269.732473
## iter  30 value 254.671419
## iter  40 value 252.245858
## iter  50 value 252.016129
## iter  60 value 251.945361
## iter  70 value 251.930267
## final  value 251.929423
## converged
## # weights:  46
## initial  value 600.914465
## iter  10 value 295.197486
## iter  20 value 250.772803
## iter  30 value 232.937979
## iter  40 value 227.635869
## iter  50 value 221.912026
## iter  60 value 220.475056
## iter  70 value 220.355549
## iter  80 value 220.305916
## iter  90 value 220.302916
## final  value 220.302701
## converged
## # weights:  10
## initial  value 514.386077
## iter  10 value 282.268386
## iter  20 value 276.088029
## iter  30 value 272.613395
## iter  40 value 270.820712
```

```
## iter  50 value 270.511579
## iter  60 value 270.242454
## iter  70 value 270.194819
## iter  80 value 270.159195
## iter  90 value 270.116488
## iter 100 value 270.111033
## final  value 270.111033
## stopped after 100 iterations
## # weights:  28
## initial  value 521.862194
## iter  10 value 297.318896
## iter  20 value 232.420729
## iter  30 value 223.903979
## iter  40 value 221.263506
## iter  50 value 216.812512
## iter  60 value 214.298433
## iter  70 value 214.086382
## iter  80 value 213.325588
## iter  90 value 213.199611
## iter 100 value 212.617216
## final  value 212.617216
## stopped after 100 iterations
## # weights:  46
## initial  value 505.001310
## iter  10 value 254.420535
## iter  20 value 227.384649
## iter  30 value 206.564775
## iter  40 value 181.444355
## iter  50 value 171.835120
## iter  60 value 165.455494
## iter  70 value 163.229486
## iter  80 value 161.836193
## iter  90 value 161.292763
## iter 100 value 160.832028
## final  value 160.832028
## stopped after 100 iterations
## # weights:  10
## initial  value 541.050321
## iter  10 value 309.808109
## iter  20 value 285.537092
## iter  30 value 282.551790
## iter  40 value 281.780084
## iter  50 value 281.500665
## iter  60 value 281.474180
## iter  70 value 281.385785
## iter  80 value 281.378192
## iter  90 value 281.348064
## iter 100 value 281.339289
## final  value 281.339289
## stopped after 100 iterations
## # weights:  28
## initial  value 527.383389
## iter  10 value 285.119820
## iter  20 value 247.131797
```

```
## iter  30 value 236.811882
## iter  40 value 228.479761
## iter  50 value 221.973687
## iter  60 value 212.769773
## iter  70 value 210.337302
## iter  80 value 205.404302
## iter  90 value 204.004636
## iter 100 value 203.986579
## final  value 203.986579
## stopped after 100 iterations
## # weights:  46
## initial  value 501.331044
## iter  10 value 265.184074
## iter  20 value 233.169203
## iter  30 value 202.742708
## iter  40 value 189.966113
## iter  50 value 184.367043
## iter  60 value 181.829487
## iter  70 value 181.431113
## iter  80 value 181.384852
## iter  90 value 181.259852
## iter 100 value 181.220442
## final  value 181.220442
## stopped after 100 iterations
## # weights:  10
## initial  value 537.305867
## iter  10 value 388.518790
## iter  20 value 306.258431
## iter  30 value 292.333595
## iter  40 value 290.907664
## final  value 290.906911
## converged
## # weights:  28
## initial  value 562.086803
## iter  10 value 342.434382
## iter  20 value 285.520409
## iter  30 value 267.848465
## iter  40 value 258.383548
## iter  50 value 256.796187
## iter  60 value 256.726090
## iter  70 value 256.680789
## iter  80 value 256.672303
## final  value 256.672255
## converged
## # weights:  46
## initial  value 525.225240
## iter  10 value 346.917729
## iter  20 value 283.725818
## iter  30 value 253.501541
## iter  40 value 247.486362
## iter  50 value 243.997468
## iter  60 value 242.892820
## iter  70 value 242.213613
## iter  80 value 239.978647
```

```
## iter  90 value 239.198800
## iter 100 value 239.118386
## final  value 239.118386
## stopped after 100 iterations
## # weights:  10
## initial  value 517.247757
## iter  10 value 314.673173
## iter  20 value 285.717737
## iter  30 value 282.679322
## iter  40 value 281.702450
## iter  50 value 281.558133
## iter  60 value 281.472293
## iter  70 value 281.437320
## iter  80 value 281.423377
## iter  90 value 281.406471
## iter 100 value 281.404615
## final  value 281.404615
## stopped after 100 iterations
## # weights:  28
## initial  value 507.291292
## iter  10 value 308.793196
## iter  20 value 275.652200
## iter  30 value 262.061371
## iter  40 value 260.508648
## iter  50 value 260.277600
## iter  60 value 259.589716
## iter  70 value 258.092337
## iter  80 value 257.753751
## iter  90 value 255.084257
## iter 100 value 249.918184
## final  value 249.918184
## stopped after 100 iterations
## # weights:  46
## initial  value 486.230616
## iter  10 value 289.768956
## iter  20 value 236.093364
## iter  30 value 219.084599
## iter  40 value 197.737798
## iter  50 value 191.139045
## iter  60 value 183.552659
## iter  70 value 182.519957
## iter  80 value 181.930895
## iter  90 value 181.882045
## iter 100 value 181.768920
## final  value 181.768920
## stopped after 100 iterations
## # weights:  10
## initial  value 584.894853
## iter  10 value 311.618980
## iter  20 value 289.084388
## iter  30 value 284.085927
## iter  40 value 283.715661
## iter  50 value 283.017216
## iter  60 value 282.957105
```

```
## iter  70 value 282.808388
## iter  80 value 282.785017
## iter  90 value 282.765575
## iter 100 value 282.726238
## final  value 282.726238
## stopped after 100 iterations
## # weights:  28
## initial  value 545.922324
## iter  10 value 332.842738
## iter  20 value 281.013374
## iter  30 value 267.187226
## iter  40 value 253.439111
## iter  50 value 242.071282
## iter  60 value 238.565878
## iter  70 value 237.863380
## iter  80 value 236.809274
## iter  90 value 236.440580
## iter 100 value 236.077199
## final  value 236.077199
## stopped after 100 iterations
## # weights:  46
## initial  value 659.172709
## iter  10 value 281.302101
## iter  20 value 229.140357
## iter  30 value 206.598693
## iter  40 value 189.139188
## iter  50 value 174.320254
## iter  60 value 160.976360
## iter  70 value 159.745923
## iter  80 value 159.547142
## iter  90 value 159.447048
## iter 100 value 159.439702
## final  value 159.439702
## stopped after 100 iterations
## # weights:  10
## initial  value 514.061936
## iter  10 value 328.112382
## iter  20 value 294.772210
## iter  30 value 292.324880
## final  value 292.140494
## converged
## # weights:  28
## initial  value 567.529318
## iter  10 value 296.407745
## iter  20 value 272.962462
## iter  30 value 260.362333
## iter  40 value 256.259465
## iter  50 value 254.193146
## iter  60 value 252.438211
## iter  70 value 249.984582
## iter  80 value 248.916161
## iter  90 value 248.896975
## final  value 248.896968
## converged
```

```
## # weights:  46
## initial  value 507.496919
## iter  10 value 293.357123
## iter  20 value 252.793765
## iter  30 value 236.362334
## iter  40 value 231.911218
## iter  50 value 230.395959
## iter  60 value 229.904252
## iter  70 value 229.762932
## iter  80 value 229.756498
## iter  90 value 229.478685
## iter 100 value 228.704178
## final  value 228.704178
## stopped after 100 iterations
## # weights:  10
## initial  value 520.051368
## iter  10 value 317.105892
## iter  20 value 295.417452
## iter  30 value 285.110882
## iter  40 value 284.175687
## iter  50 value 283.127173
## iter  60 value 282.987902
## iter  70 value 282.908971
## iter  80 value 282.862966
## iter  90 value 282.855182
## iter 100 value 282.834780
## final  value 282.834780
## stopped after 100 iterations
## # weights:  28
## initial  value 525.153774
## iter  10 value 294.614021
## iter  20 value 255.978652
## iter  30 value 238.223763
## iter  40 value 227.649168
## iter  50 value 220.708605
## iter  60 value 213.983986
## iter  70 value 209.237886
## iter  80 value 208.175201
## iter  90 value 204.577669
## iter 100 value 203.697380
## final  value 203.697380
## stopped after 100 iterations
## # weights:  46
## initial  value 520.096995
## iter  10 value 274.173597
## iter  20 value 224.492481
## iter  30 value 208.743371
## iter  40 value 198.649102
## iter  50 value 183.395393
## iter  60 value 177.121344
## iter  70 value 172.828724
## iter  80 value 170.613914
## iter  90 value 170.350536
## iter 100 value 170.299628
```

```
## final  value 170.299628
## stopped after 100 iterations
## # weights:  10
## initial  value 542.521607
## iter  10 value 413.865460
## iter  20 value 295.322623
## iter  30 value 283.041391
## iter  40 value 281.922486
## iter  50 value 281.718850
## iter  60 value 281.656202
## iter  70 value 281.447066
## iter  80 value 281.099751
## iter  90 value 280.943682
## iter 100 value 280.852097
## final  value 280.852097
## stopped after 100 iterations
## # weights:  28
## initial  value 516.763067
## iter  10 value 295.997036
## iter  20 value 242.899665
## iter  30 value 227.126576
## iter  40 value 220.445544
## iter  50 value 219.202129
## iter  60 value 216.675520
## iter  70 value 216.313742
## iter  80 value 215.667219
## iter  90 value 214.745721
## iter 100 value 214.605800
## final  value 214.605800
## stopped after 100 iterations
## # weights:  46
## initial  value 558.317280
## iter  10 value 294.835300
## iter  20 value 226.530331
## iter  30 value 207.122015
## iter  40 value 191.049706
## iter  50 value 181.520304
## iter  60 value 176.230203
## iter  70 value 174.207479
## iter  80 value 173.117599
## iter  90 value 172.337750
## iter 100 value 172.259595
## final  value 172.259595
## stopped after 100 iterations
## # weights:  10
## initial  value 505.263378
## iter  10 value 332.539726
## iter  20 value 290.254753
## iter  30 value 287.882575
## final  value 287.859184
## converged
## # weights:  28
## initial  value 532.733123
## iter  10 value 311.931571
```

```
## iter  20 value 250.162911
## iter  30 value 241.215248
## iter  40 value 239.736684
## iter  50 value 239.704615
## final  value 239.688479
## converged
## # weights:  46
## initial  value 565.692754
## iter  10 value 302.513388
## iter  20 value 257.030502
## iter  30 value 243.701242
## iter  40 value 237.958907
## iter  50 value 234.002437
## iter  60 value 232.231513
## iter  70 value 230.698026
## iter  80 value 229.431808
## iter  90 value 227.890303
## iter 100 value 227.333561
## final  value 227.333561
## stopped after 100 iterations
## # weights:  10
## initial  value 595.244108
## iter  10 value 334.644970
## iter  20 value 290.829784
## iter  30 value 280.611555
## iter  40 value 278.253077
## iter  50 value 277.884847
## iter  60 value 277.475798
## iter  70 value 277.440966
## iter  80 value 277.335272
## iter  90 value 277.332767
## iter 100 value 277.300523
## final  value 277.300523
## stopped after 100 iterations
## # weights:  28
## initial  value 607.086529
## iter  10 value 315.356439
## iter  20 value 266.552472
## iter  30 value 253.363801
## iter  40 value 242.339853
## iter  50 value 237.717561
## iter  60 value 231.081745
## iter  70 value 229.255866
## iter  80 value 227.865441
## iter  90 value 222.444601
## iter 100 value 219.858904
## final  value 219.858904
## stopped after 100 iterations
## # weights:  46
## initial  value 534.460519
## iter  10 value 298.181102
## iter  20 value 235.775049
## iter  30 value 224.023556
## iter  40 value 215.693056
```

```
## iter  50 value 210.923029
## iter  60 value 210.018401
## iter  70 value 208.954446
## iter  80 value 208.651758
## iter  90 value 208.424359
## iter 100 value 208.251185
## final  value 208.251185
## stopped after 100 iterations
## # weights:  10
## initial  value 531.114399
## iter  10 value 340.301726
## iter  20 value 296.694746
## iter  30 value 288.256408
## iter  40 value 285.499669
## iter  50 value 280.671644
## iter  60 value 279.008355
## iter  70 value 276.897299
## iter  80 value 276.566908
## iter  90 value 276.316535
## iter 100 value 276.192175
## final  value 276.192175
## stopped after 100 iterations
## # weights:  28
## initial  value 649.029776
## iter  10 value 277.624936
## iter  20 value 236.727480
## iter  30 value 225.543726
## iter  40 value 219.837108
## iter  50 value 213.502678
## iter  60 value 205.896234
## iter  70 value 205.614213
## iter  80 value 205.392036
## iter  90 value 204.701860
## iter 100 value 203.678440
## final  value 203.678440
## stopped after 100 iterations
## # weights:  46
## initial  value 517.402601
## iter  10 value 276.596970
## iter  20 value 225.548084
## iter  30 value 207.227445
## iter  40 value 194.835258
## iter  50 value 185.395573
## iter  60 value 180.319099
## iter  70 value 178.458975
## iter  80 value 177.776899
## iter  90 value 177.583046
## iter 100 value 177.358039
## final  value 177.358039
## stopped after 100 iterations
## # weights:  10
## initial  value 582.730497
## iter  10 value 388.772422
## iter  20 value 301.509842
```

```
## iter  30 value 286.900007
## iter  40 value 286.299326
## final  value 286.298313
## converged
## # weights:  28
## initial  value 561.016800
## iter  10 value 314.071760
## iter  20 value 267.016176
## iter  30 value 253.263922
## iter  40 value 250.095225
## iter  50 value 248.275107
## iter  60 value 247.310937
## iter  70 value 247.267284
## iter  80 value 247.267109
## final  value 247.267102
## converged
## # weights:  46
## initial  value 611.651849
## iter  10 value 268.036963
## iter  20 value 245.463584
## iter  30 value 234.160771
## iter  40 value 232.467523
## iter  50 value 231.987624
## iter  60 value 231.661794
## iter  70 value 230.797574
## iter  80 value 229.541654
## iter  90 value 228.726117
## iter 100 value 228.658972
## final  value 228.658972
## stopped after 100 iterations
## # weights:  10
## initial  value 506.307380
## iter  10 value 317.675509
## iter  20 value 313.205142
## iter  30 value 309.621893
## iter  40 value 308.935911
## iter  50 value 308.795378
## final  value 308.794651
## converged
## # weights:  28
## initial  value 506.974602
## iter  10 value 285.741015
## iter  20 value 253.110721
## iter  30 value 244.022689
## iter  40 value 242.608667
## iter  50 value 240.789093
## iter  60 value 240.202754
## iter  70 value 239.918961
## iter  80 value 236.749953
## iter  90 value 233.386178
## iter 100 value 233.172237
## final  value 233.172237
## stopped after 100 iterations
## # weights:  46
```

```
## initial  value 678.096407
## iter  10 value 269.799259
## iter  20 value 233.125260
## iter  30 value 208.938752
## iter  40 value 188.908962
## iter  50 value 178.896094
## iter  60 value 174.347584
## iter  70 value 169.654387
## iter  80 value 168.896809
## iter  90 value 168.519183
## iter 100 value 168.233853
## final  value 168.233853
## stopped after 100 iterations
## # weights:  10
## initial  value 512.473816
## iter  10 value 301.259883
## iter  20 value 276.522001
## iter  30 value 272.149244
## iter  40 value 269.191812
## iter  50 value 268.945670
## iter  60 value 268.779773
## iter  70 value 268.747630
## iter  80 value 268.724093
## iter  90 value 268.704716
## iter 100 value 268.697980
## final  value 268.697980
## stopped after 100 iterations
## # weights:  28
## initial  value 515.106860
## iter  10 value 303.501356
## iter  20 value 253.784078
## iter  30 value 232.411999
## iter  40 value 213.399161
## iter  50 value 205.588846
## iter  60 value 200.730600
## iter  70 value 197.885166
## iter  80 value 196.158609
## iter  90 value 195.920300
## iter 100 value 195.779626
## final  value 195.779626
## stopped after 100 iterations
## # weights:  46
## initial  value 580.414911
## iter  10 value 272.023400
## iter  20 value 244.924706
## iter  30 value 216.286199
## iter  40 value 195.717708
## iter  50 value 185.538351
## iter  60 value 177.591137
## iter  70 value 174.566201
## iter  80 value 169.923300
## iter  90 value 167.763333
## iter 100 value 165.113205
## final  value 165.113205
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 519.138837
## iter  10 value 297.271946
## iter  20 value 279.318804
## iter  30 value 279.282282
## final  value 279.282245
## converged
## # weights:  28
## initial  value 509.343669
## iter  10 value 286.427000
## iter  20 value 255.927342
## iter  30 value 246.195325
## iter  40 value 244.100357
## iter  50 value 243.515852
## iter  60 value 243.219479
## iter  70 value 242.632849
## iter  80 value 242.347795
## final  value 242.343290
## converged
## # weights:  46
## initial  value 533.477573
## iter  10 value 308.744443
## iter  20 value 273.192028
## iter  30 value 255.729222
## iter  40 value 245.997872
## iter  50 value 239.822464
## iter  60 value 237.579403
## iter  70 value 234.619464
## iter  80 value 233.034208
## iter  90 value 232.699281
## iter 100 value 232.181828
## final  value 232.181828
## stopped after 100 iterations
## # weights:  10
## initial  value 517.897643
## iter  10 value 409.607627
## iter  20 value 271.723334
## iter  30 value 271.132585
## iter  40 value 268.749679
## final  value 268.749105
## converged
## # weights:  28
## initial  value 571.510042
## iter  10 value 274.740904
## iter  20 value 227.472863
## iter  30 value 219.903172
## iter  40 value 210.325907
## iter  50 value 209.417599
## iter  60 value 209.132442
## iter  70 value 209.039810
## iter  80 value 208.742892
## iter  90 value 208.571315
## iter 100 value 208.533313
```

```
## final  value 208.533313
## stopped after 100 iterations
## # weights:  46
## initial  value 524.959604
## iter  10 value 276.623623
## iter  20 value 215.669799
## iter  30 value 193.087717
## iter  40 value 173.330229
## iter  50 value 158.603693
## iter  60 value 152.194477
## iter  70 value 150.862795
## iter  80 value 150.414878
## iter  90 value 150.203529
## iter 100 value 150.099360
## final  value 150.099360
## stopped after 100 iterations
## # weights:  10
## initial  value 532.630187
## iter  10 value 332.911785
## iter  20 value 290.158315
## iter  30 value 274.906550
## iter  40 value 271.839542
## iter  50 value 270.548808
## iter  60 value 270.356371
## iter  70 value 270.280778
## iter  80 value 270.202663
## iter  90 value 270.192453
## iter 100 value 270.147269
## final  value 270.147269
## stopped after 100 iterations
## # weights:  28
## initial  value 531.817330
## iter  10 value 262.719156
## iter  20 value 230.954749
## iter  30 value 210.097305
## iter  40 value 197.592657
## iter  50 value 190.819372
## iter  60 value 189.092186
## iter  70 value 189.050767
## final  value 189.044965
## converged
## # weights:  46
## initial  value 492.784887
## iter  10 value 260.921642
## iter  20 value 213.945601
## iter  30 value 199.379439
## iter  40 value 191.451459
## iter  50 value 183.683723
## iter  60 value 181.182969
## iter  70 value 171.987313
## iter  80 value 168.494540
## iter  90 value 164.819841
## iter 100 value 163.328456
## final  value 163.328456
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 542.317174
## iter  10 value 299.645940
## iter  20 value 283.047126
## iter  30 value 280.306524
## final  value 280.291336
## converged
## # weights:  28
## initial  value 518.867894
## iter  10 value 316.469740
## iter  20 value 257.498627
## iter  30 value 245.453738
## iter  40 value 235.849381
## iter  50 value 231.656349
## iter  60 value 230.350471
## iter  70 value 230.129403
## iter  80 value 230.112363
## final  value 230.112350
## converged
## # weights:  46
## initial  value 539.323038
## iter  10 value 287.102111
## iter  20 value 242.602558
## iter  30 value 233.175796
## iter  40 value 230.006892
## iter  50 value 225.404676
## iter  60 value 224.645267
## iter  70 value 224.439856
## iter  80 value 224.407337
## iter  90 value 224.406255
## final  value 224.406168
## converged
## # weights:  10
## initial  value 517.590569
## iter  10 value 303.056551
## iter  20 value 282.150480
## iter  30 value 281.248218
## iter  40 value 280.132546
## iter  50 value 273.788069
## iter  60 value 271.550336
## iter  70 value 270.498904
## iter  80 value 270.426984
## iter  90 value 270.262868
## iter 100 value 270.242118
## final  value 270.242118
## stopped after 100 iterations
## # weights:  28
## initial  value 524.494290
## iter  10 value 290.775240
## iter  20 value 227.753530
## iter  30 value 214.436902
## iter  40 value 208.466783
## iter  50 value 205.458000
```

```
## iter  60 value 204.083239
## iter  70 value 203.754825
## iter  80 value 203.705452
## iter  90 value 203.062504
## iter 100 value 202.085750
## final  value 202.085750
## stopped after 100 iterations
## # weights:  46
## initial  value 567.985982
## iter  10 value 276.616471
## iter  20 value 222.189308
## iter  30 value 205.369191
## iter  40 value 193.315138
## iter  50 value 186.686237
## iter  60 value 185.258644
## iter  70 value 184.319519
## iter  80 value 183.751215
## iter  90 value 182.852454
## iter 100 value 182.235210
## final  value 182.235210
## stopped after 100 iterations
## # weights:  10
## initial  value 547.915828
## iter  10 value 340.016414
## iter  20 value 300.142916
## iter  30 value 290.302726
## iter  40 value 287.124555
## iter  50 value 286.727404
## iter  60 value 286.395407
## iter  70 value 286.333841
## iter  80 value 286.285574
## iter  90 value 286.219311
## iter 100 value 286.209215
## final  value 286.209215
## stopped after 100 iterations
## # weights:  28
## initial  value 528.942705
## iter  10 value 326.801072
## iter  20 value 251.026335
## iter  30 value 239.525310
## iter  40 value 229.195849
## iter  50 value 216.413547
## iter  60 value 214.913302
## iter  70 value 214.613601
## iter  80 value 212.862251
## iter  90 value 211.775929
## iter 100 value 211.343515
## final  value 211.343515
## stopped after 100 iterations
## # weights:  46
## initial  value 557.775934
## iter  10 value 320.865550
## iter  20 value 253.553881
## iter  30 value 217.202557
```

```
## iter  40 value 195.247507
## iter  50 value 188.777318
## iter  60 value 183.236585
## iter  70 value 177.666853
## iter  80 value 172.149233
## iter  90 value 167.940953
## iter 100 value 166.610521
## final  value 166.610521
## stopped after 100 iterations
## # weights:  10
## initial  value 512.913584
## iter  10 value 344.281000
## iter  20 value 310.453940
## iter  30 value 298.816329
## iter  40 value 295.826521
## final  value 295.756394
## converged
## # weights:  28
## initial  value 504.217005
## iter  10 value 320.797593
## iter  20 value 274.908830
## iter  30 value 255.992368
## iter  40 value 252.261879
## iter  50 value 251.070003
## iter  60 value 250.860543
## iter  70 value 250.850701
## final  value 250.849018
## converged
## # weights:  46
## initial  value 531.398797
## iter  10 value 296.256425
## iter  20 value 256.275363
## iter  30 value 248.530964
## iter  40 value 246.887347
## iter  50 value 246.470353
## iter  60 value 245.206703
## iter  70 value 244.816173
## iter  80 value 244.388501
## iter  90 value 240.273176
## iter 100 value 236.548519
## final  value 236.548519
## stopped after 100 iterations
## # weights:  10
## initial  value 502.277015
## iter  10 value 347.987205
## iter  20 value 309.314443
## iter  30 value 299.185620
## iter  40 value 298.056814
## iter  50 value 282.649357
## iter  60 value 282.141444
## iter  70 value 282.096774
## final  value 282.094355
## converged
## # weights:  28
```

```
## initial  value 572.477992
## iter  10 value 301.841972
## iter  20 value 270.121856
## iter  30 value 253.915129
## iter  40 value 250.362248
## iter  50 value 246.522615
## iter  60 value 244.416761
## iter  70 value 243.722597
## iter  80 value 242.773116
## iter  90 value 241.222857
## iter 100 value 241.018053
## final  value 241.018053
## stopped after 100 iterations
## # weights:  46
## initial  value 591.945731
## iter  10 value 287.957097
## iter  20 value 241.600767
## iter  30 value 208.800658
## iter  40 value 179.440261
## iter  50 value 174.437546
## iter  60 value 171.935939
## iter  70 value 170.660711
## iter  80 value 169.885765
## iter  90 value 167.585684
## iter 100 value 166.724721
## final  value 166.724721
## stopped after 100 iterations
## # weights:  10
## initial  value 512.022633
## iter  10 value 320.455724
## iter  20 value 282.493030
## iter  30 value 278.467053
## iter  40 value 276.090557
## iter  50 value 275.901395
## iter  60 value 275.597682
## iter  70 value 275.514247
## iter  80 value 275.448469
## iter  90 value 275.376321
## iter 100 value 275.360050
## final  value 275.360050
## stopped after 100 iterations
## # weights:  28
## initial  value 538.326634
## iter  10 value 289.204054
## iter  20 value 246.606194
## iter  30 value 227.431728
## iter  40 value 221.239400
## iter  50 value 218.942214
## iter  60 value 216.233784
## iter  70 value 214.435732
## iter  80 value 214.020728
## iter  90 value 213.662452
## iter 100 value 213.529183
## final  value 213.529183
```

```
## stopped after 100 iterations
## # weights:  46
## initial  value 564.658650
## iter  10 value 284.588431
## iter  20 value 240.442424
## iter  30 value 220.288925
## iter  40 value 193.145933
## iter  50 value 179.189661
## iter  60 value 168.471342
## iter  70 value 166.379803
## iter  80 value 165.133505
## iter  90 value 164.412386
## iter 100 value 163.281110
## final  value 163.281110
## stopped after 100 iterations
## # weights:  10
## initial  value 539.015754
## iter  10 value 323.570438
## iter  20 value 291.851830
## iter  30 value 287.204076
## final  value 286.965810
## converged
## # weights:  28
## initial  value 567.500055
## iter  10 value 318.778837
## iter  20 value 266.637313
## iter  30 value 262.129434
## iter  40 value 255.099023
## iter  50 value 249.978945
## iter  60 value 249.061269
## iter  70 value 248.964621
## iter  80 value 248.959481
## final  value 248.959473
## converged
## # weights:  46
## initial  value 523.554771
## iter  10 value 274.260654
## iter  20 value 251.016982
## iter  30 value 241.978528
## iter  40 value 236.550079
## iter  50 value 234.621696
## iter  60 value 234.403057
## iter  70 value 234.334892
## iter  80 value 234.304114
## iter  90 value 234.303481
## final  value 234.303465
## converged
## # weights:  10
## initial  value 544.396918
## iter  10 value 322.160617
## iter  20 value 286.092216
## iter  30 value 281.026858
## iter  40 value 276.645199
## iter  50 value 276.130532
```

```
## iter  60 value 275.732858
## iter  70 value 275.659862
## iter  80 value 275.603737
## iter  90 value 275.530272
## iter 100 value 275.514360
## final  value 275.514360
## stopped after 100 iterations
## # weights:  28
## initial  value 531.426659
## iter  10 value 290.431003
## iter  20 value 252.978622
## iter  30 value 237.593071
## iter  40 value 226.657771
## iter  50 value 224.032042
## iter  60 value 221.461767
## iter  70 value 220.427467
## iter  80 value 219.126538
## iter  90 value 218.482050
## iter 100 value 218.077234
## final  value 218.077234
## stopped after 100 iterations
## # weights:  46
## initial  value 571.057158
## iter  10 value 306.408387
## iter  20 value 242.037135
## iter  30 value 223.026630
## iter  40 value 198.480064
## iter  50 value 182.140079
## iter  60 value 171.905486
## iter  70 value 169.642645
## iter  80 value 168.009955
## iter  90 value 166.572389
## iter 100 value 166.125845
## final  value 166.125845
## stopped after 100 iterations
## # weights:  10
## initial  value 491.145841
## iter  10 value 289.818378
## iter  20 value 281.314399
## iter  30 value 278.672609
## iter  40 value 277.508526
## iter  50 value 277.367005
## iter  60 value 277.218811
## iter  70 value 277.187897
## iter  80 value 277.153649
## iter  90 value 277.134295
## iter 100 value 277.126786
## final  value 277.126786
## stopped after 100 iterations
## # weights:  28
## initial  value 486.950039
## iter  10 value 278.372823
## iter  20 value 246.087973
## iter  30 value 238.561893
```

```
## iter  40 value 228.119345
## iter  50 value 223.178434
## iter  60 value 220.718344
## iter  70 value 220.239766
## iter  80 value 219.893300
## iter  90 value 219.830634
## iter 100 value 219.593796
## final  value 219.593796
## stopped after 100 iterations
## # weights:  46
## initial  value 690.821960
## iter  10 value 268.914797
## iter  20 value 229.500887
## iter  30 value 212.313680
## iter  40 value 205.704098
## iter  50 value 197.263214
## iter  60 value 183.041103
## iter  70 value 177.931567
## iter  80 value 172.075327
## iter  90 value 170.820514
## iter 100 value 170.018430
## final  value 170.018430
## stopped after 100 iterations
## # weights:  10
## initial  value 531.354522
## iter  10 value 391.929823
## iter  20 value 293.562487
## iter  30 value 286.587042
## final  value 286.131604
## converged
## # weights:  28
## initial  value 491.431851
## iter  10 value 274.697023
## iter  20 value 257.711847
## iter  30 value 254.205860
## iter  40 value 242.577053
## iter  50 value 237.918097
## iter  60 value 237.240953
## iter  70 value 237.237843
## final  value 237.237803
## converged
## # weights:  46
## initial  value 611.336317
## iter  10 value 287.727167
## iter  20 value 250.971759
## iter  30 value 238.337552
## iter  40 value 230.332033
## iter  50 value 227.334058
## iter  60 value 224.216431
## iter  70 value 223.191477
## iter  80 value 222.922533
## iter  90 value 222.903652
## final  value 222.903063
## converged
```

```
## # weights:  10
## initial  value 535.558809
## iter  10 value 320.123924
## iter  20 value 282.745248
## iter  30 value 279.628487
## iter  40 value 277.873194
## iter  50 value 277.564808
## iter  60 value 277.296679
## iter  70 value 277.251983
## iter  80 value 277.206384
## iter  90 value 277.196140
## iter 100 value 277.192301
## final  value 277.192301
## stopped after 100 iterations
## # weights:  28
## initial  value 530.732135
## iter  10 value 276.956419
## iter  20 value 242.071797
## iter  30 value 225.387965
## iter  40 value 218.078692
## iter  50 value 212.161762
## iter  60 value 211.739205
## iter  70 value 211.121129
## iter  80 value 210.676199
## iter  90 value 210.104273
## iter 100 value 209.747865
## final  value 209.747865
## stopped after 100 iterations
## # weights:  46
## initial  value 547.767629
## iter  10 value 268.177048
## iter  20 value 220.746889
## iter  30 value 204.336696
## iter  40 value 182.820775
## iter  50 value 168.967288
## iter  60 value 162.516329
## iter  70 value 161.287279
## iter  80 value 160.179739
## iter  90 value 159.808825
## iter 100 value 159.614738
## final  value 159.614738
## stopped after 100 iterations
## # weights:  10
## initial  value 522.549349
## iter  10 value 327.870540
## iter  20 value 285.806988
## iter  30 value 284.902718
## iter  40 value 284.481292
## iter  50 value 284.386292
## iter  60 value 284.331978
## iter  70 value 284.293568
## iter  80 value 284.281862
## iter  90 value 284.244729
## iter 100 value 284.238344
```

```
## final  value 284.238344
## stopped after 100 iterations
## # weights:  28
## initial  value 522.317692
## iter  10 value 264.488209
## iter  20 value 238.663715
## iter  30 value 237.214862
## iter  40 value 235.057746
## iter  50 value 228.888348
## iter  60 value 221.939602
## iter  70 value 221.532564
## iter  80 value 221.039142
## iter  90 value 220.562287
## iter 100 value 220.453168
## final  value 220.453168
## stopped after 100 iterations
## # weights:  46
## initial  value 477.257745
## iter  10 value 278.972813
## iter  20 value 228.282258
## iter  30 value 198.232966
## iter  40 value 181.313936
## iter  50 value 170.076109
## iter  60 value 167.507083
## iter  70 value 166.852903
## iter  80 value 166.653434
## iter  90 value 166.640332
## final  value 166.639715
## converged
## # weights:  10
## initial  value 508.010924
## iter  10 value 320.956953
## iter  20 value 304.649239
## iter  30 value 295.515419
## iter  40 value 294.834633
## final  value 294.834614
## converged
## # weights:  28
## initial  value 508.226716
## iter  10 value 311.465173
## iter  20 value 267.296387
## iter  30 value 249.788545
## iter  40 value 243.608942
## iter  50 value 241.520809
## iter  60 value 241.353759
## iter  70 value 241.336644
## iter  80 value 241.334198
## final  value 241.334194
## converged
## # weights:  46
## initial  value 535.633803
## iter  10 value 277.126176
## iter  20 value 252.212518
## iter  30 value 244.817432
```

```
## iter  40 value 239.246886
## iter  50 value 234.522296
## iter  60 value 231.747634
## iter  70 value 230.895573
## iter  80 value 230.752910
## iter  90 value 230.730529
## final  value 230.730289
## converged
## # weights:  10
## initial  value 507.874080
## iter  10 value 332.236630
## iter  20 value 321.900930
## iter  30 value 317.030075
## iter  40 value 309.818323
## iter  50 value 309.812701
## final  value 309.812599
## converged
## # weights:  28
## initial  value 511.125185
## iter  10 value 313.855872
## iter  20 value 273.607123
## iter  30 value 259.398108
## iter  40 value 248.519754
## iter  50 value 247.498666
## iter  60 value 245.653936
## iter  70 value 245.214570
## iter  80 value 245.161823
## iter  90 value 243.797880
## iter 100 value 243.266664
## final  value 243.266664
## stopped after 100 iterations
## # weights:  46
## initial  value 524.875541
## iter  10 value 280.661008
## iter  20 value 234.104919
## iter  30 value 207.671148
## iter  40 value 177.610023
## iter  50 value 166.837269
## iter  60 value 163.329649
## iter  70 value 162.455722
## iter  80 value 161.781825
## iter  90 value 161.611632
## iter 100 value 161.509770
## final  value 161.509770
## stopped after 100 iterations
## # weights:  10
## initial  value 519.052904
## iter  10 value 348.535494
## iter  20 value 298.452524
## iter  30 value 290.135194
## iter  40 value 284.462118
## iter  50 value 284.082213
## iter  60 value 283.999494
## iter  70 value 283.961223
```

```
## iter  80 value 283.948105
## iter  90 value 283.920206
## iter 100 value 283.917129
## final  value 283.917129
## stopped after 100 iterations
## # weights:  28
## initial  value 508.891471
## iter  10 value 290.659820
## iter  20 value 230.318038
## iter  30 value 219.515825
## iter  40 value 205.193617
## iter  50 value 195.788712
## iter  60 value 192.327684
## iter  70 value 191.997966
## iter  80 value 191.648742
## iter  90 value 191.451303
## final  value 191.447593
## converged
## # weights:  46
## initial  value 502.055387
## iter  10 value 278.868802
## iter  20 value 235.993833
## iter  30 value 215.355004
## iter  40 value 203.274875
## iter  50 value 195.009666
## iter  60 value 189.395659
## iter  70 value 186.775778
## iter  80 value 184.388897
## iter  90 value 183.935978
## iter 100 value 183.711207
## final  value 183.711207
## stopped after 100 iterations
## # weights:  10
## initial  value 517.537992
## iter  10 value 371.379944
## iter  20 value 311.382784
## iter  30 value 295.296270
## iter  40 value 293.545276
## final  value 293.544498
## converged
## # weights:  28
## initial  value 496.412498
## iter  10 value 299.253348
## iter  20 value 265.618874
## iter  30 value 258.344436
## iter  40 value 254.317989
## iter  50 value 254.188781
## final  value 254.152005
## converged
## # weights:  46
## initial  value 492.600179
## iter  10 value 296.975502
## iter  20 value 259.190862
## iter  30 value 248.097977
```

```
## iter  40 value 243.041078
## iter  50 value 242.038577
## iter  60 value 241.564251
## iter  70 value 241.138004
## iter  80 value 241.110793
## iter  90 value 241.104779
## final  value 241.104637
## converged
## # weights:  10
## initial  value 514.487592
## iter  10 value 333.726306
## iter  20 value 304.942903
## iter  30 value 291.047358
## iter  40 value 284.463986
## iter  50 value 284.205506
## iter  60 value 284.140391
## iter  70 value 284.045790
## iter  80 value 284.035452
## iter  90 value 284.010822
## iter 100 value 284.009759
## final  value 284.009759
## stopped after 100 iterations
## # weights:  28
## initial  value 532.508408
## iter  10 value 315.724062
## iter  20 value 260.934297
## iter  30 value 240.326370
## iter  40 value 230.486589
## iter  50 value 223.617452
## iter  60 value 223.310962
## iter  70 value 223.217263
## iter  80 value 223.125239
## iter  90 value 222.953013
## iter 100 value 222.558548
## final  value 222.558548
## stopped after 100 iterations
## # weights:  46
## initial  value 664.622082
## iter  10 value 294.247997
## iter  20 value 261.736852
## iter  30 value 247.338257
## iter  40 value 227.916181
## iter  50 value 206.374453
## iter  60 value 197.037497
## iter  70 value 191.921506
## iter  80 value 184.574495
## iter  90 value 181.814735
## iter 100 value 181.328533
## final  value 181.328533
## stopped after 100 iterations
## # weights:  10
## initial  value 520.011974
## iter  10 value 335.173045
## iter  20 value 301.386963
```

```
## iter  30 value 294.180107
## iter  40 value 286.666269
## iter  50 value 285.066364
## iter  60 value 284.246431
## iter  70 value 284.157568
## iter  80 value 284.016064
## iter  90 value 283.986176
## iter 100 value 283.929657
## final  value 283.929657
## stopped after 100 iterations
## # weights:  28
## initial  value 610.410810
## iter  10 value 303.790851
## iter  20 value 272.735366
## iter  30 value 257.706067
## iter  40 value 250.597003
## iter  50 value 243.043753
## iter  60 value 240.676692
## iter  70 value 240.627612
## iter  80 value 240.620112
## final  value 240.619245
## converged
## # weights:  46
## initial  value 539.915076
## iter  10 value 263.970179
## iter  20 value 222.740565
## iter  30 value 202.444568
## iter  40 value 178.960495
## iter  50 value 171.561957
## iter  60 value 170.399713
## iter  70 value 170.369398
## final  value 170.368663
## converged
## # weights:  10
## initial  value 512.664542
## iter  10 value 355.256261
## iter  20 value 297.953157
## iter  30 value 294.024688
## final  value 293.808446
## converged
## # weights:  28
## initial  value 545.012982
## iter  10 value 312.023384
## iter  20 value 275.469892
## iter  30 value 263.840068
## iter  40 value 256.910593
## iter  50 value 250.012649
## iter  60 value 246.821398
## iter  70 value 246.247539
## iter  80 value 245.791530
## iter  90 value 243.266812
## iter 100 value 243.123991
## final  value 243.123991
## stopped after 100 iterations
```

```
## # weights:  46
## initial  value 505.821656
## iter  10 value 289.201876
## iter  20 value 252.133611
## iter  30 value 245.705644
## iter  40 value 243.592359
## iter  50 value 242.443007
## iter  60 value 242.171958
## iter  70 value 242.127252
## iter  80 value 242.095187
## iter  90 value 242.078519
## iter 100 value 242.032891
## final  value 242.032891
## stopped after 100 iterations
## # weights:  10
## initial  value 511.531593
## iter  10 value 308.335960
## iter  20 value 298.057728
## iter  30 value 297.498469
## iter  40 value 288.681162
## iter  50 value 288.579827
## iter  60 value 288.568254
## iter  70 value 288.567374
## iter  80 value 288.562777
## iter  90 value 288.561136
## iter 100 value 288.560035
## final  value 288.560035
## stopped after 100 iterations
## # weights:  28
## initial  value 521.927966
## iter  10 value 298.609913
## iter  20 value 244.604605
## iter  30 value 233.717865
## iter  40 value 232.251149
## iter  50 value 224.617847
## iter  60 value 216.451200
## iter  70 value 216.313506
## iter  80 value 216.209599
## iter  90 value 216.094070
## iter 100 value 215.785542
## final  value 215.785542
## stopped after 100 iterations
## # weights:  46
## initial  value 607.928512
## iter  10 value 315.310325
## iter  20 value 244.550497
## iter  30 value 217.390120
## iter  40 value 207.648923
## iter  50 value 201.329144
## iter  60 value 195.611171
## iter  70 value 190.836674
## iter  80 value 189.539054
## iter  90 value 188.863157
## iter 100 value 188.712494
```

```
## final  value 188.712494
## stopped after 100 iterations
## # weights:  10
## initial  value 524.671371
## iter  10 value 312.336059
## iter  20 value 280.026290
## iter  30 value 278.478843
## iter  40 value 278.376937
## iter  50 value 278.212917
## iter  60 value 278.172894
## iter  70 value 278.123525
## iter  80 value 278.118476
## iter  90 value 278.096211
## iter 100 value 278.085349
## final  value 278.085349
## stopped after 100 iterations
## # weights:  28
## initial  value 509.767688
## iter  10 value 298.531517
## iter  20 value 259.744036
## iter  30 value 246.302370
## iter  40 value 237.862783
## iter  50 value 235.844849
## iter  60 value 235.716776
## iter  70 value 235.683905
## iter  80 value 235.601331
## iter  90 value 235.141279
## iter 100 value 234.558483
## final  value 234.558483
## stopped after 100 iterations
## # weights:  46
## initial  value 546.399415
## iter  10 value 277.164044
## iter  20 value 229.028410
## iter  30 value 210.459344
## iter  40 value 195.661206
## iter  50 value 187.336729
## iter  60 value 181.875176
## iter  70 value 179.116366
## iter  80 value 178.897653
## iter  90 value 178.887309
## iter 100 value 178.883042
## final  value 178.883042
## stopped after 100 iterations
## # weights:  10
## initial  value 531.806322
## iter  10 value 332.014144
## iter  20 value 296.788606
## iter  30 value 288.842852
## final  value 288.485233
## converged
## # weights:  28
## initial  value 504.619418
## iter  10 value 300.382256
```

```
## iter  20 value 265.206536
## iter  30 value 254.841498
## iter  40 value 246.799190
## iter  50 value 240.737993
## iter  60 value 237.934706
## iter  70 value 237.533576
## iter  80 value 237.509474
## final  value 237.509456
## converged
## # weights:  46
## initial  value 586.490846
## iter  10 value 277.023539
## iter  20 value 244.650111
## iter  30 value 233.024896
## iter  40 value 231.496195
## iter  50 value 228.743793
## iter  60 value 225.440623
## iter  70 value 225.033766
## iter  80 value 225.017170
## iter  90 value 225.016806
## final  value 225.016734
## converged
## # weights:  10
## initial  value 528.696729
## iter  10 value 321.156144
## iter  20 value 297.469978
## iter  30 value 295.740179
## iter  40 value 284.186189
## iter  50 value 280.728707
## iter  60 value 278.783103
## iter  70 value 278.462558
## iter  80 value 278.311306
## iter  90 value 278.255176
## iter 100 value 278.243157
## final  value 278.243157
## stopped after 100 iterations
## # weights:  28
## initial  value 543.138532
## iter  10 value 280.082403
## iter  20 value 251.322667
## iter  30 value 229.184717
## iter  40 value 223.431333
## iter  50 value 221.258411
## iter  60 value 219.987582
## iter  70 value 219.466357
## iter  80 value 218.919649
## iter  90 value 218.767515
## iter 100 value 218.731433
## final  value 218.731433
## stopped after 100 iterations
## # weights:  46
## initial  value 567.685732
## iter  10 value 281.243004
## iter  20 value 218.451160
```

```
## iter  30 value 196.133055
## iter  40 value 181.010764
## iter  50 value 175.261436
## iter  60 value 174.729171
## iter  70 value 174.276744
## iter  80 value 174.137283
## iter  90 value 173.932201
## iter 100 value 173.730380
## final  value 173.730380
## stopped after 100 iterations
## # weights:  10
## initial  value 511.011603
## iter  10 value 330.299264
## iter  20 value 290.127361
## iter  30 value 280.680773
## iter  40 value 277.575656
## iter  50 value 277.253559
## iter  60 value 277.098280
## iter  70 value 277.040263
## iter  80 value 276.991188
## iter  90 value 276.966051
## iter 100 value 276.953775
## final  value 276.953775
## stopped after 100 iterations
## # weights:  28
## initial  value 537.096106
## iter  10 value 291.766236
## iter  20 value 238.119892
## iter  30 value 221.098883
## iter  40 value 214.912049
## iter  50 value 207.055436
## iter  60 value 204.468427
## iter  70 value 202.548281
## iter  80 value 201.469309
## iter  90 value 200.148227
## iter 100 value 199.677225
## final  value 199.677225
## stopped after 100 iterations
## # weights:  46
## initial  value 494.842351
## iter  10 value 306.928496
## iter  20 value 242.214234
## iter  30 value 214.778089
## iter  40 value 201.463513
## iter  50 value 196.088973
## iter  60 value 192.046583
## iter  70 value 187.597409
## iter  80 value 185.619940
## iter  90 value 184.466133
## iter 100 value 183.592828
## final  value 183.592828
## stopped after 100 iterations
## # weights:  10
## initial  value 554.611973
```

```
## iter  10 value 294.279804
## iter  20 value 286.664435
## iter  30 value 286.566386
## final  value 286.566252
## converged
## # weights:  28
## initial  value 603.710907
## iter  10 value 317.474527
## iter  20 value 279.497993
## iter  30 value 267.490599
## iter  40 value 256.472068
## iter  50 value 250.154937
## iter  60 value 248.332350
## iter  70 value 245.332365
## iter  80 value 244.610609
## final  value 244.601430
## converged
## # weights:  46
## initial  value 625.433304
## iter  10 value 306.307354
## iter  20 value 267.554985
## iter  30 value 253.868789
## iter  40 value 240.674238
## iter  50 value 234.987121
## iter  60 value 232.734477
## iter  70 value 232.375983
## iter  80 value 232.310794
## iter  90 value 232.259318
## iter 100 value 232.236066
## final  value 232.236066
## stopped after 100 iterations
## # weights:  10
## initial  value 514.197188
## iter  10 value 323.477325
## iter  20 value 284.598992
## iter  30 value 279.875303
## iter  40 value 277.866478
## iter  50 value 277.485410
## iter  60 value 277.326996
## iter  70 value 277.175850
## iter  80 value 277.160592
## iter  90 value 277.110472
## final  value 277.110273
## converged
## # weights:  28
## initial  value 542.027147
## iter  10 value 302.952090
## iter  20 value 239.585735
## iter  30 value 230.301485
## iter  40 value 221.440671
## iter  50 value 219.217353
## iter  60 value 217.274370
## iter  70 value 214.966987
## iter  80 value 209.907776
```

```
## iter  90 value 209.443981
## iter 100 value 209.362390
## final  value 209.362390
## stopped after 100 iterations
## # weights:  46
## initial  value 615.189578
## iter  10 value 270.028816
## iter  20 value 228.196419
## iter  30 value 205.288049
## iter  40 value 174.196452
## iter  50 value 163.096196
## iter  60 value 160.254081
## iter  70 value 159.308511
## iter  80 value 157.799555
## iter  90 value 156.539562
## iter 100 value 156.373057
## final  value 156.373057
## stopped after 100 iterations
## # weights:  10
## initial  value 592.794095
## iter  10 value 307.366604
## iter  20 value 275.174987
## iter  30 value 271.494104
## iter  40 value 270.703114
## iter  50 value 270.030407
## iter  60 value 269.944950
## iter  70 value 269.884754
## iter  80 value 269.817405
## iter  90 value 269.795613
## iter 100 value 269.773058
## final  value 269.773058
## stopped after 100 iterations
## # weights:  28
## initial  value 505.840822
## iter  10 value 322.838741
## iter  20 value 250.468929
## iter  30 value 232.667891
## iter  40 value 226.056313
## iter  50 value 223.999707
## iter  60 value 215.958056
## iter  70 value 213.095998
## iter  80 value 212.390304
## iter  90 value 212.287390
## iter 100 value 211.723822
## final  value 211.723822
## stopped after 100 iterations
## # weights:  46
## initial  value 504.962577
## iter  10 value 255.157706
## iter  20 value 207.982401
## iter  30 value 183.722724
## iter  40 value 170.270694
## iter  50 value 165.325638
## iter  60 value 163.329073
```

```
## iter  70 value 163.093649
## iter  80 value 162.716737
## iter  90 value 162.714331
## iter  90 value 162.714331
## iter  90 value 162.714331
## final  value 162.714331
## converged
## # weights:  10
## initial  value 509.762316
## iter  10 value 335.503450
## iter  20 value 285.853684
## iter  30 value 279.369822
## iter  40 value 279.341536
## final  value 279.341478
## converged
## # weights:  28
## initial  value 531.161142
## iter  10 value 346.524401
## iter  20 value 295.848137
## iter  30 value 260.085840
## iter  40 value 254.667168
## iter  50 value 238.691984
## iter  60 value 232.170921
## iter  70 value 231.752000
## iter  80 value 231.678716
## final  value 231.675957
## converged
## # weights:  46
## initial  value 620.407306
## iter  10 value 294.939661
## iter  20 value 255.511247
## iter  30 value 240.087747
## iter  40 value 236.778331
## iter  50 value 234.054183
## iter  60 value 232.536443
## iter  70 value 228.833276
## iter  80 value 228.386053
## iter  90 value 228.339154
## iter 100 value 228.333044
## final  value 228.333044
## stopped after 100 iterations
## # weights:  10
## initial  value 519.726832
## iter  10 value 399.791439
## iter  20 value 347.705766
## iter  30 value 329.352465
## iter  40 value 312.203717
## iter  50 value 307.423379
## iter  60 value 282.101866
## iter  70 value 273.359023
## iter  80 value 271.092850
## iter  90 value 270.121665
## iter 100 value 269.996752
## final  value 269.996752
```

```
## stopped after 100 iterations
## # weights:  28
## initial  value 534.791758
## iter  10 value 273.417759
## iter  20 value 231.449685
## iter  30 value 219.821707
## iter  40 value 210.728663
## iter  50 value 199.077132
## iter  60 value 198.486524
## iter  70 value 198.300821
## iter  80 value 198.052393
## iter  90 value 197.836839
## iter 100 value 197.770991
## final  value 197.770991
## stopped after 100 iterations
## # weights:  46
## initial  value 555.370204
## iter  10 value 319.770978
## iter  20 value 234.851073
## iter  30 value 217.541676
## iter  40 value 206.554127
## iter  50 value 202.442044
## iter  60 value 193.491380
## iter  70 value 192.916956
## iter  80 value 192.799884
## iter  90 value 192.540817
## iter 100 value 191.670957
## final  value 191.670957
## stopped after 100 iterations
## # weights:  10
## initial  value 526.798600
## iter  10 value 510.176620
## iter  20 value 281.356447
## iter  30 value 277.648047
## iter  40 value 270.380191
## iter  50 value 264.479557
## iter  60 value 261.860818
## iter  70 value 261.819068
## iter  80 value 261.601035
## iter  90 value 260.523428
## iter 100 value 260.446083
## final  value 260.446083
## stopped after 100 iterations
## # weights:  28
## initial  value 551.365292
## iter  10 value 270.204037
## iter  20 value 224.681070
## iter  30 value 211.021715
## iter  40 value 207.866011
## iter  50 value 206.567726
## iter  60 value 205.608918
## iter  70 value 205.311954
## iter  80 value 204.184048
## iter  90 value 201.996247
```

```
## iter 100 value 200.822368
## final  value 200.822368
## stopped after 100 iterations
## # weights:  46
## initial  value 521.321318
## iter  10 value 260.464551
## iter  20 value 205.948056
## iter  30 value 183.367253
## iter  40 value 168.732621
## iter  50 value 161.764610
## iter  60 value 157.947655
## iter  70 value 156.181913
## iter  80 value 155.580437
## iter  90 value 155.425539
## iter 100 value 155.406449
## final  value 155.406449
## stopped after 100 iterations
## # weights:  10
## initial  value 512.254378
## iter  10 value 303.535640
## iter  20 value 285.450001
## iter  30 value 281.227546
## final  value 281.029831
## converged
## # weights:  28
## initial  value 580.085237
## iter  10 value 285.928528
## iter  20 value 252.079330
## iter  30 value 238.809665
## iter  40 value 234.297826
## iter  50 value 234.025153
## iter  60 value 234.020873
## iter  70 value 234.019269
## final  value 234.019207
## converged
## # weights:  46
## initial  value 537.382883
## iter  10 value 310.014937
## iter  20 value 256.911284
## iter  30 value 233.413509
## iter  40 value 230.065768
## iter  50 value 226.028537
## iter  60 value 223.329118
## iter  70 value 222.011480
## iter  80 value 221.726898
## iter  90 value 221.714234
## iter 100 value 221.713019
## final  value 221.713019
## stopped after 100 iterations
## # weights:  10
## initial  value 530.133456
## iter  10 value 285.915549
## iter  20 value 273.771922
## iter  30 value 272.209820
```

```
## iter  40 value 271.825938
## iter  50 value 271.742821
## iter  60 value 271.698786
## iter  70 value 271.678618
## iter  80 value 271.668724
## iter  90 value 271.656080
## iter 100 value 271.655444
## final  value 271.655444
## stopped after 100 iterations
## # weights:  28
## initial  value 519.993370
## iter  10 value 272.399689
## iter  20 value 241.137967
## iter  30 value 225.302133
## iter  40 value 212.426198
## iter  50 value 208.512378
## iter  60 value 207.422790
## iter  70 value 207.206469
## iter  80 value 206.600451
## iter  90 value 206.142871
## iter 100 value 205.860687
## final  value 205.860687
## stopped after 100 iterations
## # weights:  46
## initial  value 574.983005
## iter  10 value 272.719363
## iter  20 value 216.487927
## iter  30 value 189.900988
## iter  40 value 177.640974
## iter  50 value 167.217214
## iter  60 value 160.901050
## iter  70 value 160.099567
## iter  80 value 159.676220
## iter  90 value 158.739779
## iter 100 value 158.543695
## final  value 158.543695
## stopped after 100 iterations
## # weights:  10
## initial  value 559.384787
## iter  10 value 320.185407
## iter  20 value 288.790245
## iter  30 value 281.671094
## iter  40 value 279.809829
## iter  50 value 279.559273
## iter  60 value 279.416410
## iter  70 value 279.377475
## iter  80 value 279.323257
## iter  90 value 279.301157
## iter 100 value 279.291652
## final  value 279.291652
## stopped after 100 iterations
## # weights:  28
## initial  value 548.446109
## iter  10 value 302.265491
```

```
## iter  20 value 257.361884
## iter  30 value 247.816203
## iter  40 value 245.605407
## iter  50 value 244.674244
## iter  60 value 239.349085
## iter  70 value 237.621164
## iter  80 value 235.851021
## iter  90 value 233.970884
## iter 100 value 233.640290
## final  value 233.640290
## stopped after 100 iterations
## # weights:  46
## initial  value 594.896613
## iter  10 value 299.031899
## iter  20 value 247.264061
## iter  30 value 218.678478
## iter  40 value 203.981744
## iter  50 value 190.177177
## iter  60 value 182.215611
## iter  70 value 177.396172
## iter  80 value 175.263014
## iter  90 value 174.149626
## iter 100 value 173.606980
## final  value 173.606980
## stopped after 100 iterations
## # weights:  10
## initial  value 499.451851
## iter  10 value 331.346408
## iter  20 value 293.248793
## iter  30 value 288.879678
## final  value 288.625641
## converged
## # weights:  28
## initial  value 546.116970
## iter  10 value 299.606673
## iter  20 value 270.219435
## iter  30 value 260.306400
## iter  40 value 252.319910
## iter  50 value 244.015684
## iter  60 value 241.570872
## iter  70 value 241.328859
## iter  80 value 241.303057
## final  value 241.303017
## converged
## # weights:  46
## initial  value 546.590389
## iter  10 value 279.159637
## iter  20 value 250.838476
## iter  30 value 238.361333
## iter  40 value 235.545569
## iter  50 value 233.074011
## iter  60 value 231.850451
## iter  70 value 229.782183
## iter  80 value 229.202784
```

```
## iter  90 value 228.989792
## iter 100 value 228.943638
## final  value 228.943638
## stopped after 100 iterations
## # weights:  10
## initial  value 534.040693
## iter  10 value 306.927198
## iter  20 value 286.764220
## iter  30 value 283.989539
## iter  40 value 280.681412
## iter  50 value 279.866212
## iter  60 value 279.647499
## iter  70 value 279.487890
## iter  80 value 279.450463
## iter  90 value 279.394731
## iter 100 value 279.391518
## final  value 279.391518
## stopped after 100 iterations
## # weights:  28
## initial  value 530.489120
## iter  10 value 326.862030
## iter  20 value 277.344088
## iter  30 value 256.422372
## iter  40 value 248.611595
## iter  50 value 245.758759
## iter  60 value 245.102114
## iter  70 value 244.823411
## iter  80 value 243.928545
## iter  90 value 243.632603
## iter 100 value 243.342780
## final  value 243.342780
## stopped after 100 iterations
## # weights:  46
## initial  value 546.723240
## iter  10 value 276.676859
## iter  20 value 233.506470
## iter  30 value 209.609321
## iter  40 value 197.137407
## iter  50 value 191.885816
## iter  60 value 189.003292
## iter  70 value 188.270528
## iter  80 value 187.378208
## iter  90 value 187.146245
## iter 100 value 187.001295
## final  value 187.001295
## stopped after 100 iterations
## # weights:  10
## initial  value 529.015830
## iter  10 value 337.032039
## iter  20 value 288.391375
## iter  30 value 274.691071
## iter  40 value 272.591986
## iter  50 value 272.304864
## iter  60 value 272.049916
```

```
## iter  70 value 271.979339
## iter  80 value 271.938582
## iter  90 value 271.910415
## iter 100 value 271.903681
## final  value 271.903681
## stopped after 100 iterations
## # weights:  28
## initial  value 525.676002
## iter  10 value 285.056072
## iter  20 value 252.605315
## iter  30 value 239.837240
## iter  40 value 227.733155
## iter  50 value 222.060171
## iter  60 value 213.818735
## iter  70 value 212.892175
## iter  80 value 212.482880
## iter  90 value 210.836593
## iter 100 value 210.328071
## final  value 210.328071
## stopped after 100 iterations
## # weights:  46
## initial  value 511.353252
## iter  10 value 269.670444
## iter  20 value 219.640430
## iter  30 value 191.417699
## iter  40 value 171.197688
## iter  50 value 160.549993
## iter  60 value 155.818613
## iter  70 value 153.293248
## iter  80 value 152.734836
## iter  90 value 152.115567
## iter 100 value 150.363095
## final  value 150.363095
## stopped after 100 iterations
## # weights:  10
## initial  value 577.891481
## iter  10 value 313.049881
## iter  20 value 288.139895
## iter  30 value 281.488695
## iter  40 value 281.139210
## iter  40 value 281.139210
## iter  40 value 281.139210
## final  value 281.139210
## converged
## # weights:  28
## initial  value 491.821432
## iter  10 value 259.540985
## iter  20 value 240.016653
## iter  30 value 236.151551
## iter  40 value 235.597854
## iter  50 value 235.473053
## iter  60 value 235.439844
## final  value 235.439755
## converged
```

```
## # weights:  46
## initial  value 518.414646
## iter  10 value 268.459338
## iter  20 value 238.677290
## iter  30 value 232.669994
## iter  40 value 230.596618
## iter  50 value 229.338888
## iter  60 value 228.490434
## iter  70 value 227.668680
## iter  80 value 227.055673
## iter  90 value 226.459185
## iter 100 value 225.521444
## final  value 225.521444
## stopped after 100 iterations
## # weights:  10
## initial  value 523.445581
## iter  10 value 320.883743
## iter  20 value 288.251176
## iter  30 value 275.536215
## iter  40 value 272.310833
## iter  50 value 272.271727
## iter  60 value 272.028995
## iter  70 value 271.996518
## iter  80 value 271.966760
## iter  90 value 271.954096
## final  value 271.954077
## converged
## # weights:  28
## initial  value 541.379797
## iter  10 value 318.696089
## iter  20 value 258.089709
## iter  30 value 247.209430
## iter  40 value 242.169067
## iter  50 value 240.300934
## iter  60 value 238.713074
## iter  70 value 238.088396
## iter  80 value 235.658689
## iter  90 value 234.135394
## iter 100 value 233.390849
## final  value 233.390849
## stopped after 100 iterations
## # weights:  46
## initial  value 517.175605
## iter  10 value 275.542078
## iter  20 value 210.438588
## iter  30 value 196.418545
## iter  40 value 186.191045
## iter  50 value 177.861734
## iter  60 value 163.909289
## iter  70 value 159.640431
## iter  80 value 158.317588
## iter  90 value 156.514945
## iter 100 value 155.575944
## final  value 155.575944
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 515.195702
## iter  10 value 316.884684
## iter  20 value 292.808871
## iter  30 value 290.526625
## iter  40 value 288.729408
## iter  50 value 288.387739
## iter  60 value 288.198081
## iter  70 value 288.096939
## iter  80 value 288.066705
## iter  90 value 288.040320
## iter 100 value 288.030621
## final  value 288.030621
## stopped after 100 iterations
## # weights:  28
## initial  value 534.418748
## iter  10 value 319.988382
## iter  20 value 264.601379
## iter  30 value 252.445238
## iter  40 value 249.394736
## iter  50 value 248.478074
## iter  60 value 247.170534
## iter  70 value 246.259672
## iter  80 value 244.965205
## iter  90 value 242.859690
## iter 100 value 240.792726
## final  value 240.792726
## stopped after 100 iterations
## # weights:  46
## initial  value 530.237416
## iter  10 value 319.398609
## iter  20 value 245.052463
## iter  30 value 213.683086
## iter  40 value 202.455666
## iter  50 value 198.475959
## iter  60 value 193.371509
## iter  70 value 188.533969
## iter  80 value 187.087954
## iter  90 value 186.503276
## iter 100 value 186.152750
## final  value 186.152750
## stopped after 100 iterations
## # weights:  10
## initial  value 526.472494
## iter  10 value 321.024162
## iter  20 value 299.157080
## iter  30 value 297.814501
## final  value 297.801028
## converged
## # weights:  28
## initial  value 509.739061
## iter  10 value 294.036365
## iter  20 value 263.387223
```

```
## iter  30 value 257.413315
## iter  40 value 254.852508
## iter  50 value 253.875824
## iter  60 value 253.557284
## iter  70 value 253.555403
## iter  80 value 253.554567
## final  value 253.554530
## converged
## # weights:  46
## initial  value 603.440442
## iter  10 value 337.095771
## iter  20 value 275.794188
## iter  30 value 255.560415
## iter  40 value 248.529898
## iter  50 value 245.360185
## iter  60 value 242.604340
## iter  70 value 239.457137
## iter  80 value 237.795743
## iter  90 value 237.261100
## iter 100 value 237.121011
## final  value 237.121011
## stopped after 100 iterations
## # weights:  10
## initial  value 520.182941
## iter  10 value 296.720269
## iter  20 value 289.373188
## iter  30 value 288.853108
## iter  40 value 288.305014
## iter  50 value 288.228543
## iter  60 value 288.180420
## iter  70 value 288.133413
## iter  80 value 288.128169
## iter  90 value 288.108314
## iter 100 value 288.105964
## final  value 288.105964
## stopped after 100 iterations
## # weights:  28
## initial  value 602.769945
## iter  10 value 292.189492
## iter  20 value 256.760813
## iter  30 value 229.565654
## iter  40 value 222.080728
## iter  50 value 218.324060
## iter  60 value 217.974584
## iter  70 value 217.908872
## iter  80 value 217.859487
## iter  90 value 217.842122
## iter 100 value 217.534531
## final  value 217.534531
## stopped after 100 iterations
## # weights:  46
## initial  value 533.867481
## iter  10 value 303.865720
## iter  20 value 241.269517
```

```
## iter  30 value 205.055959
## iter  40 value 187.771068
## iter  50 value 176.588316
## iter  60 value 159.433820
## iter  70 value 154.201000
## iter  80 value 153.471844
## iter  90 value 152.636068
## iter 100 value 151.922793
## final  value 151.922793
## stopped after 100 iterations
## # weights:  10
## initial  value 527.791086
## iter  10 value 321.652996
## iter  20 value 278.194234
## iter  30 value 274.119895
## iter  40 value 273.086111
## iter  50 value 272.544402
## iter  60 value 272.315618
## iter  70 value 272.239595
## iter  80 value 272.135177
## iter  90 value 272.129073
## iter 100 value 272.076004
## final  value 272.076004
## stopped after 100 iterations
## # weights:  28
## initial  value 542.708966
## iter  10 value 265.348583
## iter  20 value 227.032667
## iter  30 value 218.118715
## iter  40 value 214.906389
## iter  50 value 213.138215
## iter  60 value 212.758947
## iter  70 value 212.677983
## iter  80 value 212.260208
## iter  90 value 211.442994
## iter 100 value 210.150960
## final  value 210.150960
## stopped after 100 iterations
## # weights:  46
## initial  value 601.741554
## iter  10 value 263.331147
## iter  20 value 218.970224
## iter  30 value 203.248858
## iter  40 value 185.210253
## iter  50 value 177.990007
## iter  60 value 173.949274
## iter  70 value 173.027484
## iter  80 value 172.831143
## iter  90 value 172.712218
## iter 100 value 172.695437
## final  value 172.695437
## stopped after 100 iterations
## # weights:  10
## initial  value 530.620338
```

```
## iter  10 value 351.025759
## iter  20 value 296.535673
## iter  30 value 285.298649
## iter  40 value 283.132777
## final  value 283.131519
## converged
## # weights:  28
## initial  value 527.343188
## iter  10 value 281.673671
## iter  20 value 255.698772
## iter  30 value 249.657912
## iter  40 value 246.615262
## iter  50 value 245.623786
## iter  60 value 245.578180
## iter  70 value 245.572982
## final  value 245.572529
## converged
## # weights:  46
## initial  value 530.797510
## iter  10 value 272.119067
## iter  20 value 246.751039
## iter  30 value 238.347350
## iter  40 value 231.637570
## iter  50 value 229.655995
## iter  60 value 227.591988
## iter  70 value 225.549742
## iter  80 value 224.589021
## iter  90 value 224.504613
## iter 100 value 224.498328
## final  value 224.498328
## stopped after 100 iterations
## # weights:  10
## initial  value 561.352401
## iter  10 value 511.414528
## iter  20 value 478.402447
## iter  30 value 390.504917
## iter  40 value 339.669963
## iter  50 value 315.462661
## iter  60 value 314.758281
## iter  70 value 314.534637
## iter  80 value 313.446109
## iter  90 value 310.330684
## iter 100 value 310.330263
## final  value 310.330263
## stopped after 100 iterations
## # weights:  28
## initial  value 529.327244
## iter  10 value 307.718255
## iter  20 value 259.663392
## iter  30 value 239.165155
## iter  40 value 236.614710
## iter  50 value 236.008268
## iter  60 value 235.655923
## iter  70 value 235.537919
```

```
## iter  80 value 235.335550
## iter  90 value 235.123635
## iter 100 value 235.035067
## final  value 235.035067
## stopped after 100 iterations
## # weights:  46
## initial  value 519.439801
## iter  10 value 246.292045
## iter  20 value 220.495200
## iter  30 value 205.811695
## iter  40 value 194.806524
## iter  50 value 189.656713
## iter  60 value 187.862073
## iter  70 value 185.392809
## iter  80 value 184.422293
## iter  90 value 184.008701
## iter 100 value 183.663732
## final  value 183.663732
## stopped after 100 iterations
## # weights:  10
## initial  value 534.530841
## iter  10 value 300.279710
## iter  20 value 276.498855
## iter  30 value 271.560374
## iter  40 value 270.007735
## iter  50 value 269.668787
## iter  60 value 269.569502
## iter  70 value 269.441531
## iter  80 value 269.399697
## iter  90 value 269.348062
## iter 100 value 269.345248
## final  value 269.345248
## stopped after 100 iterations
## # weights:  28
## initial  value 530.554729
## iter  10 value 295.158384
## iter  20 value 267.150928
## iter  30 value 255.208969
## iter  40 value 249.105029
## iter  50 value 247.330700
## iter  60 value 245.546756
## iter  70 value 244.979706
## iter  80 value 244.594482
## iter  90 value 244.385423
## iter 100 value 244.290745
## final  value 244.290745
## stopped after 100 iterations
## # weights:  46
## initial  value 560.279833
## iter  10 value 286.242253
## iter  20 value 240.399222
## iter  30 value 214.016078
## iter  40 value 201.462498
## iter  50 value 196.558941
```

```
## iter  60 value 192.379350
## iter  70 value 187.213546
## iter  80 value 185.962296
## iter  90 value 185.708293
## iter 100 value 185.656207
## final  value 185.656207
## stopped after 100 iterations
## # weights:  10
## initial  value 514.656300
## iter  10 value 335.749392
## iter  20 value 286.524284
## iter  30 value 279.226066
## final  value 278.801375
## converged
## # weights:  28
## initial  value 660.022989
## iter  10 value 292.955591
## iter  20 value 258.538459
## iter  30 value 254.410586
## iter  40 value 246.737667
## iter  50 value 245.268591
## iter  60 value 244.310202
## iter  70 value 244.092303
## iter  80 value 243.886970
## final  value 243.883728
## converged
## # weights:  46
## initial  value 514.796318
## iter  10 value 276.923766
## iter  20 value 247.419417
## iter  30 value 238.072204
## iter  40 value 232.678204
## iter  50 value 229.102187
## iter  60 value 226.047508
## iter  70 value 225.056290
## iter  80 value 224.845079
## iter  90 value 224.736278
## iter 100 value 224.709394
## final  value 224.709394
## stopped after 100 iterations
## # weights:  10
## initial  value 569.543756
## iter  10 value 313.804760
## iter  20 value 288.432126
## iter  30 value 275.896432
## iter  40 value 270.147519
## iter  50 value 269.801212
## iter  60 value 269.539955
## iter  70 value 269.472375
## iter  80 value 269.422625
## iter  90 value 269.404000
## iter 100 value 269.399337
## final  value 269.399337
## stopped after 100 iterations
```

```
## # weights:  28
## initial  value 497.090188
## iter  10 value 275.852692
## iter  20 value 235.633586
## iter  30 value 215.757400
## iter  40 value 209.278355
## iter  50 value 207.161772
## iter  60 value 206.889376
## iter  70 value 206.807209
## iter  80 value 206.476701
## iter  90 value 205.880582
## iter 100 value 205.805218
## final  value 205.805218
## stopped after 100 iterations
## # weights:  46
## initial  value 580.480709
## iter  10 value 275.648795
## iter  20 value 237.053235
## iter  30 value 207.890049
## iter  40 value 187.245708
## iter  50 value 174.283977
## iter  60 value 163.201971
## iter  70 value 151.995532
## iter  80 value 147.791428
## iter  90 value 147.277166
## iter 100 value 147.012136
## final  value 147.012136
## stopped after 100 iterations
## # weights:  10
## initial  value 540.380265
## iter  10 value 326.621278
## iter  20 value 300.898019
## iter  30 value 298.255754
## iter  40 value 289.747230
## iter  50 value 287.780801
## iter  60 value 286.444458
## iter  70 value 286.328276
## iter  80 value 286.181100
## iter  90 value 286.101793
## iter 100 value 286.076939
## final  value 286.076939
## stopped after 100 iterations
## # weights:  28
## initial  value 523.681792
## iter  10 value 301.075190
## iter  20 value 251.238131
## iter  30 value 233.226920
## iter  40 value 229.651701
## iter  50 value 220.304490
## iter  60 value 215.157431
## iter  70 value 214.315498
## iter  80 value 213.333024
## iter  90 value 212.709841
## iter 100 value 211.247543
```

```
## final  value 211.247543
## stopped after 100 iterations
## # weights:  46
## initial  value 512.631090
## iter  10 value 267.794717
## iter  20 value 237.631072
## iter  30 value 214.889117
## iter  40 value 193.102196
## iter  50 value 185.202317
## iter  60 value 183.703922
## iter  70 value 183.649707
## iter  80 value 183.648633
## iter  90 value 183.648125
## final  value 183.647967
## converged
## # weights:  10
## initial  value 515.096390
## iter  10 value 389.543413
## iter  20 value 317.723816
## iter  30 value 299.493505
## iter  40 value 296.740831
## final  value 296.683409
## converged
## # weights:  28
## initial  value 511.546519
## iter  10 value 320.751819
## iter  20 value 283.157855
## iter  30 value 267.772440
## iter  40 value 256.069407
## iter  50 value 252.384044
## iter  60 value 252.205469
## iter  70 value 252.176765
## iter  80 value 252.169298
## iter  90 value 252.163405
## iter 100 value 251.902865
## final  value 251.902865
## stopped after 100 iterations
## # weights:  46
## initial  value 539.722652
## iter  10 value 290.902407
## iter  20 value 260.007862
## iter  30 value 252.644231
## iter  40 value 250.546749
## iter  50 value 249.215309
## iter  60 value 246.751364
## iter  70 value 245.451507
## iter  80 value 241.870056
## iter  90 value 238.986594
## iter 100 value 238.466523
## final  value 238.466523
## stopped after 100 iterations
## # weights:  10
## initial  value 520.672153
## iter  10 value 299.243214
```

```
## iter  20 value 289.499234
## iter  30 value 287.100802
## iter  40 value 286.417113
## iter  50 value 286.248437
## iter  60 value 286.154915
## iter  70 value 286.118504
## iter  80 value 286.095429
## iter  90 value 286.082430
## iter 100 value 286.081138
## final  value 286.081138
## stopped after 100 iterations
## # weights:  28
## initial  value 511.698584
## iter  10 value 278.774487
## iter  20 value 247.786364
## iter  30 value 243.399717
## iter  40 value 231.937385
## iter  50 value 228.104809
## iter  60 value 225.995476
## iter  70 value 225.886076
## iter  80 value 223.734497
## iter  90 value 223.584908
## iter 100 value 223.449169
## final  value 223.449169
## stopped after 100 iterations
## # weights:  46
## initial  value 521.892560
## iter  10 value 279.532985
## iter  20 value 243.090274
## iter  30 value 215.757768
## iter  40 value 195.424868
## iter  50 value 183.454303
## iter  60 value 173.144676
## iter  70 value 169.758929
## iter  80 value 167.424437
## iter  90 value 166.543277
## iter 100 value 166.371925
## final  value 166.371925
## stopped after 100 iterations
## # weights:  10
## initial  value 515.875337
## iter  10 value 315.934239
## iter  20 value 293.505992
## iter  30 value 287.246461
## iter  40 value 273.884678
## iter  50 value 273.793968
## iter  60 value 273.765844
## iter  70 value 273.756083
## iter  80 value 273.752500
## final  value 273.752427
## converged
## # weights:  28
## initial  value 489.373884
## iter  10 value 287.228055
```

```
## iter  20 value 247.064619
## iter  30 value 234.505720
## iter  40 value 225.790711
## iter  50 value 222.225597
## iter  60 value 213.698346
## iter  70 value 209.523107
## iter  80 value 208.986585
## iter  90 value 207.646950
## iter 100 value 205.809310
## final  value 205.809310
## stopped after 100 iterations
## # weights:  46
## initial  value 504.626076
## iter  10 value 278.519756
## iter  20 value 228.531114
## iter  30 value 217.712658
## iter  40 value 208.637388
## iter  50 value 195.367884
## iter  60 value 188.672561
## iter  70 value 185.972498
## iter  80 value 184.825639
## iter  90 value 184.385698
## iter 100 value 184.178671
## final  value 184.178671
## stopped after 100 iterations
## # weights:  10
## initial  value 500.790870
## iter  10 value 307.628514
## iter  20 value 296.620328
## iter  30 value 292.149744
## iter  40 value 289.348747
## final  value 289.348643
## converged
## # weights:  28
## initial  value 513.475764
## iter  10 value 314.252334
## iter  20 value 287.528846
## iter  30 value 271.182828
## iter  40 value 262.618803
## iter  50 value 256.167019
## iter  60 value 249.658253
## iter  70 value 248.371061
## iter  80 value 247.516324
## iter  90 value 247.462295
## iter  90 value 247.462294
## iter  90 value 247.462294
## final  value 247.462294
## converged
## # weights:  46
## initial  value 536.791358
## iter  10 value 287.163417
## iter  20 value 248.408013
## iter  30 value 237.982430
## iter  40 value 235.962037
```

```
## iter  50 value 234.257406
## iter  60 value 233.875340
## iter  70 value 233.840008
## iter  80 value 233.839289
## final  value 233.839264
## converged
## # weights:  10
## initial  value 558.948970
## iter  10 value 339.563614
## iter  20 value 292.598947
## iter  30 value 288.028511
## iter  40 value 279.346076
## iter  50 value 278.579148
## iter  60 value 278.577315
## final  value 278.577300
## converged
## # weights:  28
## initial  value 521.725844
## iter  10 value 282.227930
## iter  20 value 250.570184
## iter  30 value 232.126782
## iter  40 value 224.055638
## iter  50 value 221.038609
## iter  60 value 219.235497
## iter  70 value 218.662790
## iter  80 value 217.890310
## iter  90 value 217.174678
## iter 100 value 216.363084
## final  value 216.363084
## stopped after 100 iterations
## # weights:  46
## initial  value 518.276505
## iter  10 value 287.951670
## iter  20 value 245.998428
## iter  30 value 217.698143
## iter  40 value 206.691179
## iter  50 value 197.410887
## iter  60 value 192.548952
## iter  70 value 191.009794
## iter  80 value 190.387339
## iter  90 value 189.795363
## iter 100 value 188.749027
## final  value 188.749027
## stopped after 100 iterations
## # weights:  10
## initial  value 530.661320
## iter  10 value 388.897224
## iter  20 value 342.483701
## iter  30 value 323.234117
## iter  40 value 288.488756
## iter  50 value 283.523510
## iter  60 value 280.595495
## iter  70 value 279.483178
## iter  80 value 279.361650
```

```
## iter  90 value 279.036635
## iter 100 value 279.023748
## final  value 279.023748
## stopped after 100 iterations
## # weights:  28
## initial  value 513.451740
## iter  10 value 280.469302
## iter  20 value 250.592103
## iter  30 value 229.908986
## iter  40 value 220.801900
## iter  50 value 211.761680
## iter  60 value 208.733121
## iter  70 value 208.663697
## iter  80 value 208.493066
## iter  90 value 208.445299
## iter 100 value 208.422119
## final  value 208.422119
## stopped after 100 iterations
## # weights:  46
## initial  value 539.272147
## iter  10 value 274.896120
## iter  20 value 226.080169
## iter  30 value 202.747309
## iter  40 value 183.876135
## iter  50 value 167.008305
## iter  60 value 159.993915
## iter  70 value 156.825601
## iter  80 value 156.634347
## iter  90 value 156.611148
## iter 100 value 156.602887
## final  value 156.602887
## stopped after 100 iterations
## # weights:  10
## initial  value 517.464992
## iter  10 value 298.771975
## iter  20 value 288.711980
## iter  30 value 288.688279
## final  value 288.684416
## converged
## # weights:  28
## initial  value 512.004753
## iter  10 value 313.504629
## iter  20 value 271.623744
## iter  30 value 262.778368
## iter  40 value 254.368398
## iter  50 value 250.022163
## iter  60 value 247.730445
## iter  70 value 247.114420
## iter  80 value 247.079166
## final  value 247.078962
## converged
## # weights:  46
## initial  value 527.485410
## iter  10 value 327.311517
```

```
## iter  20 value 269.943273
## iter  30 value 243.150683
## iter  40 value 239.051668
## iter  50 value 237.454987
## iter  60 value 237.287976
## iter  70 value 237.271791
## iter  80 value 237.271173
## iter  90 value 237.270834
## iter 100 value 237.270646
## final  value 237.270646
## stopped after 100 iterations
## # weights:  10
## initial  value 513.688207
## iter  10 value 308.659546
## iter  20 value 290.314552
## iter  30 value 281.467188
## iter  40 value 279.599585
## iter  50 value 279.385192
## iter  60 value 279.081557
## iter  70 value 279.032551
## iter  80 value 278.989691
## iter  90 value 278.957620
## iter 100 value 278.950922
## final  value 278.950922
## stopped after 100 iterations
## # weights:  28
## initial  value 663.765285
## iter  10 value 299.724624
## iter  20 value 257.051132
## iter  30 value 254.125676
## iter  40 value 252.778904
## iter  50 value 252.430034
## iter  60 value 252.409253
## iter  70 value 252.394068
## iter  80 value 252.376478
## iter  90 value 252.301722
## iter 100 value 252.287030
## final  value 252.287030
## stopped after 100 iterations
## # weights:  46
## initial  value 514.925371
## iter  10 value 270.851939
## iter  20 value 227.202239
## iter  30 value 204.851944
## iter  40 value 183.109636
## iter  50 value 155.653341
## iter  60 value 139.412891
## iter  70 value 133.307891
## iter  80 value 132.301789
## iter  90 value 132.077577
## iter 100 value 131.993057
## final  value 131.993057
## stopped after 100 iterations
## # weights:  10
```

```
## initial  value 570.931093
## iter  10 value 469.416339
## iter  20 value 432.249022
## iter  30 value 417.905478
## iter  40 value 392.498593
## iter  50 value 387.007936
## iter  60 value 368.100297
## iter  70 value 358.772676
## iter  80 value 358.566987
## final  value 358.562644
## converged
## # weights:  28
## initial  value 553.043854
## iter  10 value 294.288515
## iter  20 value 251.521614
## iter  30 value 236.049107
## iter  40 value 230.886004
## iter  50 value 225.872227
## iter  60 value 223.610317
## iter  70 value 223.221187
## iter  80 value 222.580111
## iter  90 value 221.446159
## iter 100 value 216.272890
## final  value 216.272890
## stopped after 100 iterations
## # weights:  46
## initial  value 528.778142
## iter  10 value 284.937906
## iter  20 value 225.258935
## iter  30 value 195.513321
## iter  40 value 185.814151
## iter  50 value 175.371671
## iter  60 value 169.493452
## iter  70 value 161.264707
## iter  80 value 155.033461
## iter  90 value 154.174590
## iter 100 value 153.923671
## final  value 153.923671
## stopped after 100 iterations
## # weights:  10
## initial  value 511.153395
## iter  10 value 313.549860
## iter  20 value 291.893392
## iter  30 value 289.493767
## final  value 289.333624
## converged
## # weights:  28
## initial  value 509.080922
## iter  10 value 305.385645
## iter  20 value 261.426557
## iter  30 value 253.716206
## iter  40 value 248.768328
## iter  50 value 244.562688
## iter  60 value 243.758685
```

```
## iter  70 value 243.590728
## iter  80 value 243.581928
## final  value 243.581896
## converged
## # weights:  46
## initial  value 498.192950
## iter  10 value 291.038093
## iter  20 value 252.285876
## iter  30 value 242.740759
## iter  40 value 236.277833
## iter  50 value 233.532488
## iter  60 value 231.747149
## iter  70 value 229.250935
## iter  80 value 228.668571
## iter  90 value 228.074244
## iter 100 value 226.363431
## final  value 226.363431
## stopped after 100 iterations
## # weights:  10
## initial  value 518.074421
## iter  10 value 341.690157
## iter  20 value 311.621195
## iter  30 value 293.210893
## iter  40 value 283.846155
## iter  50 value 281.601674
## iter  60 value 280.331658
## iter  70 value 280.229036
## iter  80 value 280.060562
## iter  90 value 280.019707
## iter 100 value 279.996933
## final  value 279.996933
## stopped after 100 iterations
## # weights:  28
## initial  value 523.314479
## iter  10 value 279.437584
## iter  20 value 247.032815
## iter  30 value 236.963450
## iter  40 value 230.515815
## iter  50 value 229.772042
## iter  60 value 229.464258
## iter  70 value 229.430198
## iter  80 value 229.367874
## iter  90 value 229.114111
## iter 100 value 227.941430
## final  value 227.941430
## stopped after 100 iterations
## # weights:  46
## initial  value 514.259206
## iter  10 value 267.976393
## iter  20 value 226.577766
## iter  30 value 191.993227
## iter  40 value 174.854265
## iter  50 value 169.579610
## iter  60 value 166.928284
```

```
## iter  70 value 164.614357
## iter  80 value 163.138739
## iter  90 value 161.209704
## iter 100 value 160.522242
## final  value 160.522242
## stopped after 100 iterations
## # weights:  10
## initial  value 518.514988
## iter  10 value 288.612757
## iter  20 value 279.585653
## iter  30 value 278.411965
## iter  40 value 278.075502
## iter  50 value 278.030750
## iter  60 value 277.969521
## iter  70 value 277.950592
## iter  80 value 277.931949
## iter  90 value 277.903026
## iter 100 value 277.899391
## final  value 277.899391
## stopped after 100 iterations
## # weights:  28
## initial  value 533.279836
## iter  10 value 349.581743
## iter  20 value 267.746451
## iter  30 value 239.998822
## iter  40 value 228.785843
## iter  50 value 222.666602
## iter  60 value 219.183994
## iter  70 value 214.030833
## iter  80 value 213.491895
## iter  90 value 213.421804
## iter 100 value 213.335810
## final  value 213.335810
## stopped after 100 iterations
## # weights:  46
## initial  value 529.663286
## iter  10 value 270.023183
## iter  20 value 220.870413
## iter  30 value 203.384485
## iter  40 value 181.555072
## iter  50 value 170.320430
## iter  60 value 155.336399
## iter  70 value 147.321094
## iter  80 value 143.217910
## iter  90 value 142.959871
## iter 100 value 142.935704
## final  value 142.935704
## stopped after 100 iterations
## # weights:  10
## initial  value 508.310703
## iter  10 value 327.170815
## iter  20 value 294.356111
## iter  30 value 287.989761
## iter  40 value 286.818705
```

```
## final  value 286.818558
## converged
## # weights:  28
## initial  value 515.940755
## iter  10 value 294.287872
## iter  20 value 270.491709
## iter  30 value 254.011399
## iter  40 value 246.001379
## iter  50 value 235.300871
## iter  60 value 233.587931
## iter  70 value 233.491575
## final  value 233.491325
## converged
## # weights:  46
## initial  value 494.835004
## iter  10 value 279.105078
## iter  20 value 245.476222
## iter  30 value 230.200986
## iter  40 value 225.521868
## iter  50 value 224.148020
## iter  60 value 220.277543
## iter  70 value 219.716378
## iter  80 value 219.689145
## iter  90 value 219.678951
## final  value 219.678813
## converged
## # weights:  10
## initial  value 520.005374
## iter  10 value 311.050776
## iter  20 value 287.860558
## iter  30 value 279.173533
## iter  40 value 278.364186
## iter  50 value 278.167726
## iter  60 value 278.050087
## iter  70 value 278.023909
## iter  80 value 278.000090
## iter  90 value 277.980169
## iter 100 value 277.977279
## final  value 277.977279
## stopped after 100 iterations
## # weights:  28
## initial  value 512.806741
## iter  10 value 295.877704
## iter  20 value 249.970357
## iter  30 value 242.561169
## iter  40 value 239.676310
## iter  50 value 233.190346
## iter  60 value 229.338265
## iter  70 value 224.901808
## iter  80 value 217.222038
## iter  90 value 216.648166
## iter 100 value 216.247518
## final  value 216.247518
## stopped after 100 iterations
```

```
## # weights:  46
## initial  value 567.722381
## iter  10 value 292.602765
## iter  20 value 232.642533
## iter  30 value 206.691680
## iter  40 value 192.816903
## iter  50 value 177.105417
## iter  60 value 169.681971
## iter  70 value 166.020176
## iter  80 value 164.628752
## iter  90 value 163.243882
## iter 100 value 162.925827
## final  value 162.925827
## stopped after 100 iterations
## # weights:  10
## initial  value 531.879074
## iter  10 value 298.394577
## iter  20 value 277.795729
## iter  30 value 277.169674
## iter  40 value 276.874140
## iter  50 value 276.805159
## iter  60 value 276.757786
## iter  70 value 276.724987
## iter  80 value 276.707055
## iter  90 value 276.692408
## iter 100 value 276.688855
## final  value 276.688855
## stopped after 100 iterations
## # weights:  28
## initial  value 537.600930
## iter  10 value 297.995281
## iter  20 value 247.467123
## iter  30 value 229.436119
## iter  40 value 221.018629
## iter  50 value 217.936794
## iter  60 value 217.708802
## iter  70 value 217.411979
## iter  80 value 216.120775
## iter  90 value 214.498710
## iter 100 value 213.270434
## final  value 213.270434
## stopped after 100 iterations
## # weights:  46
## initial  value 521.718931
## iter  10 value 283.706441
## iter  20 value 236.961449
## iter  30 value 205.625058
## iter  40 value 192.314167
## iter  50 value 178.784160
## iter  60 value 175.799081
## iter  70 value 174.747186
## iter  80 value 172.411683
## iter  90 value 169.505732
## iter 100 value 168.268463
```

```
## final  value 168.268463
## stopped after 100 iterations
## # weights:  10
## initial  value 524.659965
## iter  10 value 349.333941
## iter  20 value 309.289277
## iter  30 value 286.671220
## final  value 286.463036
## converged
## # weights:  28
## initial  value 540.414875
## iter  10 value 302.973869
## iter  20 value 274.508670
## iter  30 value 265.860351
## iter  40 value 260.082974
## iter  50 value 257.644445
## iter  60 value 256.461145
## iter  70 value 256.141110
## iter  80 value 256.053534
## final  value 256.052101
## converged
## # weights:  46
## initial  value 584.992234
## iter  10 value 302.801328
## iter  20 value 261.829227
## iter  30 value 255.321816
## iter  40 value 249.583794
## iter  50 value 244.694169
## iter  60 value 240.871268
## iter  70 value 239.866198
## iter  80 value 239.829228
## iter  90 value 239.824469
## iter 100 value 239.823326
## final  value 239.823326
## stopped after 100 iterations
## # weights:  10
## initial  value 513.968980
## iter  10 value 331.278004
## iter  20 value 281.066124
## iter  30 value 278.232949
## iter  40 value 277.160375
## iter  50 value 276.977717
## iter  60 value 276.863006
## iter  70 value 276.808597
## iter  80 value 276.793741
## iter  90 value 276.775414
## iter 100 value 276.774470
## final  value 276.774470
## stopped after 100 iterations
## # weights:  28
## initial  value 521.371646
## iter  10 value 299.888532
## iter  20 value 260.802749
## iter  30 value 255.510286
```

```
## iter  40 value 252.926067
## iter  50 value 251.853572
## iter  60 value 250.456387
## iter  70 value 249.482448
## iter  80 value 249.031242
## iter  90 value 248.709391
## iter 100 value 248.547796
## final  value 248.547796
## stopped after 100 iterations
## # weights:  46
## initial  value 529.859265
## iter  10 value 283.034810
## iter  20 value 239.825015
## iter  30 value 209.417246
## iter  40 value 198.530608
## iter  50 value 193.069027
## iter  60 value 188.493966
## iter  70 value 183.995327
## iter  80 value 179.865170
## iter  90 value 178.806035
## iter 100 value 178.221374
## final  value 178.221374
## stopped after 100 iterations
## # weights:  10
## initial  value 514.851141
## iter  10 value 351.599509
## iter  20 value 296.306629
## iter  30 value 287.466987
## iter  40 value 280.571170
## iter  50 value 279.853525
## iter  60 value 279.685281
## iter  70 value 279.581357
## iter  80 value 279.554734
## iter  90 value 279.489739
## iter 100 value 279.482215
## final  value 279.482215
## stopped after 100 iterations
## # weights:  28
## initial  value 516.443911
## iter  10 value 273.110265
## iter  20 value 239.048704
## iter  30 value 231.164731
## iter  40 value 223.804895
## iter  50 value 218.449049
## iter  60 value 214.682874
## iter  70 value 212.954343
## iter  80 value 211.959864
## iter  90 value 211.896266
## iter 100 value 211.800268
## final  value 211.800268
## stopped after 100 iterations
## # weights:  46
## initial  value 510.794370
## iter  10 value 307.821979
```

```
## iter  20 value 266.245671
## iter  30 value 227.780119
## iter  40 value 203.469710
## iter  50 value 197.542448
## iter  60 value 192.072845
## iter  70 value 188.381876
## iter  80 value 185.763794
## iter  90 value 181.361482
## iter 100 value 180.407126
## final  value 180.407126
## stopped after 100 iterations
## # weights:  10
## initial  value 531.032640
## iter  10 value 322.744188
## iter  20 value 293.151953
## iter  30 value 288.597826
## final  value 288.490006
## converged
## # weights:  28
## initial  value 530.869234
## iter  10 value 297.182323
## iter  20 value 268.758651
## iter  30 value 260.693460
## iter  40 value 255.728020
## iter  50 value 251.391982
## iter  60 value 244.428500
## iter  70 value 243.533213
## iter  80 value 243.529978
## final  value 243.529973
## converged
## # weights:  46
## initial  value 521.782285
## iter  10 value 289.633356
## iter  20 value 252.770695
## iter  30 value 246.784412
## iter  40 value 244.552795
## iter  50 value 240.235672
## iter  60 value 235.897392
## iter  70 value 234.544083
## iter  80 value 233.906727
## iter  90 value 233.302732
## iter 100 value 233.207848
## final  value 233.207848
## stopped after 100 iterations
## # weights:  10
## initial  value 509.777850
## iter  10 value 331.051702
## iter  20 value 290.851123
## iter  30 value 282.397392
## iter  40 value 280.127128
## iter  50 value 279.900170
## iter  60 value 279.698013
## iter  70 value 279.644257
## iter  80 value 279.611235
```

```
## iter  90 value 279.579412
## iter 100 value 279.574613
## final  value 279.574613
## stopped after 100 iterations
## # weights:  28
## initial  value 494.187067
## iter  10 value 281.521611
## iter  20 value 264.516293
## iter  30 value 256.348468
## iter  40 value 254.533243
## iter  50 value 253.931082
## iter  60 value 253.790834
## iter  70 value 253.784060
## iter  80 value 253.778990
## iter  90 value 253.766050
## iter 100 value 253.741687
## final  value 253.741687
## stopped after 100 iterations
## # weights:  46
## initial  value 528.148895
## iter  10 value 270.632291
## iter  20 value 219.231214
## iter  30 value 199.006844
## iter  40 value 188.074116
## iter  50 value 174.334731
## iter  60 value 159.106942
## iter  70 value 157.424038
## iter  80 value 157.208291
## iter  90 value 156.925058
## iter 100 value 156.611474
## final  value 156.611474
## stopped after 100 iterations
## # weights:  10
## initial  value 517.825919
## iter  10 value 318.767268
## iter  20 value 292.992949
## iter  30 value 289.366754
## iter  40 value 285.476302
## iter  50 value 276.824886
## iter  60 value 276.023834
## iter  70 value 274.901370
## iter  80 value 274.793033
## iter  90 value 274.630670
## iter 100 value 274.585226
## final  value 274.585226
## stopped after 100 iterations
## # weights:  28
## initial  value 510.914122
## iter  10 value 278.401919
## iter  20 value 234.870105
## iter  30 value 228.271489
## iter  40 value 222.448771
## iter  50 value 213.842466
## iter  60 value 207.558913
```

```
## iter  70 value 206.739879
## iter  80 value 206.646643
## iter  90 value 206.402521
## iter 100 value 205.946555
## final  value 205.946555
## stopped after 100 iterations
## # weights:  46
## initial  value 511.670568
## iter  10 value 286.628529
## iter  20 value 252.252439
## iter  30 value 232.482843
## iter  40 value 221.428957
## iter  50 value 211.866812
## iter  60 value 205.183451
## iter  70 value 194.007368
## iter  80 value 188.138870
## iter  90 value 185.699797
## iter 100 value 184.770284
## final  value 184.770284
## stopped after 100 iterations
## # weights:  10
## initial  value 516.887783
## iter  10 value 335.799638
## iter  20 value 291.704509
## iter  30 value 285.262468
## iter  40 value 284.771978
## final  value 284.771973
## converged
## # weights:  28
## initial  value 578.301763
## iter  10 value 360.704645
## iter  20 value 295.187468
## iter  30 value 257.180524
## iter  40 value 250.715089
## iter  50 value 245.735941
## iter  60 value 244.310115
## iter  70 value 242.574089
## iter  80 value 236.693690
## iter  90 value 235.402244
## iter 100 value 235.164186
## final  value 235.164186
## stopped after 100 iterations
## # weights:  46
## initial  value 515.878987
## iter  10 value 287.047829
## iter  20 value 249.909117
## iter  30 value 229.346242
## iter  40 value 223.502528
## iter  50 value 222.124450
## iter  60 value 221.930758
## iter  70 value 221.905482
## iter  80 value 221.901513
## final  value 221.901500
## converged
```

```
## # weights:  10
## initial  value 526.823598
## iter  10 value 286.868194
## iter  20 value 277.211374
## iter  30 value 276.055033
## iter  40 value 275.061612
## iter  50 value 274.909115
## iter  60 value 274.711041
## iter  70 value 274.681982
## iter  80 value 274.654109
## iter  90 value 274.617995
## iter 100 value 274.610368
## final  value 274.610368
## stopped after 100 iterations
## # weights:  28
## initial  value 538.852042
## iter  10 value 286.996806
## iter  20 value 232.423098
## iter  30 value 226.286040
## iter  40 value 214.011035
## iter  50 value 209.421352
## iter  60 value 208.793864
## iter  70 value 207.932460
## iter  80 value 207.711691
## iter  90 value 207.534977
## iter 100 value 207.418329
## final  value 207.418329
## stopped after 100 iterations
## # weights:  46
## initial  value 496.355232
## iter  10 value 257.839524
## iter  20 value 207.658572
## iter  30 value 189.602589
## iter  40 value 174.403398
## iter  50 value 163.820678
## iter  60 value 153.884663
## iter  70 value 151.666096
## iter  80 value 151.268980
## iter  90 value 150.590714
## iter 100 value 150.059978
## final  value 150.059978
## stopped after 100 iterations
## # weights:  10
## initial  value 522.556058
## iter  10 value 289.721656
## iter  20 value 281.340372
## iter  30 value 279.929146
## iter  40 value 276.964214
## iter  50 value 276.860673
## iter  60 value 276.819963
## iter  70 value 276.801464
## iter  80 value 276.791363
## iter  90 value 276.777482
## iter 100 value 276.775695
```

```
## final  value 276.775695
## stopped after 100 iterations
## # weights:  28
## initial  value 512.299478
## iter  10 value 287.756077
## iter  20 value 250.864634
## iter  30 value 238.609837
## iter  40 value 227.340247
## iter  50 value 224.115301
## iter  60 value 219.912060
## iter  70 value 218.783592
## iter  80 value 216.113398
## iter  90 value 210.971608
## iter 100 value 206.902695
## final  value 206.902695
## stopped after 100 iterations
## # weights:  46
## initial  value 725.542013
## iter  10 value 298.813745
## iter  20 value 235.463649
## iter  30 value 215.351493
## iter  40 value 200.532343
## iter  50 value 187.661487
## iter  60 value 179.493504
## iter  70 value 177.394426
## iter  80 value 175.022564
## iter  90 value 174.385977
## iter 100 value 174.364982
## final  value 174.364982
## stopped after 100 iterations
## # weights:  10
## initial  value 520.535888
## iter  10 value 326.633554
## iter  20 value 286.979921
## iter  30 value 285.869614
## final  value 285.767638
## converged
## # weights:  28
## initial  value 545.874352
## iter  10 value 316.879885
## iter  20 value 283.708648
## iter  30 value 264.701699
## iter  40 value 253.537521
## iter  50 value 248.221744
## iter  60 value 244.764772
## iter  70 value 244.426669
## iter  80 value 244.377398
## final  value 244.377251
## converged
## # weights:  46
## initial  value 545.808929
## iter  10 value 313.043564
## iter  20 value 264.230710
## iter  30 value 249.324503
```

```
## iter  40 value 238.049203
## iter  50 value 235.348554
## iter  60 value 233.259625
## iter  70 value 231.803295
## iter  80 value 231.591853
## iter  90 value 231.581059
## final  value 231.580883
## converged
## # weights:  10
## initial  value 530.154381
## iter  10 value 308.478539
## iter  20 value 284.506119
## iter  30 value 279.301223
## iter  40 value 277.386875
## iter  50 value 277.218676
## iter  60 value 277.009649
## iter  70 value 276.944912
## iter  80 value 276.900755
## iter  90 value 276.875398
## iter 100 value 276.869585
## final  value 276.869585
## stopped after 100 iterations
## # weights:  28
## initial  value 537.816693
## iter  10 value 281.859202
## iter  20 value 234.691150
## iter  30 value 226.997805
## iter  40 value 221.079027
## iter  50 value 219.380096
## iter  60 value 218.659884
## iter  70 value 218.077610
## iter  80 value 214.953362
## iter  90 value 214.805368
## iter 100 value 214.295791
## final  value 214.295791
## stopped after 100 iterations
## # weights:  46
## initial  value 506.049821
## iter  10 value 273.152681
## iter  20 value 234.714181
## iter  30 value 216.610656
## iter  40 value 209.264515
## iter  50 value 203.003845
## iter  60 value 195.447313
## iter  70 value 190.017031
## iter  80 value 187.671612
## iter  90 value 186.985668
## iter 100 value 186.690807
## final  value 186.690807
## stopped after 100 iterations
## # weights:  10
## initial  value 528.064228
## iter  10 value 326.490346
## iter  20 value 321.270432
```

```
## iter  30 value 298.798616
## iter  40 value 289.349824
## iter  50 value 284.073627
## iter  60 value 283.266101
## iter  70 value 282.565973
## iter  80 value 282.442939
## iter  90 value 282.349026
## iter 100 value 282.296390
## final  value 282.296390
## stopped after 100 iterations
## # weights:  28
## initial  value 537.970150
## iter  10 value 315.405231
## iter  20 value 254.412454
## iter  30 value 241.504207
## iter  40 value 229.129076
## iter  50 value 213.515050
## iter  60 value 210.787013
## iter  70 value 210.252602
## iter  80 value 210.225139
## iter  90 value 210.213709
## iter 100 value 210.201103
## final  value 210.201103
## stopped after 100 iterations
## # weights:  46
## initial  value 544.993140
## iter  10 value 335.006818
## iter  20 value 270.177991
## iter  30 value 234.180984
## iter  40 value 214.825170
## iter  50 value 204.075961
## iter  60 value 200.872162
## iter  70 value 198.561174
## iter  80 value 196.538238
## iter  90 value 195.707254
## iter 100 value 194.660165
## final  value 194.660165
## stopped after 100 iterations
## # weights:  10
## initial  value 529.884491
## iter  10 value 329.392891
## iter  20 value 297.189608
## iter  30 value 291.515096
## iter  40 value 291.354603
## final  value 291.349515
## converged
## # weights:  28
## initial  value 566.262314
## iter  10 value 311.788060
## iter  20 value 261.034552
## iter  30 value 251.647030
## iter  40 value 250.586240
## iter  50 value 250.513936
## final  value 250.512524
```

```
## converged
## # weights:  46
## initial  value 540.134595
## iter  10 value 274.574758
## iter  20 value 249.070800
## iter  30 value 236.314809
## iter  40 value 232.313435
## iter  50 value 231.187133
## iter  60 value 230.344154
## iter  70 value 230.255536
## iter  80 value 230.249483
## final  value 230.249448
## converged
## # weights:  10
## initial  value 535.579199
## iter  10 value 303.650771
## iter  20 value 288.755098
## iter  30 value 284.719942
## iter  40 value 283.106889
## iter  50 value 282.579996
## iter  60 value 282.439791
## iter  70 value 282.366807
## iter  80 value 282.353953
## iter  90 value 282.317921
## iter 100 value 282.314874
## final  value 282.314874
## stopped after 100 iterations
## # weights:  28
## initial  value 529.695467
## iter  10 value 296.578372
## iter  20 value 259.654763
## iter  30 value 234.861575
## iter  40 value 230.812531
## iter  50 value 225.895043
## iter  60 value 225.050856
## iter  70 value 224.915939
## iter  80 value 224.769150
## iter  90 value 224.576844
## iter 100 value 224.543126
## final  value 224.543126
## stopped after 100 iterations
## # weights:  46
## initial  value 526.262661
## iter  10 value 265.285632
## iter  20 value 227.096899
## iter  30 value 211.919544
## iter  40 value 196.025812
## iter  50 value 183.435781
## iter  60 value 180.253957
## iter  70 value 178.721169
## iter  80 value 178.378300
## iter  90 value 178.312873
## iter 100 value 178.289381
## final  value 178.289381
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 525.980130
## iter  10 value 311.451147
## iter  20 value 279.638604
## iter  30 value 274.329200
## iter  40 value 273.476635
## iter  50 value 272.983020
## iter  60 value 272.940255
## iter  70 value 272.828756
## iter  80 value 272.807804
## iter  90 value 272.767194
## iter 100 value 272.760170
## final  value 272.760170
## stopped after 100 iterations
## # weights:  28
## initial  value 539.793511
## iter  10 value 270.455795
## iter  20 value 251.417663
## iter  30 value 239.225198
## iter  40 value 234.798454
## iter  50 value 221.392685
## iter  60 value 218.691040
## iter  70 value 218.127224
## iter  80 value 218.103355
## iter  90 value 218.073698
## iter 100 value 217.996326
## final  value 217.996326
## stopped after 100 iterations
## # weights:  46
## initial  value 514.409532
## iter  10 value 282.825997
## iter  20 value 231.659558
## iter  30 value 201.388999
## iter  40 value 188.976949
## iter  50 value 175.654895
## iter  60 value 170.931735
## iter  70 value 170.057801
## iter  80 value 168.771421
## iter  90 value 167.983358
## iter 100 value 167.756918
## final  value 167.756918
## stopped after 100 iterations
## # weights:  10
## initial  value 517.243972
## iter  10 value 328.369166
## iter  20 value 286.372704
## iter  30 value 282.793201
## final  value 282.596662
## converged
## # weights:  28
## initial  value 523.552001
## iter  10 value 283.313976
## iter  20 value 259.494400
```

```
## iter  30 value 243.588812
## iter  40 value 237.783382
## iter  50 value 236.822978
## iter  60 value 236.799323
## final  value 236.798342
## converged
## # weights:  46
## initial  value 515.160716
## iter  10 value 283.623254
## iter  20 value 237.529384
## iter  30 value 230.272280
## iter  40 value 223.352431
## iter  50 value 220.363309
## iter  60 value 219.218063
## iter  70 value 217.417737
## iter  80 value 216.507103
## iter  90 value 215.661409
## iter 100 value 215.447149
## final  value 215.447149
## stopped after 100 iterations
## # weights:  10
## initial  value 553.585542
## iter  10 value 324.333917
## iter  20 value 278.920607
## iter  30 value 274.761275
## iter  40 value 273.120129
## iter  50 value 272.993761
## iter  60 value 272.889520
## iter  70 value 272.855664
## iter  80 value 272.847623
## iter  90 value 272.838701
## iter 100 value 272.838125
## final  value 272.838125
## stopped after 100 iterations
## # weights:  28
## initial  value 627.687775
## iter  10 value 296.778757
## iter  20 value 258.897112
## iter  30 value 250.806407
## iter  40 value 242.625881
## iter  50 value 219.880873
## iter  60 value 202.822371
## iter  70 value 196.952996
## iter  80 value 188.044727
## iter  90 value 186.827917
## iter 100 value 186.663189
## final  value 186.663189
## stopped after 100 iterations
## # weights:  46
## initial  value 523.301708
## iter  10 value 374.901276
## iter  20 value 274.512253
## iter  30 value 265.137928
## iter  40 value 257.030926
```

```
## iter  50 value 245.160497
## iter  60 value 231.962345
## iter  70 value 226.201683
## iter  80 value 217.640972
## iter  90 value 216.808289
## iter 100 value 216.651858
## final  value 216.651858
## stopped after 100 iterations
## # weights:  10
## initial  value 500.769888
## iter  10 value 318.631039
## iter  20 value 303.070516
## iter  30 value 298.583454
## iter  40 value 289.277031
## iter  50 value 285.617356
## iter  60 value 285.235590
## iter  70 value 284.783019
## iter  80 value 284.677881
## iter  90 value 284.554552
## iter 100 value 284.507756
## final  value 284.507756
## stopped after 100 iterations
## # weights:  28
## initial  value 497.192489
## iter  10 value 290.922958
## iter  20 value 261.747799
## iter  30 value 239.112199
## iter  40 value 233.728816
## iter  50 value 224.897596
## iter  60 value 216.081994
## iter  70 value 213.249673
## iter  80 value 210.347890
## iter  90 value 202.657172
## iter 100 value 201.278921
## final  value 201.278921
## stopped after 100 iterations
## # weights:  46
## initial  value 519.707667
## iter  10 value 266.350308
## iter  20 value 228.403593
## iter  30 value 206.777767
## iter  40 value 191.366166
## iter  50 value 179.739693
## iter  60 value 172.505784
## iter  70 value 171.886305
## iter  80 value 170.058986
## iter  90 value 165.944693
## iter 100 value 163.684158
## final  value 163.684158
## stopped after 100 iterations
## # weights:  10
## initial  value 531.680737
## iter  10 value 343.242296
## iter  20 value 303.460447
```

```
## iter  30 value 294.919084
## iter  40 value 294.677298
## iter  40 value 294.677297
## iter  40 value 294.677297
## final  value 294.677297
## converged
## # weights:  28
## initial  value 506.683819
## iter  10 value 311.673738
## iter  20 value 269.675170
## iter  30 value 258.551717
## iter  40 value 255.636281
## iter  50 value 254.842532
## iter  60 value 254.484004
## iter  70 value 254.476685
## final  value 254.476224
## converged
## # weights:  46
## initial  value 587.779797
## iter  10 value 314.539298
## iter  20 value 265.055153
## iter  30 value 254.423892
## iter  40 value 249.373756
## iter  50 value 247.659467
## iter  60 value 246.912566
## iter  70 value 246.771668
## iter  80 value 246.746676
## iter  90 value 245.653654
## iter 100 value 244.939273
## final  value 244.939273
## stopped after 100 iterations
## # weights:  10
## initial  value 516.974133
## iter  10 value 346.506206
## iter  20 value 299.583295
## iter  30 value 287.683267
## iter  40 value 285.380879
## iter  50 value 285.071109
## iter  60 value 284.783378
## iter  70 value 284.681178
## iter  80 value 284.644894
## iter  90 value 284.597266
## iter 100 value 284.593156
## final  value 284.593156
## stopped after 100 iterations
## # weights:  28
## initial  value 557.361894
## iter  10 value 290.952227
## iter  20 value 260.561408
## iter  30 value 257.131022
## iter  40 value 251.431796
## iter  50 value 237.580759
## iter  60 value 227.530715
## iter  70 value 221.514637
```

```
## iter  80 value 219.608255
## iter  90 value 219.294896
## iter 100 value 219.260444
## final  value 219.260444
## stopped after 100 iterations
## # weights:  46
## initial  value 619.744585
## iter  10 value 265.382337
## iter  20 value 216.708216
## iter  30 value 194.531286
## iter  40 value 180.660053
## iter  50 value 170.933912
## iter  60 value 166.019941
## iter  70 value 163.134454
## iter  80 value 162.019165
## iter  90 value 161.001891
## iter 100 value 160.664749
## final  value 160.664749
## stopped after 100 iterations
## # weights:  10
## initial  value 526.363011
## iter  10 value 395.194883
## iter  20 value 337.463125
## iter  30 value 330.929332
## iter  40 value 297.266779
## iter  50 value 295.132279
## iter  60 value 294.816256
## iter  70 value 290.228039
## iter  80 value 289.886916
## final  value 289.885504
## converged
## # weights:  28
## initial  value 568.356874
## iter  10 value 317.193336
## iter  20 value 269.930227
## iter  30 value 241.667593
## iter  40 value 228.679403
## iter  50 value 226.882890
## iter  60 value 224.529503
## iter  70 value 216.639398
## iter  80 value 214.607573
## iter  90 value 212.999345
## iter 100 value 212.852758
## final  value 212.852758
## stopped after 100 iterations
## # weights:  46
## initial  value 568.252158
## iter  10 value 290.354174
## iter  20 value 228.992185
## iter  30 value 212.914222
## iter  40 value 201.564757
## iter  50 value 188.548716
## iter  60 value 177.661473
## iter  70 value 175.144225
```

```
## iter  80 value 175.099914
## final  value 175.099542
## converged
## # weights:  10
## initial  value 508.546850
## iter  10 value 345.492106
## iter  20 value 291.698147
## final  value 290.832027
## converged
## # weights:  28
## initial  value 547.434400
## iter  10 value 289.687436
## iter  20 value 259.346490
## iter  30 value 246.751785
## iter  40 value 242.863178
## iter  50 value 242.607737
## iter  60 value 242.597007
## iter  70 value 242.596012
## final  value 242.595936
## converged
## # weights:  46
## initial  value 531.259836
## iter  10 value 327.902341
## iter  20 value 272.476617
## iter  30 value 253.566735
## iter  40 value 246.608727
## iter  50 value 237.617166
## iter  60 value 234.132649
## iter  70 value 231.354523
## iter  80 value 229.120415
## iter  90 value 228.275239
## iter 100 value 228.174831
## final  value 228.174831
## stopped after 100 iterations
## # weights:  10
## initial  value 511.124518
## iter  10 value 334.788419
## iter  20 value 297.977364
## iter  30 value 288.206703
## iter  40 value 282.834806
## iter  50 value 282.161362
## iter  60 value 281.543693
## iter  70 value 281.483354
## iter  80 value 281.390701
## iter  90 value 281.366059
## iter 100 value 281.350892
## final  value 281.350892
## stopped after 100 iterations
## # weights:  28
## initial  value 533.130206
## iter  10 value 298.395660
## iter  20 value 247.899522
## iter  30 value 238.852557
## iter  40 value 237.988106
```

```
## iter  50 value 231.733801
## iter  60 value 226.468314
## iter  70 value 224.969961
## iter  80 value 224.310433
## iter  90 value 224.151283
## iter 100 value 224.120782
## final  value 224.120782
## stopped after 100 iterations
## # weights:  46
## initial  value 542.816445
## iter  10 value 292.161577
## iter  20 value 237.605348
## iter  30 value 204.147736
## iter  40 value 188.749124
## iter  50 value 178.282343
## iter  60 value 171.155200
## iter  70 value 170.222002
## iter  80 value 169.921532
## iter  90 value 169.780896
## iter 100 value 169.731577
## final  value 169.731577
## stopped after 100 iterations
## # weights:  10
## initial  value 567.367843
## iter  10 value 362.307871
## iter  20 value 316.450933
## iter  30 value 298.836761
## iter  40 value 278.666381
## iter  50 value 275.268816
## iter  60 value 274.040102
## iter  70 value 273.620409
## iter  80 value 273.341238
## iter  90 value 273.285761
## iter 100 value 273.198060
## final  value 273.198060
## stopped after 100 iterations
## # weights:  28
## initial  value 551.910517
## iter  10 value 278.011997
## iter  20 value 243.544380
## iter  30 value 214.458629
## iter  40 value 209.262936
## iter  50 value 205.455936
## iter  60 value 203.578423
## iter  70 value 201.866538
## iter  80 value 200.992308
## iter  90 value 200.346522
## iter 100 value 200.244441
## final  value 200.244441
## stopped after 100 iterations
## # weights:  46
## initial  value 623.030261
## iter  10 value 258.881440
## iter  20 value 204.525154
```

```
## iter  30 value 187.819492
## iter  40 value 177.061260
## iter  50 value 168.543252
## iter  60 value 161.118432
## iter  70 value 159.244604
## iter  80 value 159.000153
## iter  90 value 158.968746
## iter 100 value 158.948444
## final  value 158.948444
## stopped after 100 iterations
## # weights:  10
## initial  value 539.152461
## iter  10 value 335.056339
## iter  20 value 284.002663
## iter  30 value 282.518138
## final  value 282.457188
## converged
## # weights:  28
## initial  value 592.132656
## iter  10 value 277.538270
## iter  20 value 250.902399
## iter  30 value 248.241654
## iter  40 value 247.093352
## iter  50 value 246.960503
## iter  60 value 246.955992
## iter  70 value 246.955823
## final  value 246.955804
## converged
## # weights:  46
## initial  value 559.020735
## iter  10 value 290.896410
## iter  20 value 239.588169
## iter  30 value 233.663990
## iter  40 value 232.700583
## iter  50 value 229.932037
## iter  60 value 229.569213
## iter  70 value 229.513283
## iter  80 value 229.510098
## final  value 229.509955
## converged
## # weights:  10
## initial  value 518.280290
## iter  10 value 314.434372
## iter  20 value 288.177332
## iter  30 value 283.524074
## iter  40 value 278.053269
## iter  50 value 274.992334
## iter  60 value 273.797300
## iter  70 value 273.640083
## iter  80 value 273.330221
## iter  90 value 273.302108
## iter 100 value 273.254505
## final  value 273.254505
## stopped after 100 iterations
```

```
## # weights:  28
## initial  value 523.641373
## iter  10 value 342.617968
## iter  20 value 261.847579
## iter  30 value 237.627722
## iter  40 value 223.066571
## iter  50 value 217.291893
## iter  60 value 215.920379
## iter  70 value 215.091572
## iter  80 value 213.357502
## iter  90 value 211.542166
## iter 100 value 210.777564
## final  value 210.777564
## stopped after 100 iterations
## # weights:  46
## initial  value 567.497047
## iter  10 value 273.938654
## iter  20 value 219.067804
## iter  30 value 198.361704
## iter  40 value 187.339212
## iter  50 value 184.451995
## iter  60 value 180.546658
## iter  70 value 179.407761
## iter  80 value 178.853463
## iter  90 value 178.648618
## iter 100 value 177.989203
## final  value 177.989203
## stopped after 100 iterations
## # weights:  10
## initial  value 529.995075
## iter  10 value 310.186685
## iter  20 value 283.241792
## iter  30 value 277.190650
## iter  40 value 272.589575
## iter  50 value 271.887342
## iter  60 value 271.272357
## iter  70 value 271.155329
## iter  80 value 270.988802
## iter  90 value 270.910538
## iter 100 value 270.888342
## final  value 270.888342
## stopped after 100 iterations
## # weights:  28
## initial  value 512.679368
## iter  10 value 291.275773
## iter  20 value 260.315241
## iter  30 value 234.752723
## iter  40 value 227.985760
## iter  50 value 223.816462
## iter  60 value 220.299448
## iter  70 value 218.180436
## iter  80 value 216.378305
## iter  90 value 216.045016
## iter 100 value 215.711863
```

```
## final  value 215.711863
## stopped after 100 iterations
## # weights:  46
## initial  value 522.809746
## iter  10 value 261.203941
## iter  20 value 236.738872
## iter  30 value 218.227317
## iter  40 value 203.669864
## iter  50 value 181.519888
## iter  60 value 173.075250
## iter  70 value 170.413933
## iter  80 value 167.054745
## iter  90 value 162.091856
## iter 100 value 160.863714
## final  value 160.863714
## stopped after 100 iterations
## # weights:  10
## initial  value 524.492920
## iter  10 value 315.649035
## iter  20 value 288.597129
## iter  30 value 282.242283
## iter  40 value 281.498221
## final  value 281.498211
## converged
## # weights:  28
## initial  value 524.293713
## iter  10 value 305.580832
## iter  20 value 250.162440
## iter  30 value 244.206883
## iter  40 value 239.453770
## iter  50 value 236.618688
## iter  60 value 236.021455
## iter  70 value 235.570345
## iter  80 value 235.524254
## final  value 235.523502
## converged
## # weights:  46
## initial  value 531.439549
## iter  10 value 287.650071
## iter  20 value 248.752073
## iter  30 value 239.129285
## iter  40 value 235.976103
## iter  50 value 235.078357
## iter  60 value 234.996865
## iter  70 value 234.981254
## iter  80 value 234.861813
## iter  90 value 233.557378
## iter 100 value 228.435984
## final  value 228.435984
## stopped after 100 iterations
## # weights:  10
## initial  value 570.153416
## iter  10 value 349.367931
## iter  20 value 305.461339
```

```
## iter  30 value 298.248574
## iter  40 value 288.330920
## iter  50 value 287.793942
## iter  60 value 287.661354
## iter  70 value 287.530441
## final  value 287.530422
## converged
## # weights:  28
## initial  value 533.829098
## iter  10 value 272.328910
## iter  20 value 224.656272
## iter  30 value 209.677968
## iter  40 value 207.409629
## iter  50 value 202.359429
## iter  60 value 201.812437
## iter  70 value 201.678717
## iter  80 value 201.474641
## iter  90 value 201.321659
## iter 100 value 201.298420
## final  value 201.298420
## stopped after 100 iterations
## # weights:  46
## initial  value 498.473948
## iter  10 value 263.536128
## iter  20 value 226.479785
## iter  30 value 216.681027
## iter  40 value 212.678666
## iter  50 value 212.295559
## iter  60 value 212.075558
## iter  70 value 212.024576
## iter  80 value 211.967662
## iter  90 value 211.916712
## iter 100 value 211.900075
## final  value 211.900075
## stopped after 100 iterations
## # weights:  10
## initial  value 586.502249
## iter  10 value 334.532266
## iter  20 value 317.802823
## iter  30 value 291.322709
## iter  40 value 286.148481
## iter  50 value 285.373795
## iter  60 value 284.468681
## iter  70 value 284.396744
## iter  80 value 284.181366
## iter  90 value 284.128234
## iter 100 value 284.072582
## final  value 284.072582
## stopped after 100 iterations
## # weights:  28
## initial  value 513.091884
## iter  10 value 300.524650
## iter  20 value 240.974214
## iter  30 value 237.116334
```

```
## iter  40 value 232.799274
## iter  50 value 228.901911
## iter  60 value 226.258697
## iter  70 value 217.786179
## iter  80 value 214.935414
## iter  90 value 214.921498
## iter 100 value 214.920702
## final  value 214.920702
## stopped after 100 iterations
## # weights:  46
## initial  value 566.842696
## iter  10 value 272.625055
## iter  20 value 222.119448
## iter  30 value 196.492550
## iter  40 value 186.123012
## iter  50 value 177.227421
## iter  60 value 169.735575
## iter  70 value 168.494107
## iter  80 value 168.189578
## iter  90 value 168.119871
## iter 100 value 168.109147
## final  value 168.109147
## stopped after 100 iterations
## # weights:  10
## initial  value 558.506039
## iter  10 value 328.353894
## iter  20 value 299.899315
## iter  30 value 293.730446
## iter  40 value 293.176496
## iter  40 value 293.176495
## iter  40 value 293.176495
## final  value 293.176495
## converged
## # weights:  28
## initial  value 480.981844
## iter  10 value 286.727228
## iter  20 value 268.531477
## iter  30 value 248.966632
## iter  40 value 243.954530
## iter  50 value 242.983538
## iter  60 value 241.508769
## iter  70 value 241.271834
## iter  80 value 241.248604
## final  value 241.248579
## converged
## # weights:  46
## initial  value 560.808942
## iter  10 value 293.371609
## iter  20 value 253.425075
## iter  30 value 244.317557
## iter  40 value 241.341733
## iter  50 value 239.409931
## iter  60 value 234.581867
## iter  70 value 232.334821
```

```
## iter  80 value 231.340015
## iter  90 value 230.646897
## iter 100 value 230.627047
## final  value 230.627047
## stopped after 100 iterations
## # weights:  10
## initial  value 551.136253
## iter  10 value 317.721388
## iter  20 value 292.890830
## iter  30 value 288.104483
## iter  40 value 285.447987
## iter  50 value 284.643617
## iter  60 value 284.328067
## iter  70 value 284.199737
## iter  80 value 284.160759
## iter  90 value 284.116877
## iter 100 value 284.113274
## final  value 284.113274
## stopped after 100 iterations
## # weights:  28
## initial  value 557.514358
## iter  10 value 270.215814
## iter  20 value 234.176134
## iter  30 value 219.909375
## iter  40 value 205.803199
## iter  50 value 198.559001
## iter  60 value 194.176298
## iter  70 value 192.924329
## iter  80 value 191.722101
## iter  90 value 191.283372
## iter 100 value 190.291305
## final  value 190.291305
## stopped after 100 iterations
## # weights:  46
## initial  value 515.249607
## iter  10 value 300.451561
## iter  20 value 256.734767
## iter  30 value 225.463373
## iter  40 value 205.032605
## iter  50 value 198.760965
## iter  60 value 197.095207
## iter  70 value 196.356730
## iter  80 value 195.842165
## iter  90 value 195.510113
## iter 100 value 195.291834
## final  value 195.291834
## stopped after 100 iterations
## # weights:  10
## initial  value 528.410168
## iter  10 value 310.353736
## iter  20 value 284.786299
## iter  30 value 284.719931
## iter  40 value 282.346458
## iter  50 value 277.403552
```

```
## iter  60 value 274.690154
## iter  70 value 273.477238
## iter  80 value 273.404294
## iter  90 value 273.189215
## iter 100 value 273.166754
## final  value 273.166754
## stopped after 100 iterations
## # weights:  28
## initial  value 531.344277
## iter  10 value 260.337226
## iter  20 value 232.043961
## iter  30 value 228.069595
## iter  40 value 220.089181
## iter  50 value 209.727008
## iter  60 value 208.213163
## iter  70 value 208.207283
## iter  80 value 208.205697
## final  value 208.205684
## converged
## # weights:  46
## initial  value 540.433643
## iter  10 value 288.188016
## iter  20 value 215.633657
## iter  30 value 194.854304
## iter  40 value 179.822471
## iter  50 value 174.114271
## iter  60 value 172.101555
## iter  70 value 170.909238
## iter  80 value 170.670261
## iter  90 value 170.583106
## iter 100 value 170.485246
## final  value 170.485246
## stopped after 100 iterations
## # weights:  10
## initial  value 551.579483
## iter  10 value 359.519400
## iter  20 value 283.645049
## iter  30 value 282.471885
## final  value 282.398910
## converged
## # weights:  28
## initial  value 618.817692
## iter  10 value 297.872662
## iter  20 value 254.481715
## iter  30 value 251.985162
## iter  40 value 251.534457
## iter  50 value 248.465001
## iter  60 value 247.169130
## iter  70 value 246.873256
## iter  80 value 246.844215
## final  value 246.844154
## converged
## # weights:  46
## initial  value 630.514130
```

```
## iter  10 value 284.224098
## iter  20 value 250.092511
## iter  30 value 232.214912
## iter  40 value 226.112911
## iter  50 value 224.635581
## iter  60 value 223.476990
## iter  70 value 222.363869
## iter  80 value 221.055626
## iter  90 value 220.334766
## iter 100 value 220.182187
## final  value 220.182187
## stopped after 100 iterations
## # weights:  10
## initial  value 560.644108
## iter  10 value 321.313303
## iter  20 value 292.374214
## iter  30 value 275.918661
## iter  40 value 274.331825
## iter  50 value 273.558619
## iter  60 value 273.295711
## iter  70 value 273.268827
## iter  80 value 273.207242
## iter  90 value 273.189138
## iter 100 value 273.179097
## final  value 273.179097
## stopped after 100 iterations
## # weights:  28
## initial  value 524.678766
## iter  10 value 292.528114
## iter  20 value 242.919251
## iter  30 value 221.669833
## iter  40 value 216.564229
## iter  50 value 210.085000
## iter  60 value 208.406274
## iter  70 value 208.359219
## iter  80 value 207.658907
## iter  90 value 207.312291
## iter 100 value 206.531698
## final  value 206.531698
## stopped after 100 iterations
## # weights:  46
## initial  value 519.601061
## iter  10 value 283.397711
## iter  20 value 220.722102
## iter  30 value 204.338028
## iter  40 value 193.507288
## iter  50 value 184.519389
## iter  60 value 177.332878
## iter  70 value 174.483859
## iter  80 value 173.405138
## iter  90 value 172.827611
## iter 100 value 171.019507
## final  value 171.019507
## stopped after 100 iterations
```

```
## # weights:  10
## initial  value 514.726789
## iter  10 value 309.502990
## iter  20 value 293.153098
## iter  30 value 286.457249
## iter  40 value 284.391166
## iter  50 value 283.428303
## iter  60 value 283.169600
## iter  70 value 283.069229
## iter  80 value 282.959889
## iter  90 value 282.946912
## iter 100 value 282.895573
## final  value 282.895573
## stopped after 100 iterations
## # weights:  28
## initial  value 540.976877
## iter  10 value 318.568793
## iter  20 value 251.557342
## iter  30 value 235.939609
## iter  40 value 230.427535
## iter  50 value 228.141544
## iter  60 value 227.131788
## iter  70 value 225.806100
## iter  80 value 224.009796
## iter  90 value 223.851834
## iter 100 value 223.273326
## final  value 223.273326
## stopped after 100 iterations
## # weights:  46
## initial  value 526.050315
## iter  10 value 266.158162
## iter  20 value 233.101273
## iter  30 value 212.102188
## iter  40 value 207.998920
## iter  50 value 196.833782
## iter  60 value 190.542371
## iter  70 value 188.477721
## iter  80 value 187.877209
## iter  90 value 187.837855
## final  value 187.836838
## converged
## # weights:  10
## initial  value 534.495213
## iter  10 value 337.532665
## iter  20 value 307.459422
## iter  30 value 292.840888
## iter  40 value 292.036654
## final  value 292.036614
## converged
## # weights:  28
## initial  value 516.114455
## iter  10 value 290.522710
## iter  20 value 267.027085
## iter  30 value 258.419038
```

```
## iter  40 value 257.792897
## iter  50 value 257.762468
## final  value 257.762463
## converged
## # weights:  46
## initial  value 542.655227
## iter  10 value 285.578317
## iter  20 value 255.014404
## iter  30 value 248.867592
## iter  40 value 244.462134
## iter  50 value 242.672905
## iter  60 value 238.264448
## iter  70 value 234.897536
## iter  80 value 232.532058
## iter  90 value 232.015018
## iter 100 value 231.961551
## final  value 231.961551
## stopped after 100 iterations
## # weights:  10
## initial  value 511.311860
## iter  10 value 333.829472
## iter  20 value 329.046757
## iter  30 value 328.997681
## iter  40 value 327.556309
## iter  50 value 325.558572
## iter  60 value 325.519101
## final  value 325.519057
## converged
## # weights:  28
## initial  value 604.008053
## iter  10 value 275.426501
## iter  20 value 238.320955
## iter  30 value 225.213116
## iter  40 value 220.726848
## iter  50 value 217.694743
## iter  60 value 216.209346
## iter  70 value 215.661811
## iter  80 value 214.520845
## iter  90 value 213.576274
## iter 100 value 213.368085
## final  value 213.368085
## stopped after 100 iterations
## # weights:  46
## initial  value 542.528669
## iter  10 value 323.576367
## iter  20 value 246.633489
## iter  30 value 225.556720
## iter  40 value 208.188500
## iter  50 value 201.341356
## iter  60 value 195.288129
## iter  70 value 193.927582
## iter  80 value 193.170653
## iter  90 value 192.801256
## iter 100 value 192.708097
```

```
## final  value 192.708097
## stopped after 100 iterations
## # weights:  10
## initial  value 536.607318
## iter  10 value 329.038279
## iter  20 value 283.058650
## iter  30 value 278.749168
## iter  40 value 275.243073
## iter  50 value 275.235685
## iter  60 value 275.085626
## iter  70 value 275.059982
## iter  80 value 275.026479
## iter  90 value 275.002201
## iter 100 value 274.995398
## final  value 274.995398
## stopped after 100 iterations
## # weights:  28
## initial  value 521.543194
## iter  10 value 363.509049
## iter  20 value 266.487121
## iter  30 value 249.882532
## iter  40 value 245.029854
## iter  50 value 244.462939
## iter  60 value 243.909866
## iter  70 value 243.744922
## iter  80 value 242.437196
## iter  90 value 240.615722
## iter 100 value 240.385657
## final  value 240.385657
## stopped after 100 iterations
## # weights:  46
## initial  value 546.373583
## iter  10 value 264.024411
## iter  20 value 223.760312
## iter  30 value 207.491168
## iter  40 value 198.915885
## iter  50 value 177.652596
## iter  60 value 167.966685
## iter  70 value 165.479806
## iter  80 value 165.172925
## iter  90 value 165.133774
## final  value 165.133650
## converged
## # weights:  10
## initial  value 513.249112
## iter  10 value 327.187239
## iter  20 value 296.213004
## iter  30 value 285.605439
## iter  40 value 284.987048
## final  value 284.986440
## converged
## # weights:  28
## initial  value 562.164830
## iter  10 value 362.666750
```

```
## iter  20 value 281.031305
## iter  30 value 256.005537
## iter  40 value 249.231538
## iter  50 value 246.749067
## iter  60 value 246.542926
## iter  70 value 246.457490
## iter  80 value 246.444809
## final  value 246.444786
## converged
## # weights:  46
## initial  value 668.900872
## iter  10 value 274.930485
## iter  20 value 252.039110
## iter  30 value 240.093826
## iter  40 value 232.403711
## iter  50 value 229.121382
## iter  60 value 226.406133
## iter  70 value 225.528074
## iter  80 value 225.439884
## iter  90 value 225.410379
## iter 100 value 225.405089
## final  value 225.405089
## stopped after 100 iterations
## # weights:  10
## initial  value 541.670521
## iter  10 value 300.811999
## iter  20 value 277.468201
## iter  30 value 276.155295
## iter  40 value 275.351337
## iter  50 value 275.252009
## iter  60 value 275.114771
## iter  70 value 275.097758
## iter  80 value 275.077598
## iter  90 value 275.064388
## iter 100 value 275.063682
## final  value 275.063682
## stopped after 100 iterations
## # weights:  28
## initial  value 529.832450
## iter  10 value 302.696164
## iter  20 value 253.008276
## iter  30 value 243.176634
## iter  40 value 232.555899
## iter  50 value 229.771513
## iter  60 value 229.569405
## iter  70 value 229.452240
## iter  80 value 229.310418
## iter  90 value 228.694972
## iter 100 value 225.996439
## final  value 225.996439
## stopped after 100 iterations
## # weights:  46
## initial  value 526.113973
## iter  10 value 254.671787
```

```
## iter  20 value 226.885223
## iter  30 value 209.305298
## iter  40 value 187.339386
## iter  50 value 178.731335
## iter  60 value 173.628970
## iter  70 value 171.246547
## iter  80 value 168.724602
## iter  90 value 167.169402
## iter 100 value 166.657359
## final  value 166.657359
## stopped after 100 iterations
## # weights:  10
## initial  value 521.013882
## iter  10 value 302.496966
## iter  20 value 286.332855
## iter  30 value 283.907090
## iter  40 value 279.053406
## iter  50 value 278.392075
## iter  60 value 278.268566
## iter  70 value 278.152875
## iter  80 value 278.122796
## iter  90 value 278.063784
## iter 100 value 278.058863
## final  value 278.058863
## stopped after 100 iterations
## # weights:  28
## initial  value 529.677459
## iter  10 value 319.278290
## iter  20 value 248.132341
## iter  30 value 225.235467
## iter  40 value 212.824209
## iter  50 value 206.670218
## iter  60 value 205.713180
## iter  70 value 205.707036
## final  value 205.706508
## converged
## # weights:  46
## initial  value 574.148039
## iter  10 value 259.734542
## iter  20 value 234.246486
## iter  30 value 206.932403
## iter  40 value 187.453713
## iter  50 value 171.104487
## iter  60 value 168.042383
## iter  70 value 164.413659
## iter  80 value 163.459892
## iter  90 value 163.354679
## iter 100 value 163.242782
## final  value 163.242782
## stopped after 100 iterations
## # weights:  10
## initial  value 527.796015
## iter  10 value 317.063191
## iter  20 value 291.860676
```

```
## iter  30 value 288.886234
## final  value 288.841668
## converged
## # weights:  28
## initial  value 569.083540
## iter  10 value 360.474537
## iter  20 value 304.884554
## iter  30 value 264.766879
## iter  40 value 256.423267
## iter  50 value 250.761810
## iter  60 value 249.295664
## iter  70 value 249.171364
## iter  80 value 249.163749
## final  value 249.163621
## converged
## # weights:  46
## initial  value 562.603210
## iter  10 value 281.805818
## iter  20 value 247.032814
## iter  30 value 239.787082
## iter  40 value 235.377076
## iter  50 value 232.143887
## iter  60 value 231.189432
## iter  70 value 230.742812
## iter  80 value 230.651393
## iter  90 value 230.597826
## final  value 230.597185
## converged
## # weights:  10
## initial  value 546.703455
## iter  10 value 329.177564
## iter  20 value 291.102507
## iter  30 value 283.454837
## iter  40 value 279.388224
## iter  50 value 278.771262
## iter  60 value 278.467285
## iter  70 value 278.355050
## iter  80 value 278.289034
## iter  90 value 278.224436
## iter 100 value 278.214450
## final  value 278.214450
## stopped after 100 iterations
## # weights:  28
## initial  value 520.611919
## iter  10 value 305.103711
## iter  20 value 244.884450
## iter  30 value 229.686792
## iter  40 value 226.578121
## iter  50 value 222.881105
## iter  60 value 214.757924
## iter  70 value 212.957698
## iter  80 value 210.864173
## iter  90 value 210.336591
## iter 100 value 210.228141
```

```
## final  value 210.228141
## stopped after 100 iterations
## # weights:  46
## initial  value 511.380747
## iter  10 value 271.434947
## iter  20 value 222.704424
## iter  30 value 200.902918
## iter  40 value 184.961092
## iter  50 value 176.353768
## iter  60 value 173.724155
## iter  70 value 172.482386
## iter  80 value 172.212940
## iter  90 value 172.113843
## iter 100 value 172.057266
## final  value 172.057266
## stopped after 100 iterations
## # weights:  10
## initial  value 504.656549
## iter  10 value 319.453368
## iter  20 value 310.232362
## iter  30 value 306.389576
## iter  40 value 304.678990
## iter  50 value 303.233126
## iter  60 value 303.181443
## final  value 303.180913
## converged
## # weights:  28
## initial  value 574.468903
## iter  10 value 299.185271
## iter  20 value 250.089689
## iter  30 value 235.131677
## iter  40 value 228.586594
## iter  50 value 223.880374
## iter  60 value 217.005042
## iter  70 value 211.297914
## iter  80 value 208.545235
## iter  90 value 208.276199
## iter 100 value 208.040987
## final  value 208.040987
## stopped after 100 iterations
## # weights:  46
## initial  value 498.505015
## iter  10 value 278.629217
## iter  20 value 226.850976
## iter  30 value 205.095491
## iter  40 value 192.091120
## iter  50 value 189.104074
## iter  60 value 188.219895
## iter  70 value 188.039140
## iter  80 value 188.020965
## iter  90 value 188.011401
## final  value 188.009361
## converged
## # weights:  10
```

```
## initial  value 519.860851
## iter  10 value 332.525645
## iter  20 value 306.318143
## iter  30 value 296.385838
## final  value 295.520276
## converged
## # weights:  28
## initial  value 504.831890
## iter  10 value 296.613121
## iter  20 value 265.857971
## iter  30 value 257.763529
## iter  40 value 254.047169
## iter  50 value 253.067924
## iter  60 value 252.994308
## iter  70 value 252.949852
## iter  80 value 252.515766
## iter  90 value 251.892836
## iter 100 value 251.859412
## final  value 251.859412
## stopped after 100 iterations
## # weights:  46
## initial  value 525.092755
## iter  10 value 292.668559
## iter  20 value 261.043511
## iter  30 value 247.771770
## iter  40 value 242.393916
## iter  50 value 240.250853
## iter  60 value 237.914607
## iter  70 value 237.250063
## iter  80 value 236.889248
## iter  90 value 236.168279
## iter 100 value 236.112266
## final  value 236.112266
## stopped after 100 iterations
## # weights:  10
## initial  value 538.756965
## iter  10 value 333.521907
## iter  20 value 302.332880
## iter  30 value 295.103838
## iter  40 value 286.346566
## iter  50 value 285.652904
## iter  60 value 285.269455
## iter  70 value 285.189266
## iter  80 value 285.162631
## final  value 285.140537
## converged
## # weights:  28
## initial  value 594.902669
## iter  10 value 318.960492
## iter  20 value 280.628088
## iter  30 value 253.876810
## iter  40 value 241.769666
## iter  50 value 234.997940
## iter  60 value 231.350791
```

```
## iter  70 value 230.250377
## iter  80 value 229.952203
## iter  90 value 229.803349
## iter 100 value 229.570447
## final  value 229.570447
## stopped after 100 iterations
## # weights:  46
## initial  value 514.879060
## iter  10 value 301.322050
## iter  20 value 238.850564
## iter  30 value 220.093996
## iter  40 value 210.375731
## iter  50 value 202.996203
## iter  60 value 199.095601
## iter  70 value 196.395310
## iter  80 value 195.359820
## iter  90 value 194.609345
## iter 100 value 194.454531
## final  value 194.454531
## stopped after 100 iterations
## # weights:  10
## initial  value 556.517905
## iter  10 value 333.197788
## iter  20 value 301.428675
## iter  30 value 293.632820
## iter  40 value 278.906528
## iter  50 value 275.616510
## iter  60 value 274.818058
## iter  70 value 274.764206
## iter  80 value 274.688341
## iter  90 value 272.433101
## iter 100 value 272.401642
## final  value 272.401642
## stopped after 100 iterations
## # weights:  28
## initial  value 511.606794
## iter  10 value 275.070848
## iter  20 value 234.716373
## iter  30 value 226.969243
## iter  40 value 222.805644
## iter  50 value 221.187898
## iter  60 value 219.218373
## iter  70 value 218.625005
## iter  80 value 217.363569
## iter  90 value 216.900927
## iter 100 value 216.642030
## final  value 216.642030
## stopped after 100 iterations
## # weights:  46
## initial  value 501.053357
## iter  10 value 287.084795
## iter  20 value 225.630373
## iter  30 value 196.462554
## iter  40 value 183.587879
```

```
## iter  50 value 175.799728
## iter  60 value 171.007596
## iter  70 value 166.474376
## iter  80 value 165.836767
## iter  90 value 165.734719
## iter 100 value 165.672454
## final  value 165.672454
## stopped after 100 iterations
## # weights:  10
## initial  value 518.744185
## iter  10 value 335.461931
## iter  20 value 304.702449
## iter  30 value 289.005108
## iter  40 value 287.476724
## final  value 287.419624
## converged
## # weights:  28
## initial  value 572.739677
## iter  10 value 293.192308
## iter  20 value 270.784557
## iter  30 value 263.021172
## iter  40 value 259.578815
## iter  50 value 259.180327
## iter  60 value 259.174948
## iter  70 value 259.173705
## final  value 259.173637
## converged
## # weights:  46
## initial  value 546.242813
## iter  10 value 289.041866
## iter  20 value 253.946034
## iter  30 value 240.192514
## iter  40 value 236.069301
## iter  50 value 235.255971
## iter  60 value 234.486793
## iter  70 value 232.031993
## iter  80 value 228.669400
## iter  90 value 228.171523
## iter 100 value 227.958166
## final  value 227.958166
## stopped after 100 iterations
## # weights:  10
## initial  value 516.310308
## iter  10 value 300.665871
## iter  20 value 286.139264
## iter  30 value 280.700500
## iter  40 value 278.257062
## iter  50 value 277.554137
## iter  60 value 277.452854
## iter  70 value 277.244434
## iter  80 value 277.237107
## iter  90 value 277.171375
## iter 100 value 277.169277
## final  value 277.169277
```

```
## stopped after 100 iterations
## # weights:  28
## initial  value 527.248370
## iter  10 value 304.677233
## iter  20 value 268.759593
## iter  30 value 256.754790
## iter  40 value 248.754866
## iter  50 value 232.268698
## iter  60 value 226.093760
## iter  70 value 225.855325
## iter  80 value 225.682856
## iter  90 value 225.140071
## iter 100 value 225.009256
## final  value 225.009256
## stopped after 100 iterations
## # weights:  46
## initial  value 495.608939
## iter  10 value 266.145530
## iter  20 value 222.474695
## iter  30 value 191.920922
## iter  40 value 181.856155
## iter  50 value 177.443764
## iter  60 value 173.651581
## iter  70 value 171.296156
## iter  80 value 170.131570
## iter  90 value 169.378958
## iter 100 value 168.995793
## final  value 168.995793
## stopped after 100 iterations
## # weights:  10
## initial  value 502.458571
## iter  10 value 294.842197
## iter  20 value 282.709112
## iter  30 value 280.845564
## iter  40 value 280.012960
## iter  50 value 279.722841
## iter  60 value 279.534236
## iter  70 value 279.456761
## iter  80 value 279.433666
## iter  90 value 279.388111
## iter 100 value 279.378094
## final  value 279.378094
## stopped after 100 iterations
## # weights:  28
## initial  value 507.757147
## iter  10 value 264.106847
## iter  20 value 243.467178
## iter  30 value 230.764791
## iter  40 value 226.748250
## iter  50 value 223.353143
## iter  60 value 220.661239
## iter  70 value 217.952732
## iter  80 value 216.646544
## iter  90 value 215.033820
```

```
## iter 100 value 212.785002
## final  value 212.785002
## stopped after 100 iterations
## # weights:  46
## initial  value 536.635444
## iter  10 value 300.305691
## iter  20 value 233.402537
## iter  30 value 219.952889
## iter  40 value 204.231285
## iter  50 value 200.138762
## iter  60 value 194.926198
## iter  70 value 189.274800
## iter  80 value 186.852770
## iter  90 value 185.544021
## iter 100 value 185.108259
## final  value 185.108259
## stopped after 100 iterations
## # weights:  10
## initial  value 511.993109
## iter  10 value 329.438996
## iter  20 value 299.562136
## iter  30 value 289.502392
## final  value 289.108903
## converged
## # weights:  28
## initial  value 534.297147
## iter  10 value 298.526023
## iter  20 value 269.405240
## iter  30 value 256.963805
## iter  40 value 249.448710
## iter  50 value 245.337800
## iter  60 value 244.767213
## iter  70 value 244.531250
## iter  80 value 244.504623
## final  value 244.503998
## converged
## # weights:  46
## initial  value 547.572992
## iter  10 value 294.202564
## iter  20 value 259.884189
## iter  30 value 239.467364
## iter  40 value 235.238863
## iter  50 value 232.152685
## iter  60 value 226.266826
## iter  70 value 225.951152
## iter  80 value 225.914083
## iter  90 value 225.901446
## iter 100 value 225.900994
## final  value 225.900994
## stopped after 100 iterations
## # weights:  10
## initial  value 523.574218
## iter  10 value 289.799783
## iter  20 value 280.908851
```

```
## iter  30 value 280.015791
## iter  40 value 279.628298
## iter  50 value 279.578224
## iter  60 value 279.494152
## iter  70 value 279.469375
## iter  80 value 279.460603
## iter  90 value 279.448910
## iter  90 value 279.448909
## final  value 279.448852
## converged
## # weights:  28
## initial  value 516.636044
## iter  10 value 321.263827
## iter  20 value 267.126790
## iter  30 value 241.186203
## iter  40 value 232.578350
## iter  50 value 229.687305
## iter  60 value 229.047865
## iter  70 value 228.953127
## iter  80 value 228.772173
## iter  90 value 228.580937
## iter 100 value 228.386410
## final  value 228.386410
## stopped after 100 iterations
## # weights:  46
## initial  value 508.336083
## iter  10 value 265.449728
## iter  20 value 230.051973
## iter  30 value 204.798435
## iter  40 value 183.027676
## iter  50 value 173.595221
## iter  60 value 170.234869
## iter  70 value 169.284758
## iter  80 value 168.556715
## iter  90 value 168.307071
## iter 100 value 168.210606
## final  value 168.210606
## stopped after 100 iterations
## # weights:  10
## initial  value 512.979748
## iter  10 value 343.375182
## iter  20 value 286.032952
## iter  30 value 280.474324
## iter  40 value 277.006068
## iter  50 value 275.784232
## iter  60 value 275.507950
## iter  70 value 275.481702
## iter  80 value 275.422074
## iter  90 value 275.416993
## iter 100 value 275.397228
## final  value 275.397228
## stopped after 100 iterations
## # weights:  28
## initial  value 517.957367
```

```
## iter  10 value 283.596307
## iter  20 value 237.034493
## iter  30 value 233.020837
## iter  40 value 225.434603
## iter  50 value 219.243839
## iter  60 value 219.097736
## final  value 219.097725
## converged
## # weights:  46
## initial  value 578.536883
## iter  10 value 269.977892
## iter  20 value 211.589667
## iter  30 value 195.430798
## iter  40 value 177.559423
## iter  50 value 166.723372
## iter  60 value 165.915599
## iter  70 value 165.911254
## iter  80 value 165.911153
## final  value 165.911145
## converged
## # weights:  10
## initial  value 512.452445
## iter  10 value 304.639500
## iter  20 value 284.891595
## iter  30 value 283.878284
## final  value 283.874320
## converged
## # weights:  28
## initial  value 499.281908
## iter  10 value 292.129149
## iter  20 value 255.842136
## iter  30 value 246.268485
## iter  40 value 243.893804
## iter  50 value 243.871694
## final  value 243.869294
## converged
## # weights:  46
## initial  value 517.445302
## iter  10 value 279.991155
## iter  20 value 245.327894
## iter  30 value 234.688475
## iter  40 value 228.256012
## iter  50 value 226.313446
## iter  60 value 226.049507
## iter  70 value 226.025231
## iter  80 value 225.965811
## final  value 225.962525
## converged
## # weights:  10
## initial  value 521.899178
## iter  10 value 315.019682
## iter  20 value 287.463204
## iter  30 value 285.145601
## iter  40 value 273.392945
```

```
## iter  50 value 273.354417
## iter  60 value 273.350592
## final  value 273.350304
## converged
## # weights:  28
## initial  value 601.633560
## iter  10 value 287.922869
## iter  20 value 246.865926
## iter  30 value 231.260199
## iter  40 value 217.248373
## iter  50 value 210.866314
## iter  60 value 208.487106
## iter  70 value 207.852792
## iter  80 value 204.902482
## iter  90 value 204.457491
## iter 100 value 204.188844
## final  value 204.188844
## stopped after 100 iterations
## # weights:  46
## initial  value 556.332125
## iter  10 value 275.187857
## iter  20 value 226.616003
## iter  30 value 208.409100
## iter  40 value 192.909145
## iter  50 value 175.076665
## iter  60 value 167.378746
## iter  70 value 163.990412
## iter  80 value 163.204107
## iter  90 value 162.700142
## iter 100 value 162.536695
## final  value 162.536695
## stopped after 100 iterations
## # weights:  10
## initial  value 544.796780
## iter  10 value 327.082339
## iter  20 value 288.186443
## iter  30 value 279.980618
## iter  40 value 278.957917
## iter  50 value 278.547970
## iter  60 value 278.348503
## iter  70 value 278.320067
## iter  80 value 278.226135
## iter  90 value 278.222058
## iter 100 value 278.185364
## final  value 278.185364
## stopped after 100 iterations
## # weights:  28
## initial  value 554.582308
## iter  10 value 284.725207
## iter  20 value 238.405237
## iter  30 value 224.766512
## iter  40 value 215.712431
## iter  50 value 213.049300
## iter  60 value 209.526506
```

```
## iter  70 value 209.165034
## iter  80 value 208.490346
## iter  90 value 207.122705
## iter 100 value 205.661216
## final  value 205.661216
## stopped after 100 iterations
## # weights:  46
## initial  value 534.162609
## iter  10 value 270.032825
## iter  20 value 238.194305
## iter  30 value 196.152516
## iter  40 value 185.074653
## iter  50 value 181.524782
## iter  60 value 178.855844
## iter  70 value 178.646275
## iter  80 value 178.639793
## final  value 178.639747
## converged
## # weights:  10
## initial  value 569.895545
## iter  10 value 336.846715
## iter  20 value 298.256581
## iter  30 value 288.639152
## final  value 288.091414
## converged
## # weights:  28
## initial  value 538.517744
## iter  10 value 285.707798
## iter  20 value 260.757824
## iter  30 value 254.965644
## iter  40 value 252.975929
## iter  50 value 252.510862
## iter  60 value 252.479987
## iter  70 value 252.478897
## final  value 252.478715
## converged
## # weights:  46
## initial  value 553.788826
## iter  10 value 288.929716
## iter  20 value 258.948483
## iter  30 value 244.897615
## iter  40 value 242.864165
## iter  50 value 241.593695
## iter  60 value 241.061845
## iter  70 value 240.914199
## iter  80 value 240.901538
## iter  90 value 240.897325
## final  value 240.896246
## converged
## # weights:  10
## initial  value 594.599177
## iter  10 value 496.306289
## iter  20 value 290.456689
## iter  30 value 280.329303
```

```
## iter  40 value 279.137727
## iter  50 value 278.537831
## iter  60 value 278.396976
## iter  70 value 278.323205
## iter  80 value 278.300919
## iter  90 value 278.293897
## iter 100 value 278.283536
## final  value 278.283536
## stopped after 100 iterations
## # weights:  28
## initial  value 533.972092
## iter  10 value 296.256190
## iter  20 value 245.896445
## iter  30 value 220.251607
## iter  40 value 213.285963
## iter  50 value 209.045604
## iter  60 value 206.860188
## iter  70 value 206.170482
## iter  80 value 205.770403
## iter  90 value 204.440695
## iter 100 value 204.326474
## final  value 204.326474
## stopped after 100 iterations
## # weights:  46
## initial  value 494.568751
## iter  10 value 267.477808
## iter  20 value 227.600226
## iter  30 value 215.898258
## iter  40 value 198.883821
## iter  50 value 182.368301
## iter  60 value 177.790037
## iter  70 value 177.014357
## iter  80 value 176.210297
## iter  90 value 175.846459
## iter 100 value 175.345273
## final  value 175.345273
## stopped after 100 iterations
## # weights:  10
## initial  value 539.508038
## iter  10 value 349.290595
## iter  20 value 287.562903
## iter  30 value 283.948162
## iter  40 value 278.131527
## iter  50 value 277.477648
## iter  60 value 276.727095
## iter  70 value 276.655077
## iter  80 value 276.581372
## iter  90 value 276.535658
## iter 100 value 276.525544
## final  value 276.525544
## stopped after 100 iterations
## # weights:  28
## initial  value 559.359219
## iter  10 value 299.217205
```

```
## iter  20 value 238.276214
## iter  30 value 228.851925
## iter  40 value 223.942704
## iter  50 value 216.132554
## iter  60 value 214.072491
## iter  70 value 212.408204
## iter  80 value 205.089894
## iter  90 value 200.010200
## iter 100 value 199.349185
## final  value 199.349185
## stopped after 100 iterations
## # weights:  46
## initial  value 550.009256
## iter  10 value 274.722170
## iter  20 value 231.951051
## iter  30 value 207.928829
## iter  40 value 191.486899
## iter  50 value 182.128121
## iter  60 value 170.372520
## iter  70 value 167.685064
## iter  80 value 165.967616
## iter  90 value 159.554617
## iter 100 value 156.293126
## final  value 156.293126
## stopped after 100 iterations
## # weights:  10
## initial  value 522.978035
## iter  10 value 362.228132
## iter  20 value 291.857682
## iter  30 value 286.073430
## iter  40 value 285.474667
## iter  40 value 285.474667
## iter  40 value 285.474667
## final  value 285.474667
## converged
## # weights:  28
## initial  value 528.116769
## iter  10 value 329.549705
## iter  20 value 277.553290
## iter  30 value 258.320313
## iter  40 value 247.883271
## iter  50 value 244.564598
## iter  60 value 241.854810
## iter  70 value 241.438153
## iter  80 value 241.277583
## final  value 241.276755
## converged
## # weights:  46
## initial  value 578.460193
## iter  10 value 290.334431
## iter  20 value 251.288933
## iter  30 value 243.016698
## iter  40 value 236.268139
## iter  50 value 231.761142
```

```
## iter  60 value 225.832986
## iter  70 value 225.125919
## iter  80 value 225.082134
## iter  90 value 225.053813
## final  value 225.053262
## converged
## # weights:  10
## initial  value 523.908010
## iter  10 value 482.122441
## iter  20 value 474.462788
## iter  30 value 469.558068
## iter  40 value 421.579654
## iter  50 value 388.188315
## iter  60 value 372.208922
## iter  70 value 351.372890
## iter  80 value 351.170514
## iter  90 value 351.123994
## iter 100 value 350.908101
## final  value 350.908101
## stopped after 100 iterations
## # weights:  28
## initial  value 508.508061
## iter  10 value 283.428060
## iter  20 value 262.899727
## iter  30 value 238.966006
## iter  40 value 227.434716
## iter  50 value 225.230609
## iter  60 value 222.892241
## iter  70 value 222.485822
## iter  80 value 222.106853
## iter  90 value 221.375879
## iter 100 value 220.894849
## final  value 220.894849
## stopped after 100 iterations
## # weights:  46
## initial  value 628.447437
## iter  10 value 280.719562
## iter  20 value 219.220552
## iter  30 value 200.381301
## iter  40 value 195.889321
## iter  50 value 190.874651
## iter  60 value 187.853920
## iter  70 value 186.989190
## iter  80 value 186.581884
## iter  90 value 186.236910
## iter 100 value 186.132940
## final  value 186.132940
## stopped after 100 iterations
## # weights:  10
## initial  value 496.174266
## iter  10 value 294.478081
## iter  20 value 281.832942
## iter  30 value 280.535551
## iter  40 value 279.466143
```

```
## iter  50 value 279.308962
## iter  60 value 279.224973
## iter  70 value 279.212476
## iter  80 value 279.206138
## iter  90 value 279.199377
## iter 100 value 279.198504
## final  value 279.198504
## stopped after 100 iterations
## # weights:  28
## initial  value 618.426507
## iter  10 value 322.255007
## iter  20 value 252.839099
## iter  30 value 235.406275
## iter  40 value 231.553976
## iter  50 value 227.351542
## iter  60 value 225.522365
## iter  70 value 225.409014
## iter  80 value 225.384518
## iter  90 value 225.368804
## iter 100 value 225.252661
## final  value 225.252661
## stopped after 100 iterations
## # weights:  46
## initial  value 511.733025
## iter  10 value 272.405395
## iter  20 value 221.778651
## iter  30 value 199.927282
## iter  40 value 185.192680
## iter  50 value 177.587072
## iter  60 value 174.458055
## iter  70 value 173.994116
## iter  80 value 173.809467
## iter  90 value 173.778726
## iter 100 value 173.708801
## final  value 173.708801
## stopped after 100 iterations
## # weights:  10
## initial  value 525.708300
## iter  10 value 374.223491
## iter  20 value 310.785610
## iter  30 value 287.737051
## iter  40 value 287.030718
## final  value 287.030707
## converged
## # weights:  28
## initial  value 531.099197
## iter  10 value 310.030890
## iter  20 value 273.383711
## iter  30 value 259.620224
## iter  40 value 255.846870
## iter  50 value 249.848838
## iter  60 value 247.858961
## iter  70 value 247.683436
## iter  80 value 247.660535
```

```
## final  value 247.660408
## converged
## # weights:  46
## initial  value 537.589222
## iter  10 value 267.322202
## iter  20 value 252.427843
## iter  30 value 243.412500
## iter  40 value 237.833282
## iter  50 value 228.314630
## iter  60 value 226.975426
## iter  70 value 226.560339
## iter  80 value 226.466131
## iter  90 value 226.441769
## final  value 226.440387
## converged
## # weights:  10
## initial  value 512.022001
## iter  10 value 306.404707
## iter  20 value 292.277210
## iter  30 value 289.063601
## iter  40 value 279.554070
## iter  50 value 279.230783
## iter  60 value 279.226091
## iter  70 value 279.225844
## iter  80 value 279.223862
## final  value 279.222742
## converged
## # weights:  28
## initial  value 561.669679
## iter  10 value 273.512295
## iter  20 value 246.073105
## iter  30 value 231.131183
## iter  40 value 222.506666
## iter  50 value 214.154971
## iter  60 value 212.312543
## iter  70 value 211.625300
## iter  80 value 210.678350
## iter  90 value 210.094349
## iter 100 value 209.929796
## final  value 209.929796
## stopped after 100 iterations
## # weights:  46
## initial  value 585.735823
## iter  10 value 278.757711
## iter  20 value 234.821313
## iter  30 value 190.286902
## iter  40 value 166.234635
## iter  50 value 162.134057
## iter  60 value 161.152945
## iter  70 value 160.707159
## iter  80 value 160.497742
## iter  90 value 160.347263
## iter 100 value 160.262771
## final  value 160.262771
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 490.212888
## iter  10 value 289.142345
## iter  20 value 282.170939
## iter  30 value 280.750972
## iter  40 value 279.873541
## iter  50 value 279.768045
## iter  60 value 279.618541
## iter  70 value 279.556466
## iter  80 value 279.530984
## final  value 279.494383
## converged
## # weights:  28
## initial  value 506.719761
## iter  10 value 370.615537
## iter  20 value 256.439591
## iter  30 value 248.529708
## iter  40 value 238.311418
## iter  50 value 232.593688
## iter  60 value 222.382697
## iter  70 value 217.702242
## iter  80 value 216.553747
## iter  90 value 215.495930
## iter 100 value 213.262457
## final  value 213.262457
## stopped after 100 iterations
## # weights:  46
## initial  value 528.520264
## iter  10 value 275.353636
## iter  20 value 228.556741
## iter  30 value 206.265786
## iter  40 value 189.685595
## iter  50 value 179.775960
## iter  60 value 174.795336
## iter  70 value 170.212038
## iter  80 value 167.515945
## iter  90 value 165.356788
## iter 100 value 164.978468
## final  value 164.978468
## stopped after 100 iterations
## # weights:  10
## initial  value 535.968363
## iter  10 value 340.850199
## iter  20 value 317.133508
## iter  30 value 297.003537
## iter  40 value 290.065640
## iter  50 value 290.052046
## final  value 290.051136
## converged
## # weights:  28
## initial  value 514.061341
## iter  10 value 302.588346
## iter  20 value 280.846579
```

```
## iter  30 value 257.299776
## iter  40 value 245.368872
## iter  50 value 244.460047
## iter  60 value 244.434126
## iter  70 value 244.433533
## final  value 244.433508
## converged
## # weights:  46
## initial  value 579.952122
## iter  10 value 284.349935
## iter  20 value 251.932790
## iter  30 value 241.502546
## iter  40 value 231.882039
## iter  50 value 226.003137
## iter  60 value 223.955473
## iter  70 value 223.654670
## iter  80 value 223.117983
## iter  90 value 222.034282
## iter 100 value 221.950605
## final  value 221.950605
## stopped after 100 iterations
## # weights:  10
## initial  value 524.930626
## iter  10 value 342.877209
## iter  20 value 317.849147
## iter  30 value 316.633667
## iter  40 value 311.290604
## iter  50 value 311.289768
## final  value 311.289654
## converged
## # weights:  28
## initial  value 510.989600
## iter  10 value 298.375972
## iter  20 value 249.934018
## iter  30 value 224.533824
## iter  40 value 218.980992
## iter  50 value 216.390238
## iter  60 value 215.145406
## iter  70 value 215.049400
## iter  80 value 214.435531
## iter  90 value 213.837391
## iter 100 value 213.791359
## final  value 213.791359
## stopped after 100 iterations
## # weights:  46
## initial  value 531.137480
## iter  10 value 272.285466
## iter  20 value 228.156825
## iter  30 value 197.219237
## iter  40 value 187.297011
## iter  50 value 181.165444
## iter  60 value 177.514842
## iter  70 value 174.698441
## iter  80 value 169.618176
```

```
## iter  90 value 167.256739
## iter 100 value 166.561388
## final  value 166.561388
## stopped after 100 iterations
## # weights:  10
## initial  value 562.758338
## iter  10 value 366.851918
## iter  20 value 328.588789
## iter  30 value 311.312222
## iter  40 value 297.372684
## iter  50 value 284.421615
## iter  60 value 283.635306
## iter  70 value 278.700452
## iter  80 value 278.615220
## final  value 278.602712
## converged
## # weights:  28
## initial  value 591.515301
## iter  10 value 297.644437
## iter  20 value 255.752786
## iter  30 value 230.213633
## iter  40 value 224.277971
## iter  50 value 220.933063
## iter  60 value 216.554251
## iter  70 value 212.080650
## iter  80 value 211.264078
## iter  90 value 210.442000
## iter 100 value 207.942788
## final  value 207.942788
## stopped after 100 iterations
## # weights:  46
## initial  value 507.894007
## iter  10 value 278.639924
## iter  20 value 228.960677
## iter  30 value 206.790699
## iter  40 value 191.449976
## iter  50 value 181.202183
## iter  60 value 177.855982
## iter  70 value 177.693464
## iter  80 value 177.681431
## iter  90 value 177.679635
## iter 100 value 177.547246
## final  value 177.547246
## stopped after 100 iterations
## # weights:  10
## initial  value 520.647044
## iter  10 value 333.793126
## iter  20 value 292.489802
## iter  30 value 291.369365
## final  value 291.199528
## converged
## # weights:  28
## initial  value 542.696995
## iter  10 value 330.191963
```

```
## iter  20 value 267.200392
## iter  30 value 255.932565
## iter  40 value 252.875460
## iter  50 value 250.000281
## iter  60 value 247.062966
## iter  70 value 246.080085
## iter  80 value 245.741852
## final  value 245.741164
## converged
## # weights:  46
## initial  value 544.764456
## iter  10 value 279.984618
## iter  20 value 253.434080
## iter  30 value 239.427298
## iter  40 value 235.477017
## iter  50 value 233.720936
## iter  60 value 232.871667
## iter  70 value 232.447755
## iter  80 value 232.253512
## iter  90 value 232.227767
## iter 100 value 232.227102
## final  value 232.227102
## stopped after 100 iterations
## # weights:  10
## initial  value 512.325326
## iter  10 value 316.228992
## iter  20 value 293.327782
## iter  30 value 287.321753
## iter  40 value 281.753712
## iter  50 value 281.737072
## iter  60 value 281.534168
## iter  70 value 281.499987
## iter  80 value 281.470856
## iter  90 value 281.446195
## iter 100 value 281.442565
## final  value 281.442565
## stopped after 100 iterations
## # weights:  28
## initial  value 525.779278
## iter  10 value 308.497609
## iter  20 value 256.724904
## iter  30 value 244.193740
## iter  40 value 235.280885
## iter  50 value 223.553132
## iter  60 value 220.168615
## iter  70 value 219.576922
## iter  80 value 219.265884
## iter  90 value 218.397939
## iter 100 value 217.887369
## final  value 217.887369
## stopped after 100 iterations
## # weights:  46
## initial  value 504.296317
## iter  10 value 276.727472
```

```
## iter  20 value 230.714685
## iter  30 value 196.713619
## iter  40 value 182.359683
## iter  50 value 174.313058
## iter  60 value 171.204809
## iter  70 value 164.516597
## iter  80 value 161.877899
## iter  90 value 159.132327
## iter 100 value 158.192712
## final  value 158.192712
## stopped after 100 iterations
## # weights:  10
## initial  value 518.580699
## iter  10 value 423.308848
## iter  20 value 295.558387
## iter  30 value 280.470261
## iter  40 value 278.467715
## iter  50 value 278.292163
## iter  60 value 278.072127
## iter  70 value 278.034630
## iter  80 value 277.993407
## iter  90 value 277.974607
## iter 100 value 277.960064
## final  value 277.960064
## stopped after 100 iterations
## # weights:  28
## initial  value 537.670247
## iter  10 value 262.622142
## iter  20 value 242.229439
## iter  30 value 237.850170
## iter  40 value 226.070820
## iter  50 value 222.565375
## iter  60 value 221.631115
## iter  70 value 221.613644
## final  value 221.611985
## converged
## # weights:  46
## initial  value 514.402733
## iter  10 value 274.448312
## iter  20 value 233.189377
## iter  30 value 220.536432
## iter  40 value 205.313971
## iter  50 value 192.880519
## iter  60 value 190.785080
## iter  70 value 187.461303
## iter  80 value 185.443339
## iter  90 value 185.323374
## iter 100 value 185.105546
## final  value 185.105546
## stopped after 100 iterations
## # weights:  10
## initial  value 546.592665
## iter  10 value 387.814876
## iter  20 value 310.843626
```

```
## iter  30 value 294.846920
## iter  40 value 287.219991
## final  value 287.054552
## converged
## # weights:  28
## initial  value 571.682616
## iter  10 value 323.127691
## iter  20 value 272.889828
## iter  30 value 260.292605
## iter  40 value 254.832402
## iter  50 value 252.582143
## iter  60 value 252.441058
## iter  70 value 252.439695
## final  value 252.439612
## converged
## # weights:  46
## initial  value 510.315738
## iter  10 value 276.274315
## iter  20 value 246.943035
## iter  30 value 240.530932
## iter  40 value 233.314143
## iter  50 value 230.421620
## iter  60 value 229.996870
## iter  70 value 229.420790
## iter  80 value 228.802448
## iter  90 value 227.994214
## iter 100 value 227.949756
## final  value 227.949756
## stopped after 100 iterations
## # weights:  10
## initial  value 516.240543
## iter  10 value 296.695164
## iter  20 value 280.002654
## iter  30 value 279.038446
## iter  40 value 278.335907
## iter  50 value 278.198478
## iter  60 value 278.071797
## iter  70 value 278.043492
## iter  80 value 278.033544
## iter  90 value 278.023772
## iter  90 value 278.023771
## final  value 278.023745
## converged
## # weights:  28
## initial  value 525.794094
## iter  10 value 298.411483
## iter  20 value 240.412363
## iter  30 value 228.612959
## iter  40 value 220.066150
## iter  50 value 216.453348
## iter  60 value 214.012554
## iter  70 value 213.083853
## iter  80 value 212.659416
## iter  90 value 212.183492
```

```
## iter 100 value 211.322152
## final  value 211.322152
## stopped after 100 iterations
## # weights:  46
## initial  value 875.143591
## iter  10 value 285.273480
## iter  20 value 235.790772
## iter  30 value 209.515299
## iter  40 value 202.199832
## iter  50 value 191.654548
## iter  60 value 182.070269
## iter  70 value 178.670089
## iter  80 value 177.349000
## iter  90 value 176.813385
## iter 100 value 176.406925
## final  value 176.406925
## stopped after 100 iterations
## # weights:  10
## initial  value 516.084368
## iter  10 value 322.161025
## iter  20 value 295.167846
## iter  30 value 290.509684
## iter  40 value 286.723464
## iter  50 value 286.305545
## iter  60 value 285.955696
## iter  70 value 285.796501
## iter  80 value 285.746137
## iter  90 value 285.665250
## iter 100 value 285.657504
## final  value 285.657504
## stopped after 100 iterations
## # weights:  28
## initial  value 501.890242
## iter  10 value 288.905213
## iter  20 value 244.712691
## iter  30 value 229.575048
## iter  40 value 223.222202
## iter  50 value 214.665926
## iter  60 value 213.899355
## iter  70 value 213.561508
## iter  80 value 213.196195
## iter  90 value 209.096369
## iter 100 value 200.758547
## final  value 200.758547
## stopped after 100 iterations
## # weights:  46
## initial  value 525.994556
## iter  10 value 290.833553
## iter  20 value 255.830931
## iter  30 value 219.477089
## iter  40 value 195.852750
## iter  50 value 181.334000
## iter  60 value 177.707308
## iter  70 value 177.191530
```

```
## iter  80 value 177.126921
## iter  90 value 177.114537
## iter 100 value 177.102768
## final  value 177.102768
## stopped after 100 iterations
## # weights:  10
## initial  value 561.551399
## iter  10 value 335.724884
## iter  20 value 302.546297
## iter  30 value 295.813463
## iter  40 value 295.439803
## iter  40 value 295.439803
## iter  40 value 295.439803
## final  value 295.439803
## converged
## # weights:  28
## initial  value 538.914220
## iter  10 value 350.366386
## iter  20 value 290.477241
## iter  30 value 269.244035
## iter  40 value 258.544861
## iter  50 value 253.404078
## iter  60 value 252.001975
## iter  70 value 251.611560
## iter  80 value 251.534405
## iter  80 value 251.534403
## iter  80 value 251.534403
## final  value 251.534403
## converged
## # weights:  46
## initial  value 609.780475
## iter  10 value 346.895789
## iter  20 value 292.289317
## iter  30 value 252.293608
## iter  40 value 241.558561
## iter  50 value 239.757165
## iter  60 value 237.888453
## iter  70 value 233.973230
## iter  80 value 232.597451
## iter  90 value 232.280701
## iter 100 value 231.717665
## final  value 231.717665
## stopped after 100 iterations
## # weights:  10
## initial  value 564.666036
## iter  10 value 325.816062
## iter  20 value 317.138103
## iter  30 value 307.184464
## iter  40 value 300.514101
## iter  50 value 299.520910
## iter  60 value 295.373944
## iter  70 value 295.126725
## iter  80 value 295.086600
## iter  90 value 295.076422
```

```
## iter 100 value 295.064273
## final  value 295.064273
## stopped after 100 iterations
## # weights:  28
## initial  value 540.665637
## iter  10 value 295.477695
## iter  20 value 254.223387
## iter  30 value 236.064986
## iter  40 value 227.902695
## iter  50 value 223.481611
## iter  60 value 223.331016
## iter  70 value 223.049273
## iter  80 value 221.353918
## iter  90 value 220.533813
## iter 100 value 220.325612
## final  value 220.325612
## stopped after 100 iterations
## # weights:  46
## initial  value 603.748806
## iter  10 value 327.056238
## iter  20 value 254.020895
## iter  30 value 219.171617
## iter  40 value 193.432277
## iter  50 value 185.035777
## iter  60 value 179.215475
## iter  70 value 170.276729
## iter  80 value 169.482910
## iter  90 value 169.129298
## iter 100 value 169.088097
## final  value 169.088097
## stopped after 100 iterations
## # weights:  10
## initial  value 556.316926
## iter  10 value 315.017332
## iter  20 value 291.824161
## iter  30 value 289.071804
## iter  40 value 287.835943
## iter  50 value 287.450327
## iter  60 value 287.368817
## iter  70 value 287.174936
## iter  80 value 287.157541
## iter  90 value 287.088815
## iter 100 value 287.078877
## final  value 287.078877
## stopped after 100 iterations
## # weights:  28
## initial  value 548.687950
## iter  10 value 294.608838
## iter  20 value 249.453097
## iter  30 value 239.677067
## iter  40 value 236.331944
## iter  50 value 233.380229
## iter  60 value 233.032046
## iter  70 value 232.483282
```

```
## iter  80 value 231.527909
## iter  90 value 228.636398
## iter 100 value 222.857645
## final  value 222.857645
## stopped after 100 iterations
## # weights:  46
## initial  value 512.575225
## iter  10 value 268.602621
## iter  20 value 236.700993
## iter  30 value 209.699083
## iter  40 value 192.229763
## iter  50 value 188.051728
## iter  60 value 187.690661
## iter  70 value 187.638605
## iter  80 value 187.584448
## final  value 187.584356
## converged
## # weights:  10
## initial  value 536.512113
## iter  10 value 361.349315
## iter  20 value 308.671644
## iter  30 value 297.128314
## iter  40 value 296.785818
## final  value 296.775350
## converged
## # weights:  28
## initial  value 522.538933
## iter  10 value 296.242137
## iter  20 value 264.173337
## iter  30 value 258.514261
## iter  40 value 257.288807
## iter  50 value 256.975463
## iter  60 value 256.952607
## iter  70 value 256.865347
## iter  80 value 256.854949
## iter  80 value 256.854948
## iter  80 value 256.854948
## final  value 256.854948
## converged
## # weights:  46
## initial  value 547.506248
## iter  10 value 315.654308
## iter  20 value 257.921049
## iter  30 value 241.400788
## iter  40 value 237.091762
## iter  50 value 234.262392
## iter  60 value 233.361361
## iter  70 value 233.209928
## iter  80 value 233.107935
## iter  90 value 233.089412
## iter 100 value 233.086061
## final  value 233.086061
## stopped after 100 iterations
## # weights:  10
```

```
## initial  value 541.911668
## iter  10 value 337.142310
## iter  20 value 297.247678
## iter  30 value 291.575335
## iter  40 value 288.259289
## iter  50 value 287.847322
## iter  60 value 287.389419
## iter  70 value 287.315811
## iter  80 value 287.282258
## iter  90 value 287.239328
## iter 100 value 287.233101
## final  value 287.233101
## stopped after 100 iterations
## # weights:  28
## initial  value 520.262612
## iter  10 value 292.621509
## iter  20 value 247.407448
## iter  30 value 230.644669
## iter  40 value 224.579417
## iter  50 value 222.615983
## iter  60 value 222.222886
## iter  70 value 221.922391
## iter  80 value 221.807492
## iter  90 value 221.788749
## iter 100 value 221.726547
## final  value 221.726547
## stopped after 100 iterations
## # weights:  46
## initial  value 523.552369
## iter  10 value 288.950367
## iter  20 value 236.261901
## iter  30 value 211.949814
## iter  40 value 200.086135
## iter  50 value 193.441183
## iter  60 value 191.227668
## iter  70 value 190.691634
## iter  80 value 190.407094
## iter  90 value 190.256491
## iter 100 value 190.145613
## final  value 190.145613
## stopped after 100 iterations
## # weights:  10
## initial  value 560.610466
## iter  10 value 449.165486
## iter  20 value 379.837026
## iter  30 value 345.994956
## iter  40 value 340.811181
## iter  50 value 331.616071
## iter  60 value 331.478724
## iter  70 value 331.069554
## iter  80 value 328.859220
## iter  90 value 309.261714
## iter 100 value 276.381671
## final  value 276.381671
```

```
## stopped after 100 iterations
## # weights:  28
## initial  value 546.903166
## iter  10 value 277.084104
## iter  20 value 228.554254
## iter  30 value 221.897686
## iter  40 value 213.741962
## iter  50 value 207.730637
## iter  60 value 202.634855
## iter  70 value 202.440912
## iter  80 value 201.987523
## iter  90 value 201.775283
## iter 100 value 201.410756
## final  value 201.410756
## stopped after 100 iterations
## # weights:  46
## initial  value 488.246531
## iter  10 value 256.690383
## iter  20 value 225.742637
## iter  30 value 202.039318
## iter  40 value 182.651349
## iter  50 value 177.381403
## iter  60 value 175.820838
## iter  70 value 174.656778
## iter  80 value 174.405087
## iter  90 value 174.343250
## final  value 174.339674
## converged
## # weights:  10
## initial  value 546.332054
## iter  10 value 329.311031
## iter  20 value 276.702359
## iter  30 value 274.802657
## final  value 274.754244
## converged
## # weights:  28
## initial  value 526.195830
## iter  10 value 298.776270
## iter  20 value 262.331502
## iter  30 value 245.813655
## iter  40 value 238.807690
## iter  50 value 233.199442
## iter  60 value 232.248660
## iter  70 value 232.174550
## iter  80 value 232.164632
## final  value 232.164607
## converged
## # weights:  46
## initial  value 556.353784
## iter  10 value 282.028319
## iter  20 value 243.702173
## iter  30 value 234.514123
## iter  40 value 231.209873
## iter  50 value 230.724447
```

```
## iter  60 value 230.520175
## iter  70 value 230.346753
## iter  80 value 229.906583
## iter  90 value 228.334507
## iter 100 value 227.980384
## final  value 227.980384
## stopped after 100 iterations
## # weights:  10
## initial  value 514.119470
## iter  10 value 299.217231
## iter  20 value 292.478042
## iter  30 value 291.211588
## iter  40 value 288.159317
## iter  50 value 288.099299
## final  value 288.098579
## converged
## # weights:  28
## initial  value 521.065630
## iter  10 value 290.316772
## iter  20 value 260.895233
## iter  30 value 246.519273
## iter  40 value 235.531611
## iter  50 value 217.896275
## iter  60 value 210.085936
## iter  70 value 207.816407
## iter  80 value 203.732766
## iter  90 value 186.718055
## iter 100 value 183.732980
## final  value 183.732980
## stopped after 100 iterations
## # weights:  46
## initial  value 616.944190
## iter  10 value 257.693449
## iter  20 value 214.071140
## iter  30 value 199.481325
## iter  40 value 177.038545
## iter  50 value 160.431303
## iter  60 value 156.171918
## iter  70 value 153.739029
## iter  80 value 152.217120
## iter  90 value 149.622447
## iter 100 value 148.651406
## final  value 148.651406
## stopped after 100 iterations
## # weights:  10
## initial  value 552.388455
## iter  10 value 421.268513
## iter  20 value 286.891082
## iter  30 value 279.321152
## iter  40 value 276.951273
## iter  50 value 276.695468
## iter  60 value 276.369075
## iter  70 value 276.328517
## iter  80 value 276.280370
```

```
## iter  90 value 276.225528
## iter 100 value 276.219328
## final  value 276.219328
## stopped after 100 iterations
## # weights:  28
## initial  value 554.522283
## iter  10 value 281.746543
## iter  20 value 236.994696
## iter  30 value 225.781647
## iter  40 value 219.449693
## iter  50 value 218.239614
## iter  60 value 216.955280
## iter  70 value 216.182938
## iter  80 value 213.017483
## iter  90 value 212.570809
## iter 100 value 211.969657
## final  value 211.969657
## stopped after 100 iterations
## # weights:  46
## initial  value 501.026711
## iter  10 value 268.561233
## iter  20 value 226.726062
## iter  30 value 194.987238
## iter  40 value 180.400633
## iter  50 value 175.518092
## iter  60 value 173.855977
## iter  70 value 173.563802
## iter  80 value 171.702259
## iter  90 value 171.622743
## iter 100 value 171.614154
## final  value 171.614154
## stopped after 100 iterations
## # weights:  10
## initial  value 523.101515
## iter  10 value 329.580412
## iter  20 value 290.543972
## iter  30 value 286.946336
## iter  40 value 286.664185
## iter  40 value 286.664185
## iter  40 value 286.664185
## final  value 286.664185
## converged
## # weights:  28
## initial  value 579.970480
## iter  10 value 295.213726
## iter  20 value 264.134644
## iter  30 value 249.017586
## iter  40 value 241.720188
## iter  50 value 238.985991
## iter  60 value 237.976305
## iter  70 value 237.731129
## iter  80 value 237.690910
## final  value 237.690868
## converged
```

```
## # weights:  46
## initial  value 689.365862
## iter  10 value 313.955124
## iter  20 value 263.195299
## iter  30 value 239.333038
## iter  40 value 228.306308
## iter  50 value 224.793267
## iter  60 value 224.425684
## iter  70 value 224.407902
## iter  80 value 224.401109
## iter  90 value 224.399523
## final  value 224.399339
## converged
## # weights:  10
## initial  value 546.415303
## iter  10 value 311.596352
## iter  20 value 300.107178
## iter  30 value 295.889963
## iter  40 value 292.095040
## iter  50 value 289.796144
## iter  60 value 289.562135
## iter  70 value 289.467560
## final  value 289.467549
## converged
## # weights:  28
## initial  value 527.530336
## iter  10 value 297.738927
## iter  20 value 265.992463
## iter  30 value 262.493462
## iter  40 value 253.475526
## iter  50 value 246.480113
## iter  60 value 245.157245
## iter  70 value 244.819438
## iter  80 value 241.482308
## iter  90 value 237.023861
## iter 100 value 235.970852
## final  value 235.970852
## stopped after 100 iterations
## # weights:  46
## initial  value 491.339621
## iter  10 value 269.396369
## iter  20 value 218.409050
## iter  30 value 194.860596
## iter  40 value 180.252478
## iter  50 value 172.484730
## iter  60 value 169.414681
## iter  70 value 166.705179
## iter  80 value 165.529931
## iter  90 value 164.576690
## iter 100 value 163.414897
## final  value 163.414897
## stopped after 100 iterations
## # weights:  10
## initial  value 554.889367
```

```
## iter  10 value 324.237035
## iter  20 value 283.489624
## iter  30 value 277.078864
## iter  40 value 273.927608
## iter  50 value 273.193611
## iter  60 value 272.968422
## iter  70 value 272.763545
## iter  80 value 272.741090
## iter  90 value 272.662307
## iter 100 value 272.653315
## final  value 272.653315
## stopped after 100 iterations
## # weights:  28
## initial  value 565.576346
## iter  10 value 271.100959
## iter  20 value 238.835181
## iter  30 value 229.069416
## iter  40 value 225.086049
## iter  50 value 216.062217
## iter  60 value 215.292745
## iter  70 value 214.465638
## iter  80 value 211.476900
## iter  90 value 207.068862
## iter 100 value 202.786472
## final  value 202.786472
## stopped after 100 iterations
## # weights:  46
## initial  value 542.790651
## iter  10 value 264.276287
## iter  20 value 233.929653
## iter  30 value 215.259183
## iter  40 value 201.938855
## iter  50 value 198.037243
## iter  60 value 192.681674
## iter  70 value 190.718033
## iter  80 value 189.651542
## iter  90 value 189.329909
## iter 100 value 189.217203
## final  value 189.217203
## stopped after 100 iterations
## # weights:  10
## initial  value 515.858618
## iter  10 value 334.842583
## iter  20 value 287.427667
## iter  30 value 284.245529
## final  value 284.206100
## converged
## # weights:  28
## initial  value 594.587985
## iter  10 value 325.773061
## iter  20 value 282.696873
## iter  30 value 264.814709
## iter  40 value 260.251543
## iter  50 value 246.939544
```

```
## iter  60 value 243.300292
## iter  70 value 243.147255
## iter  80 value 243.136923
## final  value 243.135855
## converged
## # weights:  46
## initial  value 511.872086
## iter  10 value 267.565838
## iter  20 value 242.313087
## iter  30 value 236.887831
## iter  40 value 233.232842
## iter  50 value 229.850131
## iter  60 value 228.687512
## iter  70 value 228.203571
## iter  80 value 228.114259
## iter  90 value 228.103085
## final  value 228.101555
## converged
## # weights:  10
## initial  value 520.907570
## iter  10 value 340.290104
## iter  20 value 278.449613
## iter  30 value 275.162667
## iter  40 value 273.378842
## iter  50 value 273.138440
## iter  60 value 272.875968
## iter  70 value 272.816379
## iter  80 value 272.762498
## iter  90 value 272.738243
## iter 100 value 272.733042
## final  value 272.733042
## stopped after 100 iterations
## # weights:  28
## initial  value 549.470838
## iter  10 value 301.653832
## iter  20 value 263.534410
## iter  30 value 247.028570
## iter  40 value 237.568259
## iter  50 value 231.846046
## iter  60 value 230.223182
## iter  70 value 229.808255
## iter  80 value 227.795839
## iter  90 value 227.622110
## iter 100 value 227.235579
## final  value 227.235579
## stopped after 100 iterations
## # weights:  46
## initial  value 560.910220
## iter  10 value 276.555129
## iter  20 value 222.359231
## iter  30 value 202.980025
## iter  40 value 193.230212
## iter  50 value 189.781026
## iter  60 value 187.584131
```

```
## iter  70 value 185.700222
## iter  80 value 183.467941
## iter  90 value 181.575404
## iter 100 value 180.820675
## final  value 180.820675
## stopped after 100 iterations
## # weights:  10
## initial  value 534.972828
## iter  10 value 296.971127
## iter  20 value 276.856898
## iter  30 value 275.734392
## iter  40 value 274.752848
## iter  50 value 274.391504
## iter  60 value 274.238791
## iter  70 value 274.127237
## iter  80 value 274.100080
## iter  90 value 274.035349
## iter 100 value 274.030230
## final  value 274.030230
## stopped after 100 iterations
## # weights:  28
## initial  value 544.828490
## iter  10 value 293.530288
## iter  20 value 250.496120
## iter  30 value 227.472292
## iter  40 value 220.622779
## iter  50 value 209.864048
## iter  60 value 208.413689
## iter  70 value 208.413057
## iter  80 value 208.411145
## iter  90 value 208.410144
## iter 100 value 208.403042
## final  value 208.403042
## stopped after 100 iterations
## # weights:  46
## initial  value 510.038614
## iter  10 value 265.984585
## iter  20 value 231.840436
## iter  30 value 208.099556
## iter  40 value 185.488030
## iter  50 value 174.891630
## iter  60 value 167.781732
## iter  70 value 167.471389
## iter  80 value 167.406596
## iter  90 value 167.405953
## iter  90 value 167.405952
## iter  90 value 167.405952
## final  value 167.405952
## converged
## # weights:  10
## initial  value 518.081549
## iter  10 value 326.056261
## iter  20 value 289.440613
## iter  30 value 284.695267
```

```
## final  value 284.156781
## converged
## # weights:  28
## initial  value 483.560093
## iter  10 value 275.609136
## iter  20 value 244.283015
## iter  30 value 240.923363
## iter  40 value 240.711066
## final  value 240.708399
## converged
## # weights:  46
## initial  value 553.654313
## iter  10 value 299.397805
## iter  20 value 264.010014
## iter  30 value 240.725771
## iter  40 value 234.835303
## iter  50 value 232.403462
## iter  60 value 231.498699
## iter  70 value 231.191442
## iter  80 value 230.912287
## iter  90 value 230.863424
## iter 100 value 230.848387
## final  value 230.848387
## stopped after 100 iterations
## # weights:  10
## initial  value 513.223920
## iter  10 value 311.318114
## iter  20 value 284.377018
## iter  30 value 284.309184
## final  value 284.309088
## converged
## # weights:  28
## initial  value 578.166601
## iter  10 value 285.957107
## iter  20 value 244.789712
## iter  30 value 223.902649
## iter  40 value 209.659730
## iter  50 value 206.005169
## iter  60 value 203.089852
## iter  70 value 201.026737
## iter  80 value 200.767000
## iter  90 value 200.415557
## iter 100 value 199.838037
## final  value 199.838037
## stopped after 100 iterations
## # weights:  46
## initial  value 599.456747
## iter  10 value 277.384939
## iter  20 value 231.248355
## iter  30 value 216.336413
## iter  40 value 199.670142
## iter  50 value 187.656736
## iter  60 value 183.829563
## iter  70 value 182.873218
```

```
## iter  80 value 182.787528
## iter  90 value 182.608898
## iter 100 value 182.088446
## final  value 182.088446
## stopped after 100 iterations
## # weights:  10
## initial  value 503.662722
## iter  10 value 327.818606
## iter  20 value 320.641586
## iter  30 value 304.439223
## iter  40 value 303.747712
## iter  50 value 302.012146
## iter  60 value 298.661635
## iter  70 value 287.274594
## iter  80 value 286.996895
## iter  90 value 286.982446
## iter 100 value 286.974023
## final  value 286.974023
## stopped after 100 iterations
## # weights:  28
## initial  value 516.480547
## iter  10 value 297.990158
## iter  20 value 239.590092
## iter  30 value 229.238499
## iter  40 value 224.003671
## iter  50 value 221.820421
## iter  60 value 220.588578
## iter  70 value 220.263511
## iter  80 value 219.830696
## iter  90 value 218.647008
## iter 100 value 214.620309
## final  value 214.620309
## stopped after 100 iterations
## # weights:  46
## initial  value 771.707736
## iter  10 value 259.040818
## iter  20 value 222.771506
## iter  30 value 204.329637
## iter  40 value 186.788103
## iter  50 value 183.061969
## iter  60 value 181.102280
## iter  70 value 180.671846
## iter  80 value 179.270724
## iter  90 value 178.343826
## iter 100 value 176.073717
## final  value 176.073717
## stopped after 100 iterations
## # weights:  10
## initial  value 506.956134
## iter  10 value 316.866397
## iter  20 value 293.409160
## iter  30 value 291.263882
## final  value 291.147710
## converged
```

```
## # weights:  28
## initial  value 523.707508
## iter  10 value 349.708360
## iter  20 value 275.356867
## iter  30 value 263.128698
## iter  40 value 252.894241
## iter  50 value 251.018649
## iter  60 value 250.920549
## final  value 250.918399
## converged
## # weights:  46
## initial  value 551.345287
## iter  10 value 303.456241
## iter  20 value 256.742362
## iter  30 value 244.574941
## iter  40 value 241.886478
## iter  50 value 240.010119
## iter  60 value 238.860024
## iter  70 value 238.457534
## iter  80 value 237.689738
## iter  90 value 234.795864
## iter 100 value 234.556938
## final  value 234.556938
## stopped after 100 iterations
## # weights:  10
## initial  value 540.483020
## iter  10 value 477.238725
## iter  20 value 439.160609
## iter  30 value 427.848302
## iter  40 value 399.030036
## iter  50 value 382.002255
## iter  60 value 349.229576
## iter  70 value 346.697855
## iter  80 value 346.586892
## iter  90 value 344.279855
## iter 100 value 338.820557
## final  value 338.820557
## stopped after 100 iterations
## # weights:  28
## initial  value 519.036876
## iter  10 value 276.543136
## iter  20 value 242.427518
## iter  30 value 233.391922
## iter  40 value 207.963533
## iter  50 value 197.400224
## iter  60 value 194.990027
## iter  70 value 193.993328
## iter  80 value 193.056404
## iter  90 value 192.709755
## iter 100 value 192.560954
## final  value 192.560954
## stopped after 100 iterations
## # weights:  46
## initial  value 589.373311
```

```
## iter  10 value 314.808243
## iter  20 value 246.333625
## iter  30 value 227.047780
## iter  40 value 220.156314
## iter  50 value 215.606141
## iter  60 value 214.009531
## iter  70 value 213.256765
## iter  80 value 211.207499
## iter  90 value 209.416404
## iter 100 value 205.978224
## final  value 205.978224
## stopped after 100 iterations
## # weights:  10
## initial  value 524.767880
## iter  10 value 306.362333
## iter  20 value 278.820092
## iter  30 value 274.596510
## iter  40 value 273.288551
## iter  50 value 273.081701
## iter  60 value 272.803243
## iter  70 value 272.729617
## iter  80 value 272.648398
## iter  90 value 272.592206
## iter 100 value 272.573122
## final  value 272.573122
## stopped after 100 iterations
## # weights:  28
## initial  value 572.939584
## iter  10 value 311.275489
## iter  20 value 259.002658
## iter  30 value 231.265718
## iter  40 value 218.980556
## iter  50 value 211.239833
## iter  60 value 206.560292
## iter  70 value 203.938196
## iter  80 value 203.208721
## iter  90 value 201.693100
## iter 100 value 201.515668
## final  value 201.515668
## stopped after 100 iterations
## # weights:  46
## initial  value 572.902957
## iter  10 value 273.401815
## iter  20 value 210.660186
## iter  30 value 190.492063
## iter  40 value 177.194591
## iter  50 value 171.596565
## iter  60 value 167.075959
## iter  70 value 165.745009
## iter  80 value 164.854913
## iter  90 value 162.353730
## iter 100 value 161.859590
## final  value 161.859590
## stopped after 100 iterations
```

```
## # weights:  10
## initial  value 518.492874
## iter  10 value 323.656999
## iter  20 value 286.041771
## iter  30 value 284.468413
## final  value 284.186317
## converged
## # weights:  28
## initial  value 576.677913
## iter  10 value 313.312028
## iter  20 value 275.459040
## iter  30 value 259.123945
## iter  40 value 253.774743
## iter  50 value 249.313091
## iter  60 value 249.074285
## iter  70 value 249.018912
## final  value 249.015092
## converged
## # weights:  46
## initial  value 558.895875
## iter  10 value 286.680143
## iter  20 value 245.147804
## iter  30 value 237.192089
## iter  40 value 231.045730
## iter  50 value 229.911216
## iter  60 value 228.626199
## iter  70 value 227.543434
## iter  80 value 226.661455
## iter  90 value 226.486034
## iter 100 value 226.470681
## final  value 226.470681
## stopped after 100 iterations
## # weights:  10
## initial  value 537.419268
## iter  10 value 335.770583
## iter  20 value 279.997029
## iter  30 value 274.432720
## iter  40 value 273.172714
## iter  50 value 272.947184
## iter  60 value 272.799267
## iter  70 value 272.771534
## iter  80 value 272.750031
## iter  90 value 272.718726
## iter 100 value 272.715694
## final  value 272.715694
## stopped after 100 iterations
## # weights:  28
## initial  value 505.128669
## iter  10 value 266.765712
## iter  20 value 229.469563
## iter  30 value 218.644972
## iter  40 value 204.391922
## iter  50 value 201.450285
## iter  60 value 199.813748
```

```
## iter  70 value 199.096644
## iter  80 value 198.183940
## iter  90 value 197.946857
## iter 100 value 197.784876
## final  value 197.784876
## stopped after 100 iterations
## # weights:  46
## initial  value 511.491820
## iter  10 value 285.281171
## iter  20 value 231.333399
## iter  30 value 206.115265
## iter  40 value 195.440677
## iter  50 value 184.215896
## iter  60 value 178.670639
## iter  70 value 178.063056
## iter  80 value 177.547684
## iter  90 value 176.983990
## iter 100 value 176.452031
## final  value 176.452031
## stopped after 100 iterations
## # weights:  10
## initial  value 526.758019
## iter  10 value 341.204239
## iter  20 value 301.006878
## iter  30 value 297.731215
## iter  40 value 279.729634
## iter  50 value 279.575665
## iter  60 value 279.571345
## iter  70 value 279.568446
## iter  80 value 279.567959
## iter  90 value 279.567841
## final  value 279.567741
## converged
## # weights:  28
## initial  value 530.885213
## iter  10 value 290.215349
## iter  20 value 228.305019
## iter  30 value 219.336143
## iter  40 value 213.635444
## iter  50 value 210.229030
## iter  60 value 208.511322
## iter  70 value 208.227024
## iter  80 value 207.873992
## iter  90 value 206.477316
## iter 100 value 205.075568
## final  value 205.075568
## stopped after 100 iterations
## # weights:  46
## initial  value 654.909665
## iter  10 value 288.623781
## iter  20 value 252.200716
## iter  30 value 225.954722
## iter  40 value 213.069145
## iter  50 value 204.768613
```

```
## iter  60 value 198.843419
## iter  70 value 191.088326
## iter  80 value 188.405319
## iter  90 value 187.861721
## iter 100 value 187.720790
## final  value 187.720790
## stopped after 100 iterations
## # weights:  10
## initial  value 530.919665
## iter  10 value 351.444437
## iter  20 value 296.224011
## iter  30 value 286.358579
## iter  40 value 285.760640
## iter  40 value 285.760640
## iter  40 value 285.760640
## final  value 285.760640
## converged
## # weights:  28
## initial  value 606.977755
## iter  10 value 304.163437
## iter  20 value 288.907492
## iter  30 value 265.806846
## iter  40 value 258.454111
## iter  50 value 256.263860
## iter  60 value 248.300885
## iter  70 value 245.673693
## iter  80 value 244.904828
## iter  90 value 243.018650
## iter 100 value 242.792575
## final  value 242.792575
## stopped after 100 iterations
## # weights:  46
## initial  value 499.945752
## iter  10 value 299.075376
## iter  20 value 258.571912
## iter  30 value 242.313751
## iter  40 value 230.890698
## iter  50 value 227.383951
## iter  60 value 225.525247
## iter  70 value 223.888977
## iter  80 value 223.078438
## iter  90 value 222.691084
## iter 100 value 222.532695
## final  value 222.532695
## stopped after 100 iterations
## # weights:  10
## initial  value 513.451149
## iter  10 value 283.406966
## iter  20 value 277.329630
## iter  30 value 276.290599
## iter  40 value 275.589319
## iter  50 value 275.386261
## iter  60 value 275.298312
## iter  70 value 275.228700
```

```
## iter  80 value 275.216149
## iter  90 value 275.193690
## iter 100 value 275.193255
## final  value 275.193255
## stopped after 100 iterations
## # weights:  28
## initial  value 506.455127
## iter  10 value 290.632844
## iter  20 value 255.967918
## iter  30 value 244.587143
## iter  40 value 231.672739
## iter  50 value 230.559465
## iter  60 value 229.706094
## iter  70 value 229.258528
## iter  80 value 228.682704
## iter  90 value 228.324516
## iter 100 value 227.917867
## final  value 227.917867
## stopped after 100 iterations
## # weights:  46
## initial  value 645.969318
## iter  10 value 259.060204
## iter  20 value 231.141889
## iter  30 value 207.739728
## iter  40 value 180.766690
## iter  50 value 170.467706
## iter  60 value 162.027100
## iter  70 value 155.863736
## iter  80 value 155.029243
## iter  90 value 154.194141
## iter 100 value 153.966363
## final  value 153.966363
## stopped after 100 iterations
## # weights:  10
## initial  value 514.774070
## iter  10 value 340.614832
## iter  20 value 315.695971
## iter  30 value 301.774413
## iter  40 value 300.613998
## iter  50 value 297.517125
## iter  60 value 297.480538
## iter  70 value 297.475212
## final  value 297.475207
## converged
## # weights:  28
## initial  value 514.747802
## iter  10 value 360.275978
## iter  20 value 268.595204
## iter  30 value 233.561439
## iter  40 value 227.148771
## iter  50 value 224.335483
## iter  60 value 222.397756
## iter  70 value 221.995091
## iter  80 value 221.037990
```

```
## iter  90 value 216.965398
## iter 100 value 214.444859
## final  value 214.444859
## stopped after 100 iterations
## # weights:  46
## initial  value 528.886197
## iter  10 value 262.889882
## iter  20 value 212.677070
## iter  30 value 191.682085
## iter  40 value 180.099528
## iter  50 value 163.922113
## iter  60 value 157.434522
## iter  70 value 156.009156
## iter  80 value 155.615279
## iter  90 value 154.396526
## iter 100 value 154.361111
## final  value 154.361111
## stopped after 100 iterations
## # weights:  10
## initial  value 519.410896
## iter  10 value 338.232900
## iter  20 value 301.730803
## iter  30 value 290.503523
## iter  40 value 289.144942
## iter  50 value 289.143929
## iter  50 value 289.143928
## iter  50 value 289.143928
## final  value 289.143928
## converged
## # weights:  28
## initial  value 528.811892
## iter  10 value 296.994130
## iter  20 value 262.752355
## iter  30 value 255.756746
## iter  40 value 251.410079
## iter  50 value 248.279565
## iter  60 value 242.046903
## iter  70 value 239.616689
## iter  80 value 239.181445
## final  value 239.164857
## converged
## # weights:  46
## initial  value 546.438166
## iter  10 value 281.070820
## iter  20 value 255.088233
## iter  30 value 240.653171
## iter  40 value 229.903446
## iter  50 value 226.679656
## iter  60 value 225.844262
## iter  70 value 225.201513
## iter  80 value 224.307875
## iter  90 value 224.289933
## iter 100 value 224.289844
## final  value 224.289844
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 520.785710
## iter  10 value 317.657174
## iter  20 value 281.954611
## iter  30 value 279.832330
## iter  40 value 278.768487
## iter  50 value 278.597929
## iter  60 value 278.293554
## iter  70 value 278.216421
## iter  80 value 278.170590
## iter  90 value 278.132850
## iter 100 value 278.121578
## final  value 278.121578
## stopped after 100 iterations
## # weights:  28
## initial  value 534.658233
## iter  10 value 275.010652
## iter  20 value 239.209487
## iter  30 value 223.058035
## iter  40 value 215.467451
## iter  50 value 212.945624
## iter  60 value 212.786376
## iter  70 value 212.683532
## iter  80 value 212.355773
## iter  90 value 211.904196
## iter 100 value 211.336092
## final  value 211.336092
## stopped after 100 iterations
## # weights:  46
## initial  value 515.783044
## iter  10 value 284.619786
## iter  20 value 236.116136
## iter  30 value 216.363698
## iter  40 value 200.624182
## iter  50 value 187.895801
## iter  60 value 182.759024
## iter  70 value 181.308780
## iter  80 value 179.780691
## iter  90 value 179.065365
## iter 100 value 179.015314
## final  value 179.015314
## stopped after 100 iterations
## # weights:  10
## initial  value 534.552443
## iter  10 value 359.928241
## iter  20 value 295.919222
## iter  30 value 292.445843
## iter  40 value 291.712674
## final  value 291.711647
## converged
## # weights:  28
## initial  value 508.905913
## iter  10 value 311.749437
```

```
## iter  20 value 272.358993
## iter  30 value 263.577492
## iter  40 value 255.434670
## iter  50 value 251.259206
## iter  60 value 250.561285
## iter  70 value 250.493507
## iter  80 value 250.189477
## iter  90 value 249.789928
## iter 100 value 249.279196
## final  value 249.279196
## stopped after 100 iterations
## # weights:  46
## initial  value 495.938477
## iter  10 value 271.614247
## iter  20 value 230.045716
## iter  30 value 215.097084
## iter  40 value 207.584901
## iter  50 value 204.568592
## iter  60 value 192.723010
## iter  70 value 169.712991
## iter  80 value 160.512484
## iter  90 value 159.852807
## iter 100 value 159.296284
## final  value 159.296284
## stopped after 100 iterations
## # weights:  10
## initial  value 550.639062
## iter  10 value 325.468176
## iter  20 value 295.084581
## iter  30 value 288.312083
## iter  40 value 288.092773
## iter  40 value 288.092773
## iter  40 value 288.092773
## final  value 288.092773
## converged
## # weights:  28
## initial  value 530.587476
## iter  10 value 290.670726
## iter  20 value 254.341746
## iter  30 value 247.885208
## iter  40 value 242.258610
## iter  50 value 240.467765
## iter  60 value 240.295237
## iter  70 value 240.278553
## iter  80 value 240.276847
## final  value 240.276787
## converged
## # weights:  46
## initial  value 533.241073
## iter  10 value 277.696874
## iter  20 value 247.680535
## iter  30 value 234.827578
## iter  40 value 229.765073
## iter  50 value 228.535912
```

```
## iter  60 value 228.345650
## iter  70 value 228.273523
## iter  80 value 228.239169
## iter  90 value 228.217595
## iter 100 value 228.214632
## final  value 228.214632
## stopped after 100 iterations
## # weights:  10
## initial  value 525.940214
## iter  10 value 317.440826
## iter  20 value 311.365672
## iter  30 value 295.585156
## iter  40 value 281.134672
## iter  50 value 280.049992
## iter  60 value 278.647975
## iter  70 value 278.305681
## iter  80 value 278.153957
## iter  90 value 278.092449
## iter 100 value 278.076258
## final  value 278.076258
## stopped after 100 iterations
## # weights:  28
## initial  value 573.321364
## iter  10 value 314.553155
## iter  20 value 271.208172
## iter  30 value 233.522205
## iter  40 value 229.025913
## iter  50 value 227.204506
## iter  60 value 223.580286
## iter  70 value 223.104160
## iter  80 value 222.523849
## iter  90 value 220.879560
## iter 100 value 219.954174
## final  value 219.954174
## stopped after 100 iterations
## # weights:  46
## initial  value 645.973467
## iter  10 value 272.611322
## iter  20 value 226.905878
## iter  30 value 208.428992
## iter  40 value 179.121030
## iter  50 value 170.757057
## iter  60 value 166.069094
## iter  70 value 163.804157
## iter  80 value 163.081426
## iter  90 value 162.361524
## iter 100 value 162.239499
## final  value 162.239499
## stopped after 100 iterations
## # weights:  10
## initial  value 536.630567
## iter  10 value 285.232550
## iter  20 value 277.728497
## iter  30 value 276.278875
```

```
## iter  40 value 275.256517
## iter  50 value 275.158761
## iter  60 value 275.026357
## iter  70 value 274.977068
## iter  80 value 274.945016
## iter  90 value 274.915003
## iter 100 value 274.908708
## final  value 274.908708
## stopped after 100 iterations
## # weights:  28
## initial  value 619.609168
## iter  10 value 310.509202
## iter  20 value 249.294275
## iter  30 value 234.219192
## iter  40 value 225.304108
## iter  50 value 219.490112
## iter  60 value 217.472629
## iter  70 value 217.450225
## iter  80 value 217.443535
## final  value 217.441769
## converged
## # weights:  46
## initial  value 514.352531
## iter  10 value 263.462040
## iter  20 value 227.722123
## iter  30 value 211.523443
## iter  40 value 198.983496
## iter  50 value 184.846455
## iter  60 value 176.212684
## iter  70 value 169.073298
## iter  80 value 166.851196
## iter  90 value 165.743727
## iter 100 value 165.563687
## final  value 165.563687
## stopped after 100 iterations
## # weights:  10
## initial  value 567.917505
## iter  10 value 304.057530
## iter  20 value 285.948828
## iter  30 value 284.677892
## final  value 284.538845
## converged
## # weights:  28
## initial  value 536.821300
## iter  10 value 290.188843
## iter  20 value 251.465348
## iter  30 value 247.711531
## iter  40 value 245.436009
## iter  50 value 245.300615
## iter  60 value 245.292011
## iter  70 value 245.291806
## final  value 245.291791
## converged
## # weights:  46
```

```
## initial  value 575.509752
## iter  10 value 327.076024
## iter  20 value 266.331556
## iter  30 value 235.117351
## iter  40 value 228.633161
## iter  50 value 227.661966
## iter  60 value 227.133253
## iter  70 value 226.438160
## iter  80 value 225.761097
## iter  90 value 224.943860
## iter 100 value 224.857342
## final  value 224.857342
## stopped after 100 iterations
## # weights:  10
## initial  value 530.478660
## iter  10 value 314.524427
## iter  20 value 288.469740
## iter  30 value 278.122030
## iter  40 value 275.703516
## iter  50 value 275.401730
## iter  60 value 275.159058
## iter  70 value 275.089275
## iter  80 value 275.060626
## iter  90 value 275.024802
## iter 100 value 275.019292
## final  value 275.019292
## stopped after 100 iterations
## # weights:  28
## initial  value 521.891682
## iter  10 value 279.982706
## iter  20 value 227.542094
## iter  30 value 216.014076
## iter  40 value 210.287465
## iter  50 value 205.092153
## iter  60 value 203.550042
## iter  70 value 203.365114
## iter  80 value 202.957153
## iter  90 value 202.541908
## iter 100 value 202.405578
## final  value 202.405578
## stopped after 100 iterations
## # weights:  46
## initial  value 555.682053
## iter  10 value 265.273455
## iter  20 value 215.371580
## iter  30 value 190.903358
## iter  40 value 171.413607
## iter  50 value 160.602532
## iter  60 value 159.726770
## iter  70 value 158.564498
## iter  80 value 158.393648
## iter  90 value 158.328225
## iter 100 value 158.299836
## final  value 158.299836
```

```
## stopped after 100 iterations
## # weights:  10
## initial  value 528.791279
## iter  10 value 334.609225
## iter  20 value 294.014568
## iter  30 value 287.996114
## iter  40 value 287.498035
## iter  50 value 282.424295
## iter  60 value 280.237903
## iter  70 value 279.515911
## iter  80 value 279.352070
## iter  90 value 279.315685
## iter 100 value 279.269064
## final  value 279.269064
## stopped after 100 iterations
## # weights:  28
## initial  value 690.812116
## iter  10 value 342.829762
## iter  20 value 263.203846
## iter  30 value 246.807455
## iter  40 value 234.310330
## iter  50 value 222.466358
## iter  60 value 215.669726
## iter  70 value 214.484743
## iter  80 value 214.471475
## final  value 214.471447
## converged
## # weights:  46
## initial  value 691.316027
## iter  10 value 279.688523
## iter  20 value 236.358767
## iter  30 value 203.286004
## iter  40 value 182.172424
## iter  50 value 172.717993
## iter  60 value 169.690874
## iter  70 value 167.247904
## iter  80 value 166.715500
## iter  90 value 166.641520
## iter 100 value 166.636234
## final  value 166.636234
## stopped after 100 iterations
## # weights:  10
## initial  value 524.248427
## iter  10 value 306.320843
## iter  20 value 291.908524
## iter  30 value 288.817499
## final  value 288.766819
## converged
## # weights:  28
## initial  value 535.840577
## iter  10 value 323.938478
## iter  20 value 269.749759
## iter  30 value 258.395051
## iter  40 value 254.665855
```

```
## iter  50 value 253.357997
## iter  60 value 253.226239
## iter  70 value 253.225882
## final  value 253.225839
## converged
## # weights:  46
## initial  value 554.751792
## iter  10 value 309.106201
## iter  20 value 267.109139
## iter  30 value 253.966129
## iter  40 value 249.294333
## iter  50 value 246.447838
## iter  60 value 241.954965
## iter  70 value 229.419894
## iter  80 value 226.873240
## iter  90 value 226.257797
## iter 100 value 225.559519
## final  value 225.559519
## stopped after 100 iterations
## # weights:  10
## initial  value 512.394385
## iter  10 value 315.679251
## iter  20 value 286.805913
## iter  30 value 282.419727
## iter  40 value 279.673595
## iter  50 value 279.562200
## iter  60 value 279.386617
## iter  70 value 279.331652
## iter  80 value 279.312243
## final  value 279.307371
## converged
## # weights:  28
## initial  value 543.182351
## iter  10 value 323.927196
## iter  20 value 242.475744
## iter  30 value 231.872503
## iter  40 value 226.666243
## iter  50 value 224.034333
## iter  60 value 223.077349
## iter  70 value 222.798615
## iter  80 value 222.227926
## iter  90 value 220.878740
## iter 100 value 219.841342
## final  value 219.841342
## stopped after 100 iterations
## # weights:  46
## initial  value 540.801692
## iter  10 value 313.637209
## iter  20 value 222.453195
## iter  30 value 206.654874
## iter  40 value 199.133497
## iter  50 value 197.438878
## iter  60 value 197.221453
## iter  70 value 197.090207
```

```
## iter  80 value 196.943800
## iter  90 value 196.565074
## iter 100 value 196.433054
## final  value 196.433054
## stopped after 100 iterations
## # weights:  10
## initial  value 521.915810
## iter  10 value 303.209495
## iter  20 value 280.238174
## iter  30 value 278.367558
## iter  40 value 277.599054
## iter  50 value 277.532151
## iter  60 value 277.475419
## iter  70 value 277.459263
## iter  80 value 277.447726
## iter  90 value 277.424362
## iter 100 value 277.422113
## final  value 277.422113
## stopped after 100 iterations
## # weights:  28
## initial  value 556.058354
## iter  10 value 303.623388
## iter  20 value 247.901598
## iter  30 value 235.622687
## iter  40 value 229.863452
## iter  50 value 226.149782
## iter  60 value 223.256442
## iter  70 value 222.886485
## iter  80 value 222.528537
## iter  90 value 222.303496
## iter 100 value 222.059100
## final  value 222.059100
## stopped after 100 iterations
## # weights:  46
## initial  value 504.408809
## iter  10 value 314.088586
## iter  20 value 258.148345
## iter  30 value 235.002623
## iter  40 value 220.713606
## iter  50 value 211.884870
## iter  60 value 209.323331
## iter  70 value 202.657453
## iter  80 value 198.025243
## iter  90 value 190.124234
## iter 100 value 186.103315
## final  value 186.103315
## stopped after 100 iterations
## # weights:  10
## initial  value 504.068504
## iter  10 value 338.365360
## iter  20 value 301.076320
## iter  30 value 287.475941
## iter  40 value 287.120893
## final  value 287.120564
```

```
## converged
## # weights:  28
## initial  value 555.370059
## iter  10 value 320.025881
## iter  20 value 268.886136
## iter  30 value 261.817121
## iter  40 value 256.721431
## iter  50 value 256.485058
## iter  60 value 256.346122
## iter  70 value 256.317936
## iter  80 value 256.223480
## iter  90 value 254.624628
## iter 100 value 254.166378
## final  value 254.166378
## stopped after 100 iterations
## # weights:  46
## initial  value 499.845773
## iter  10 value 348.228373
## iter  20 value 275.134766
## iter  30 value 252.496294
## iter  40 value 245.940887
## iter  50 value 242.806504
## iter  60 value 241.108500
## iter  70 value 239.109532
## iter  80 value 238.047265
## iter  90 value 236.485567
## iter 100 value 235.519803
## final  value 235.519803
## stopped after 100 iterations
## # weights:  10
## initial  value 530.363781
## iter  10 value 327.484604
## iter  20 value 285.764194
## iter  30 value 280.747968
## iter  40 value 278.383856
## iter  50 value 277.695084
## iter  60 value 277.651603
## iter  70 value 277.535054
## iter  80 value 277.530370
## iter  90 value 277.511082
## iter 100 value 277.510593
## final  value 277.510593
## stopped after 100 iterations
## # weights:  28
## initial  value 517.845206
## iter  10 value 299.802851
## iter  20 value 267.188215
## iter  30 value 250.098992
## iter  40 value 246.491366
## iter  50 value 244.522100
## iter  60 value 242.613602
## iter  70 value 236.013767
## iter  80 value 233.922712
## iter  90 value 233.000440
```

```
## iter 100 value 230.394483
## final  value 230.394483
## stopped after 100 iterations
## # weights:  46
## initial  value 552.948847
## iter  10 value 279.152552
## iter  20 value 220.582024
## iter  30 value 200.395535
## iter  40 value 182.520929
## iter  50 value 178.474424
## iter  60 value 176.705955
## iter  70 value 174.655975
## iter  80 value 171.238109
## iter  90 value 167.199766
## iter 100 value 166.121213
## final  value 166.121213
## stopped after 100 iterations
## # weights:  10
## initial  value 511.055909
## iter  10 value 297.423089
## iter  20 value 288.215179
## iter  30 value 287.235950
## iter  40 value 286.929715
## iter  50 value 286.714364
## iter  60 value 286.675188
## iter  70 value 286.604390
## iter  80 value 286.595733
## iter  90 value 286.552999
## iter 100 value 286.549286
## final  value 286.549286
## stopped after 100 iterations
## # weights:  28
## initial  value 528.735665
## iter  10 value 324.912991
## iter  20 value 260.673792
## iter  30 value 247.709700
## iter  40 value 242.338593
## iter  50 value 237.931082
## iter  60 value 234.725611
## iter  70 value 234.453364
## iter  80 value 234.063633
## iter  90 value 233.682659
## iter 100 value 233.477352
## final  value 233.477352
## stopped after 100 iterations
## # weights:  46
## initial  value 534.593166
## iter  10 value 290.465977
## iter  20 value 235.655960
## iter  30 value 199.431925
## iter  40 value 190.462230
## iter  50 value 186.214014
## iter  60 value 183.328433
## iter  70 value 181.275036
```

```
## iter  80 value 178.786055
## iter  90 value 177.675759
## iter 100 value 176.757219
## final  value 176.757219
## stopped after 100 iterations
## # weights:  10
## initial  value 509.901608
## iter  10 value 360.317586
## iter  20 value 307.060867
## iter  30 value 297.263741
## iter  40 value 295.532059
## final  value 295.531096
## converged
## # weights:  28
## initial  value 538.328420
## iter  10 value 335.755482
## iter  20 value 271.231792
## iter  30 value 259.454522
## iter  40 value 255.294553
## iter  50 value 246.814362
## iter  60 value 246.136754
## iter  70 value 246.135108
## final  value 246.134738
## converged
## # weights:  46
## initial  value 522.192410
## iter  10 value 328.280277
## iter  20 value 281.021214
## iter  30 value 255.472362
## iter  40 value 249.642728
## iter  50 value 248.247614
## iter  60 value 247.665759
## iter  70 value 244.664762
## iter  80 value 243.255830
## iter  90 value 240.730476
## iter 100 value 238.556563
## final  value 238.556563
## stopped after 100 iterations
## # weights:  10
## initial  value 574.583988
## iter  10 value 334.028998
## iter  20 value 301.551985
## iter  30 value 290.070133
## iter  40 value 287.552081
## iter  50 value 287.234737
## iter  60 value 286.891897
## iter  70 value 286.808402
## iter  80 value 286.746196
## iter  90 value 286.704510
## iter 100 value 286.692057
## final  value 286.692057
## stopped after 100 iterations
## # weights:  28
## initial  value 554.822563
```

```
## iter  10 value 288.738364
## iter  20 value 259.561516
## iter  30 value 250.741970
## iter  40 value 245.297900
## iter  50 value 242.313186
## iter  60 value 240.420772
## iter  70 value 236.487367
## iter  80 value 235.092143
## iter  90 value 235.024385
## iter 100 value 235.006136
## final  value 235.006136
## stopped after 100 iterations
## # weights:  46
## initial  value 497.052158
## iter  10 value 279.079150
## iter  20 value 240.750081
## iter  30 value 213.874843
## iter  40 value 201.344310
## iter  50 value 193.812328
## iter  60 value 191.066415
## iter  70 value 189.668922
## iter  80 value 188.723574
## iter  90 value 187.192520
## iter 100 value 186.804007
## final  value 186.804007
## stopped after 100 iterations
## # weights:  10
## initial  value 511.194331
## iter  10 value 299.348204
## iter  20 value 285.494181
## iter  30 value 285.255001
## iter  40 value 282.275464
## iter  50 value 279.685586
## iter  60 value 271.306540
## iter  70 value 271.049570
## iter  80 value 271.032859
## iter  90 value 271.026012
## iter 100 value 271.002306
## final  value 271.002306
## stopped after 100 iterations
## # weights:  28
## initial  value 522.088363
## iter  10 value 285.717344
## iter  20 value 244.390380
## iter  30 value 229.525946
## iter  40 value 227.812860
## iter  50 value 225.150552
## iter  60 value 220.817775
## iter  70 value 216.850159
## iter  80 value 211.806290
## iter  90 value 206.737122
## iter 100 value 206.535450
## final  value 206.535450
## stopped after 100 iterations
```

```
## # weights:  46
## initial  value 556.301078
## iter  10 value 278.381912
## iter  20 value 222.024037
## iter  30 value 203.232936
## iter  40 value 190.316769
## iter  50 value 180.078590
## iter  60 value 174.311745
## iter  70 value 167.760305
## iter  80 value 162.984110
## iter  90 value 160.439859
## iter 100 value 159.982639
## final  value 159.982639
## stopped after 100 iterations
## # weights:  10
## initial  value 526.854725
## iter  10 value 373.573611
## iter  20 value 293.752054
## iter  30 value 286.300489
## iter  40 value 285.659594
## iter  40 value 285.659592
## iter  40 value 285.659592
## final  value 285.659592
## converged
## # weights:  28
## initial  value 499.639439
## iter  10 value 291.190725
## iter  20 value 251.644378
## iter  30 value 245.151949
## iter  40 value 244.327035
## iter  50 value 244.088638
## final  value 244.080614
## converged
## # weights:  46
## initial  value 581.442555
## iter  10 value 303.089042
## iter  20 value 256.335681
## iter  30 value 245.579611
## iter  40 value 241.582444
## iter  50 value 239.192518
## iter  60 value 237.006983
## iter  70 value 233.922792
## iter  80 value 232.750072
## iter  90 value 232.144620
## iter 100 value 232.058126
## final  value 232.058126
## stopped after 100 iterations
## # weights:  10
## initial  value 533.312609
## iter  10 value 296.074350
## iter  20 value 288.942327
## iter  30 value 288.491153
## iter  40 value 280.900233
## iter  50 value 280.827932
```

```
## iter  60 value 280.815381
## final  value 280.815342
## converged
## # weights:  28
## initial  value 492.982031
## iter  10 value 270.964095
## iter  20 value 240.098333
## iter  30 value 233.605745
## iter  40 value 222.902927
## iter  50 value 216.902564
## iter  60 value 214.495782
## iter  70 value 214.198831
## iter  80 value 213.257967
## iter  90 value 211.161133
## iter 100 value 210.601320
## final  value 210.601320
## stopped after 100 iterations
## # weights:  46
## initial  value 545.428803
## iter  10 value 266.245084
## iter  20 value 224.250232
## iter  30 value 204.331266
## iter  40 value 194.173034
## iter  50 value 186.811434
## iter  60 value 185.419050
## iter  70 value 185.247120
## iter  80 value 185.087408
## iter  90 value 185.034344
## iter 100 value 184.905561
## final  value 184.905561
## stopped after 100 iterations
## # weights:  10
## initial  value 523.466417
## iter  10 value 355.207639
## iter  20 value 302.535216
## iter  30 value 279.282554
## iter  40 value 278.870913
## iter  50 value 274.714743
## iter  60 value 270.645170
## iter  70 value 270.243200
## iter  80 value 269.809062
## iter  90 value 269.789587
## iter 100 value 269.671839
## final  value 269.671839
## stopped after 100 iterations
## # weights:  28
## initial  value 544.573567
## iter  10 value 265.832358
## iter  20 value 230.569307
## iter  30 value 223.528831
## iter  40 value 219.046308
## iter  50 value 208.488162
## iter  60 value 203.003802
## iter  70 value 201.332245
```

```
## iter  80 value 200.519503
## iter  90 value 199.346325
## iter 100 value 199.125048
## final  value 199.125048
## stopped after 100 iterations
## # weights:  46
## initial  value 538.744110
## iter  10 value 298.218975
## iter  20 value 242.801558
## iter  30 value 222.559774
## iter  40 value 216.017704
## iter  50 value 209.545658
## iter  60 value 206.900239
## iter  70 value 206.601868
## iter  80 value 206.412111
## iter  90 value 205.998437
## iter 100 value 205.458293
## final  value 205.458293
## stopped after 100 iterations
## # weights:  10
## initial  value 521.248221
## iter  10 value 332.086607
## iter  20 value 289.625933
## iter  30 value 281.033103
## iter  40 value 280.146197
## final  value 280.146102
## converged
## # weights:  28
## initial  value 544.916531
## iter  10 value 331.589414
## iter  20 value 269.982734
## iter  30 value 255.692620
## iter  40 value 247.435411
## iter  50 value 245.738743
## iter  60 value 245.028348
## iter  70 value 244.705052
## iter  80 value 244.684876
## final  value 244.684745
## converged
## # weights:  46
## initial  value 520.823192
## iter  10 value 281.796194
## iter  20 value 254.804120
## iter  30 value 241.025761
## iter  40 value 234.615593
## iter  50 value 229.291338
## iter  60 value 226.284313
## iter  70 value 223.651960
## iter  80 value 223.290530
## iter  90 value 221.321423
## iter 100 value 218.556245
## final  value 218.556245
## stopped after 100 iterations
## # weights:  10
```

```
## initial  value 514.119703
## iter  10 value 372.899614
## iter  20 value 305.390526
## iter  30 value 280.749614
## iter  40 value 275.988802
## iter  50 value 272.105993
## iter  60 value 270.339176
## iter  70 value 270.067491
## iter  80 value 269.825238
## iter  90 value 269.779859
## iter 100 value 269.748883
## final  value 269.748883
## stopped after 100 iterations
## # weights:  28
## initial  value 539.912112
## iter  10 value 269.275029
## iter  20 value 240.173475
## iter  30 value 226.840611
## iter  40 value 222.564038
## iter  50 value 222.339335
## iter  60 value 222.106451
## iter  70 value 221.924980
## iter  80 value 221.523015
## iter  90 value 219.768713
## iter 100 value 218.181615
## final  value 218.181615
## stopped after 100 iterations
## # weights:  46
## initial  value 688.400386
## iter  10 value 270.870078
## iter  20 value 225.368588
## iter  30 value 210.692104
## iter  40 value 197.519372
## iter  50 value 193.012449
## iter  60 value 191.119481
## iter  70 value 189.554830
## iter  80 value 188.510781
## iter  90 value 187.058533
## iter 100 value 186.925965
## final  value 186.925965
## stopped after 100 iterations
## # weights:  10
## initial  value 520.871797
## iter  10 value 317.665280
## iter  20 value 297.413907
## iter  30 value 286.859495
## iter  40 value 281.631471
## iter  50 value 281.185786
## iter  60 value 280.923023
## iter  70 value 280.668793
## iter  80 value 280.590639
## iter  90 value 280.460454
## iter 100 value 280.453951
## final  value 280.453951
```

```
## stopped after 100 iterations
## # weights:  28
## initial  value 511.720484
## iter  10 value 311.163308
## iter  20 value 261.451839
## iter  30 value 228.847985
## iter  40 value 223.296471
## iter  50 value 217.437357
## iter  60 value 216.030735
## iter  70 value 215.042864
## iter  80 value 214.939500
## iter  90 value 214.680738
## iter 100 value 214.551081
## final  value 214.551081
## stopped after 100 iterations
## # weights:  46
## initial  value 488.349923
## iter  10 value 276.940377
## iter  20 value 234.087737
## iter  30 value 207.045121
## iter  40 value 195.915386
## iter  50 value 187.728960
## iter  60 value 184.732988
## iter  70 value 182.638798
## iter  80 value 179.768869
## iter  90 value 178.421416
## iter 100 value 177.659825
## final  value 177.659825
## stopped after 100 iterations
## # weights:  10
## initial  value 519.424909
## iter  10 value 331.335597
## iter  20 value 298.835313
## iter  30 value 293.122156
## iter  40 value 292.123314
## final  value 292.123303
## converged
## # weights:  28
## initial  value 553.790388
## iter  10 value 319.478535
## iter  20 value 275.567000
## iter  30 value 257.413167
## iter  40 value 251.430078
## iter  50 value 250.581301
## iter  60 value 250.367335
## iter  70 value 250.367123
## final  value 250.367036
## converged
## # weights:  46
## initial  value 528.421896
## iter  10 value 382.271254
## iter  20 value 295.691799
## iter  30 value 262.439551
## iter  40 value 248.019692
```

```
## iter  50 value 238.699268
## iter  60 value 233.661078
## iter  70 value 232.488786
## iter  80 value 231.926494
## iter  90 value 231.404918
## iter 100 value 231.041024
## final  value 231.041024
## stopped after 100 iterations
## # weights:  10
## initial  value 518.435195
## iter  10 value 319.397620
## iter  20 value 289.941678
## iter  30 value 283.173781
## iter  40 value 281.274613
## iter  50 value 280.890877
## iter  60 value 280.609919
## iter  70 value 280.556060
## iter  80 value 280.503864
## iter  90 value 280.471898
## iter 100 value 280.468154
## final  value 280.468154
## stopped after 100 iterations
## # weights:  28
## initial  value 529.917309
## iter  10 value 294.109527
## iter  20 value 260.036401
## iter  30 value 228.783562
## iter  40 value 206.338319
## iter  50 value 200.248295
## iter  60 value 196.152816
## iter  70 value 195.568506
## iter  80 value 195.310218
## iter  90 value 194.088579
## iter 100 value 193.559442
## final  value 193.559442
## stopped after 100 iterations
## # weights:  46
## initial  value 537.192637
## iter  10 value 272.273471
## iter  20 value 231.581892
## iter  30 value 201.948366
## iter  40 value 182.286078
## iter  50 value 173.455937
## iter  60 value 170.390030
## iter  70 value 169.572526
## iter  80 value 168.837779
## iter  90 value 168.557384
## iter 100 value 168.379531
## final  value 168.379531
## stopped after 100 iterations
## # weights:  10
## initial  value 568.588627
## iter  10 value 420.898809
## iter  20 value 325.886848
```

```
## iter  30 value 316.053037
## iter  40 value 315.382005
## final  value 315.381996
## converged
## # weights:  28
## initial  value 555.338735
## iter  10 value 306.094990
## iter  20 value 261.663063
## iter  30 value 241.882517
## iter  40 value 235.766881
## iter  50 value 233.394451
## iter  60 value 227.179066
## iter  70 value 224.876903
## iter  80 value 223.559315
## iter  90 value 223.294940
## iter 100 value 222.948096
## final  value 222.948096
## stopped after 100 iterations
## # weights:  46
## initial  value 528.262109
## iter  10 value 290.386830
## iter  20 value 240.580424
## iter  30 value 227.819022
## iter  40 value 213.613249
## iter  50 value 202.327737
## iter  60 value 196.756418
## iter  70 value 193.116938
## iter  80 value 192.736068
## iter  90 value 192.660568
## iter 100 value 192.653330
## final  value 192.653330
## stopped after 100 iterations
## # weights:  10
## initial  value 512.848785
## iter  10 value 355.152259
## iter  20 value 301.243032
## iter  30 value 295.563901
## final  value 295.154251
## converged
## # weights:  28
## initial  value 540.145796
## iter  10 value 333.332362
## iter  20 value 285.300039
## iter  30 value 262.723591
## iter  40 value 259.428605
## iter  50 value 259.234455
## iter  60 value 259.223718
## final  value 259.223573
## converged
## # weights:  46
## initial  value 547.226201
## iter  10 value 290.824791
## iter  20 value 260.758642
## iter  30 value 249.398013
```

```
## iter  40 value 242.039682
## iter  50 value 238.234569
## iter  60 value 236.678711
## iter  70 value 234.869041
## iter  80 value 233.648488
## iter  90 value 233.192082
## iter 100 value 232.879849
## final  value 232.879849
## stopped after 100 iterations
## # weights:  10
## initial  value 515.895763
## iter  10 value 335.451567
## iter  20 value 326.224902
## iter  30 value 323.600300
## iter  40 value 322.238409
## final  value 322.224830
## converged
## # weights:  28
## initial  value 537.333303
## iter  10 value 291.048369
## iter  20 value 246.076995
## iter  30 value 233.109839
## iter  40 value 226.338955
## iter  50 value 223.588924
## iter  60 value 222.544488
## iter  70 value 222.324556
## iter  80 value 222.289559
## iter  90 value 222.110469
## iter 100 value 222.099406
## final  value 222.099406
## stopped after 100 iterations
## # weights:  46
## initial  value 710.225641
## iter  10 value 286.620474
## iter  20 value 233.174512
## iter  30 value 216.779122
## iter  40 value 203.535588
## iter  50 value 199.115602
## iter  60 value 195.749426
## iter  70 value 194.306031
## iter  80 value 193.494895
## iter  90 value 193.452778
## iter 100 value 193.377748
## final  value 193.377748
## stopped after 100 iterations
## # weights:  10
## initial  value 522.632438
## iter  10 value 301.871737
## iter  20 value 282.915420
## iter  30 value 279.499153
## iter  40 value 274.951722
## iter  50 value 274.695723
## iter  60 value 274.598530
## iter  70 value 274.573201
```

```
## iter  80 value 274.551412
## iter  90 value 274.520065
## iter 100 value 274.514131
## final  value 274.514131
## stopped after 100 iterations
## # weights:  28
## initial  value 486.109736
## iter  10 value 284.576656
## iter  20 value 255.939204
## iter  30 value 247.685164
## iter  40 value 231.240469
## iter  50 value 222.445346
## iter  60 value 217.703434
## iter  70 value 214.042275
## iter  80 value 209.534838
## iter  90 value 208.110106
## iter 100 value 207.165286
## final  value 207.165286
## stopped after 100 iterations
## # weights:  46
## initial  value 545.197713
## iter  10 value 291.591385
## iter  20 value 238.055730
## iter  30 value 194.707965
## iter  40 value 183.119605
## iter  50 value 174.129454
## iter  60 value 166.298942
## iter  70 value 160.841463
## iter  80 value 156.740625
## iter  90 value 156.087055
## iter 100 value 155.956618
## final  value 155.956618
## stopped after 100 iterations
## # weights:  10
## initial  value 515.175918
## iter  10 value 296.425184
## iter  20 value 285.558699
## iter  30 value 285.246314
## final  value 285.183526
## converged
## # weights:  28
## initial  value 508.976808
## iter  10 value 330.408630
## iter  20 value 280.202298
## iter  30 value 264.960423
## iter  40 value 254.479276
## iter  50 value 250.545461
## iter  60 value 248.078567
## iter  70 value 247.409639
## iter  80 value 247.311239
## final  value 247.310687
## converged
## # weights:  46
## initial  value 505.966675
```

```
## iter  10 value 279.987771
## iter  20 value 242.056941
## iter  30 value 231.827312
## iter  40 value 228.794672
## iter  50 value 227.518735
## iter  60 value 227.125129
## iter  70 value 227.096269
## iter  80 value 227.092170
## final  value 227.092162
## converged
## # weights:  10
## initial  value 512.213837
## iter  10 value 323.639499
## iter  20 value 287.719202
## iter  30 value 279.910146
## iter  40 value 275.871113
## iter  50 value 275.438423
## iter  60 value 274.925875
## iter  70 value 274.786789
## iter  80 value 274.690002
## iter  90 value 274.665004
## iter 100 value 274.642928
## final  value 274.642928
## stopped after 100 iterations
## # weights:  28
## initial  value 589.348960
## iter  10 value 278.741765
## iter  20 value 252.008900
## iter  30 value 239.859235
## iter  40 value 234.193387
## iter  50 value 224.224994
## iter  60 value 223.223653
## iter  70 value 222.951992
## iter  80 value 222.624298
## iter  90 value 222.420173
## iter 100 value 222.195237
## final  value 222.195237
## stopped after 100 iterations
## # weights:  46
## initial  value 504.679821
## iter  10 value 274.268885
## iter  20 value 227.907735
## iter  30 value 206.400418
## iter  40 value 195.295373
## iter  50 value 186.170522
## iter  60 value 181.538579
## iter  70 value 181.305630
## iter  80 value 181.223875
## iter  90 value 181.018438
## iter 100 value 180.914365
## final  value 180.914365
## stopped after 100 iterations
## # weights:  10
## initial  value 503.249578
```

```
## iter  10 value 302.651458
## iter  20 value 284.396998
## iter  30 value 280.960413
## iter  40 value 279.553256
## iter  50 value 279.331622
## iter  60 value 279.124648
## iter  70 value 279.073477
## iter  80 value 279.002226
## iter  90 value 278.970397
## iter 100 value 278.955720
## final  value 278.955720
## stopped after 100 iterations
## # weights:  28
## initial  value 561.849449
## iter  10 value 292.877227
## iter  20 value 268.619552
## iter  30 value 259.718317
## iter  40 value 252.271189
## iter  50 value 245.828603
## iter  60 value 238.818607
## iter  70 value 234.468776
## iter  80 value 226.518277
## iter  90 value 223.344479
## iter 100 value 222.914926
## final  value 222.914926
## stopped after 100 iterations
## # weights:  46
## initial  value 604.970349
## iter  10 value 294.839269
## iter  20 value 235.525265
## iter  30 value 214.293005
## iter  40 value 193.145942
## iter  50 value 188.926515
## iter  60 value 182.646932
## iter  70 value 177.795513
## iter  80 value 172.817196
## iter  90 value 168.167926
## iter 100 value 164.056547
## final  value 164.056547
## stopped after 100 iterations
## # weights:  10
## initial  value 509.621495
## iter  10 value 367.932911
## iter  20 value 301.913122
## iter  30 value 289.721006
## final  value 289.420072
## converged
## # weights:  28
## initial  value 558.002839
## iter  10 value 339.500737
## iter  20 value 292.210798
## iter  30 value 269.898735
## iter  40 value 261.886051
## iter  50 value 257.809921
```

```
## iter  60 value 255.348194
## iter  70 value 250.815476
## iter  80 value 250.034325
## iter  90 value 249.973825
## iter  90 value 249.973824
## iter  90 value 249.973824
## final  value 249.973824
## converged
## # weights:  46
## initial  value 567.191699
## iter  10 value 307.390939
## iter  20 value 266.279625
## iter  30 value 252.675044
## iter  40 value 245.841204
## iter  50 value 240.237783
## iter  60 value 233.875694
## iter  70 value 231.115838
## iter  80 value 228.438305
## iter  90 value 227.419160
## iter 100 value 226.959113
## final  value 226.959113
## stopped after 100 iterations
## # weights:  10
## initial  value 542.200351
## iter  10 value 297.221067
## iter  20 value 287.225021
## iter  30 value 281.986016
## iter  40 value 279.807356
## iter  50 value 279.427883
## iter  60 value 279.203285
## iter  70 value 279.105035
## iter  80 value 279.082156
## iter  90 value 279.027955
## iter 100 value 279.023246
## final  value 279.023246
## stopped after 100 iterations
## # weights:  28
## initial  value 514.726310
## iter  10 value 301.210152
## iter  20 value 249.583369
## iter  30 value 227.394165
## iter  40 value 218.213485
## iter  50 value 211.327745
## iter  60 value 207.044891
## iter  70 value 205.350500
## iter  80 value 202.835293
## iter  90 value 201.662729
## iter 100 value 200.936198
## final  value 200.936198
## stopped after 100 iterations
## # weights:  46
## initial  value 503.972626
## iter  10 value 266.968746
## iter  20 value 240.370611
```

```
## iter  30 value 225.920010
## iter  40 value 217.967322
## iter  50 value 211.955604
## iter  60 value 208.359201
## iter  70 value 206.922094
## iter  80 value 206.511210
## iter  90 value 205.984819
## iter 100 value 205.740464
## final  value 205.740464
## stopped after 100 iterations
## # weights:  10
## initial  value 550.476424
## iter  10 value 326.722636
## iter  20 value 305.495276
## iter  30 value 300.085006
## iter  40 value 290.621825
## iter  50 value 275.895892
## iter  60 value 275.236418
## iter  70 value 275.195600
## iter  80 value 275.133686
## iter  90 value 275.113970
## iter 100 value 274.937593
## final  value 274.937593
## stopped after 100 iterations
## # weights:  28
## initial  value 531.227470
## iter  10 value 299.928238
## iter  20 value 264.395755
## iter  30 value 256.451516
## iter  40 value 245.850740
## iter  50 value 244.369571
## iter  60 value 242.603736
## iter  70 value 241.210502
## iter  80 value 240.595794
## iter  90 value 240.297363
## iter 100 value 239.268347
## final  value 239.268347
## stopped after 100 iterations
## # weights:  46
## initial  value 535.105108
## iter  10 value 266.624468
## iter  20 value 228.814725
## iter  30 value 207.876208
## iter  40 value 197.706690
## iter  50 value 186.901310
## iter  60 value 177.372456
## iter  70 value 173.702492
## iter  80 value 171.586738
## iter  90 value 166.427460
## iter 100 value 165.382880
## final  value 165.382880
## stopped after 100 iterations
## # weights:  10
## initial  value 568.217625
```

```
## iter  10 value 317.883022
## iter  20 value 288.559535
## iter  30 value 282.936143
## iter  40 value 282.932940
## final  value 282.932889
## converged
## # weights:  28
## initial  value 577.066825
## iter  10 value 293.479708
## iter  20 value 261.136733
## iter  30 value 255.060918
## iter  40 value 251.683902
## iter  50 value 249.961683
## iter  60 value 249.469140
## iter  70 value 247.769382
## iter  80 value 246.470354
## iter  90 value 246.456443
## final  value 246.456437
## converged
## # weights:  46
## initial  value 586.674000
## iter  10 value 308.076484
## iter  20 value 257.729980
## iter  30 value 244.405631
## iter  40 value 241.050381
## iter  50 value 238.123652
## iter  60 value 236.502948
## iter  70 value 236.169385
## iter  80 value 234.486580
## iter  90 value 234.202427
## iter 100 value 234.169568
## final  value 234.169568
## stopped after 100 iterations
## # weights:  10
## initial  value 542.497140
## iter  10 value 332.984301
## iter  20 value 285.616061
## iter  30 value 277.676890
## iter  40 value 273.047199
## iter  50 value 272.567616
## iter  60 value 272.504458
## iter  70 value 272.351750
## iter  80 value 272.301242
## iter  90 value 272.277196
## iter 100 value 272.274499
## final  value 272.274499
## stopped after 100 iterations
## # weights:  28
## initial  value 537.281066
## iter  10 value 281.964052
## iter  20 value 248.841403
## iter  30 value 231.033645
## iter  40 value 225.454608
## iter  50 value 219.796867
```

```
## iter  60 value 217.590970
## iter  70 value 216.112289
## iter  80 value 204.191096
## iter  90 value 195.702883
## iter 100 value 192.572967
## final  value 192.572967
## stopped after 100 iterations
## # weights:  46
## initial  value 641.821818
## iter  10 value 267.313121
## iter  20 value 219.282532
## iter  30 value 192.739577
## iter  40 value 182.490627
## iter  50 value 176.671520
## iter  60 value 171.736012
## iter  70 value 167.307671
## iter  80 value 165.263378
## iter  90 value 164.731410
## iter 100 value 164.232443
## final  value 164.232443
## stopped after 100 iterations
## # weights:  10
## initial  value 569.944521
## iter  10 value 312.029115
## iter  20 value 286.206090
## iter  30 value 281.195338
## iter  40 value 277.653116
## iter  50 value 277.180757
## iter  60 value 276.727007
## iter  70 value 276.664140
## iter  80 value 276.588035
## iter  90 value 276.549304
## iter 100 value 276.530352
## final  value 276.530352
## stopped after 100 iterations
## # weights:  28
## initial  value 514.581810
## iter  10 value 305.768843
## iter  20 value 248.068644
## iter  30 value 238.934987
## iter  40 value 227.559364
## iter  50 value 216.627232
## iter  60 value 213.843326
## iter  70 value 213.813350
## iter  80 value 213.629263
## iter  90 value 212.951175
## iter 100 value 212.919312
## final  value 212.919312
## stopped after 100 iterations
## # weights:  46
## initial  value 631.129454
## iter  10 value 281.220750
## iter  20 value 224.184821
## iter  30 value 194.244515
```

```
## iter  40 value 181.522492
## iter  50 value 178.693297
## iter  60 value 178.548087
## iter  70 value 178.538771
## iter  80 value 178.192109
## iter  90 value 178.129443
## final  value 178.129314
## converged
## # weights:  10
## initial  value 551.819624
## iter  10 value 352.813110
## iter  20 value 287.746220
## iter  30 value 285.906907
## final  value 285.741541
## converged
## # weights:  28
## initial  value 522.232620
## iter  10 value 320.681790
## iter  20 value 263.312884
## iter  30 value 257.681620
## iter  40 value 255.797301
## iter  50 value 251.431194
## iter  60 value 249.021910
## iter  70 value 248.856562
## iter  80 value 248.838835
## final  value 248.838806
## converged
## # weights:  46
## initial  value 496.461753
## iter  10 value 293.742992
## iter  20 value 255.931781
## iter  30 value 243.451656
## iter  40 value 233.628683
## iter  50 value 232.205821
## iter  60 value 231.801419
## iter  70 value 231.785382
## iter  80 value 231.782841
## iter  90 value 231.782619
## final  value 231.782572
## converged
## # weights:  10
## initial  value 513.461249
## iter  10 value 344.880823
## iter  20 value 301.473639
## iter  30 value 280.139739
## iter  40 value 277.609253
## iter  50 value 277.141536
## iter  60 value 276.782513
## iter  70 value 276.747225
## iter  80 value 276.650528
## iter  90 value 276.646094
## iter 100 value 276.616741
## final  value 276.616741
## stopped after 100 iterations
```

```
## # weights:  28
## initial  value 532.466376
## iter  10 value 312.740174
## iter  20 value 247.518598
## iter  30 value 224.781905
## iter  40 value 211.682249
## iter  50 value 206.897919
## iter  60 value 205.587990
## iter  70 value 205.334390
## iter  80 value 204.150383
## iter  90 value 201.694119
## iter 100 value 198.417944
## final  value 198.417944
## stopped after 100 iterations
## # weights:  46
## initial  value 529.805050
## iter  10 value 302.830622
## iter  20 value 241.032973
## iter  30 value 211.019328
## iter  40 value 193.957710
## iter  50 value 181.468465
## iter  60 value 175.949752
## iter  70 value 172.472077
## iter  80 value 168.357416
## iter  90 value 162.641740
## iter 100 value 161.752689
## final  value 161.752689
## stopped after 100 iterations
## # weights:  10
## initial  value 515.463250
## iter  10 value 326.330744
## iter  20 value 292.455236
## iter  30 value 290.489186
## iter  40 value 286.283162
## iter  50 value 285.252111
## iter  60 value 284.389253
## iter  70 value 284.212571
## iter  80 value 284.085743
## iter  90 value 284.052552
## iter 100 value 284.036717
## final  value 284.036717
## stopped after 100 iterations
## # weights:  28
## initial  value 512.679236
## iter  10 value 322.262030
## iter  20 value 276.420493
## iter  30 value 250.944268
## iter  40 value 241.805816
## iter  50 value 233.060802
## iter  60 value 226.869348
## iter  70 value 226.627481
## iter  80 value 226.601949
## iter  90 value 226.533870
## iter 100 value 226.405308
```

```
## final  value 226.405308
## stopped after 100 iterations
## # weights:  46
## initial  value 520.035121
## iter  10 value 278.258447
## iter  20 value 237.380199
## iter  30 value 211.426257
## iter  40 value 198.150259
## iter  50 value 192.254092
## iter  60 value 190.331713
## iter  70 value 189.171584
## iter  80 value 186.852889
## iter  90 value 183.685800
## iter 100 value 182.721313
## final  value 182.721313
## stopped after 100 iterations
## # weights:  10
## initial  value 507.486151
## iter  10 value 328.686070
## iter  20 value 293.776557
## iter  30 value 293.147050
## final  value 293.108515
## converged
## # weights:  28
## initial  value 561.431336
## iter  10 value 307.289081
## iter  20 value 270.730327
## iter  30 value 256.575618
## iter  40 value 252.464382
## iter  50 value 250.626497
## iter  60 value 250.265994
## iter  70 value 250.255924
## iter  80 value 250.255472
## iter  80 value 250.255472
## iter  80 value 250.255472
## final  value 250.255472
## converged
## # weights:  46
## initial  value 649.030518
## iter  10 value 309.275389
## iter  20 value 273.333173
## iter  30 value 263.643688
## iter  40 value 253.429167
## iter  50 value 247.665311
## iter  60 value 244.762635
## iter  70 value 237.078836
## iter  80 value 234.114179
## iter  90 value 232.609492
## iter 100 value 231.425543
## final  value 231.425543
## stopped after 100 iterations
## # weights:  10
## initial  value 520.595374
## iter  10 value 342.045057
```

```
## iter  20 value 293.858807
## iter  30 value 287.230298
## iter  40 value 284.569985
## iter  50 value 284.310037
## iter  60 value 284.151671
## iter  70 value 284.131876
## iter  80 value 284.103927
## iter  90 value 284.080291
## iter 100 value 284.074481
## final  value 284.074481
## stopped after 100 iterations
## # weights:  28
## initial  value 608.328158
## iter  10 value 287.910445
## iter  20 value 282.438807
## iter  30 value 253.492460
## iter  40 value 235.778533
## iter  50 value 225.491272
## iter  60 value 223.437420
## iter  70 value 221.900005
## iter  80 value 220.691920
## iter  90 value 220.359545
## iter 100 value 220.276237
## final  value 220.276237
## stopped after 100 iterations
## # weights:  46
## initial  value 509.750276
## iter  10 value 284.933166
## iter  20 value 231.275890
## iter  30 value 212.579957
## iter  40 value 204.120998
## iter  50 value 199.321726
## iter  60 value 194.802832
## iter  70 value 192.702044
## iter  80 value 189.755844
## iter  90 value 187.550080
## iter 100 value 187.287495
## final  value 187.287495
## stopped after 100 iterations
## # weights:  10
## initial  value 496.033742
## iter  10 value 330.750310
## iter  20 value 315.623498
## iter  30 value 315.511839
## iter  40 value 310.500769
## iter  50 value 310.162850
## final  value 310.129087
## converged
## # weights:  28
## initial  value 550.722587
## iter  10 value 280.464833
## iter  20 value 240.667125
## iter  30 value 221.657868
## iter  40 value 215.659088
```

```
## iter  50 value 212.549709
## iter  60 value 211.680608
## iter  70 value 211.645189
## iter  80 value 211.641524
## iter  90 value 211.640704
## final  value 211.640433
## converged
## # weights:  46
## initial  value 694.328552
## iter  10 value 271.162480
## iter  20 value 227.477768
## iter  30 value 203.419401
## iter  40 value 188.037199
## iter  50 value 175.346985
## iter  60 value 168.469768
## iter  70 value 166.714121
## iter  80 value 166.118214
## iter  90 value 166.057084
## iter 100 value 166.051248
## final  value 166.051248
## stopped after 100 iterations
## # weights:  10
## initial  value 518.408115
## iter  10 value 323.213298
## iter  20 value 289.303622
## iter  30 value 282.019630
## iter  40 value 281.937834
## final  value 281.937128
## converged
## # weights:  28
## initial  value 527.181156
## iter  10 value 312.367564
## iter  20 value 272.528197
## iter  30 value 242.581260
## iter  40 value 238.147724
## iter  50 value 236.858779
## iter  60 value 236.614532
## iter  70 value 236.517611
## iter  80 value 236.506938
## final  value 236.506933
## converged
## # weights:  46
## initial  value 536.563234
## iter  10 value 311.568036
## iter  20 value 255.206484
## iter  30 value 234.914836
## iter  40 value 232.817241
## iter  50 value 232.651466
## final  value 232.649299
## converged
## # weights:  10
## initial  value 509.240433
## iter  10 value 341.522152
## iter  20 value 296.232379
```

```
## iter  30 value 276.666315
## iter  40 value 274.083444
## iter  50 value 273.749412
## iter  60 value 273.550325
## iter  70 value 273.496742
## iter  80 value 273.482556
## final  value 273.477624
## converged
## # weights:  28
## initial  value 510.408818
## iter  10 value 285.969896
## iter  20 value 233.094755
## iter  30 value 208.592945
## iter  40 value 200.668594
## iter  50 value 198.079651
## iter  60 value 197.359386
## iter  70 value 196.928662
## iter  80 value 196.884860
## iter  90 value 196.843252
## iter 100 value 196.434133
## final  value 196.434133
## stopped after 100 iterations
## # weights:  46
## initial  value 594.567654
## iter  10 value 285.917099
## iter  20 value 233.540814
## iter  30 value 205.872355
## iter  40 value 190.308886
## iter  50 value 182.459117
## iter  60 value 176.671122
## iter  70 value 166.278082
## iter  80 value 163.410345
## iter  90 value 162.046387
## iter 100 value 161.689332
## final  value 161.689332
## stopped after 100 iterations
## # weights:  10
## initial  value 523.161389
## iter  10 value 326.393324
## iter  20 value 324.072439
## iter  30 value 322.254406
## iter  40 value 316.835738
## iter  50 value 316.226704
## iter  60 value 316.207596
## final  value 316.185716
## converged
## # weights:  28
## initial  value 514.905572
## iter  10 value 286.665602
## iter  20 value 254.172774
## iter  30 value 238.702617
## iter  40 value 235.117454
## iter  50 value 226.095522
## iter  60 value 214.654761
```

```
## iter  70 value 212.169046
## iter  80 value 210.466195
## iter  90 value 206.761983
## iter 100 value 206.134298
## final  value 206.134298
## stopped after 100 iterations
## # weights:  46
## initial  value 542.892796
## iter  10 value 268.414883
## iter  20 value 222.114664
## iter  30 value 212.113569
## iter  40 value 205.444761
## iter  50 value 198.048613
## iter  60 value 194.401154
## iter  70 value 193.437616
## iter  80 value 193.162050
## iter  90 value 193.121809
## iter 100 value 193.121066
## final  value 193.121066
## stopped after 100 iterations
## # weights:  10
## initial  value 515.062200
## iter  10 value 421.862010
## iter  20 value 320.810730
## iter  30 value 295.306973
## iter  40 value 293.245279
## iter  50 value 293.231313
## iter  50 value 293.231313
## iter  50 value 293.231313
## final  value 293.231313
## converged
## # weights:  28
## initial  value 588.790175
## iter  10 value 293.848639
## iter  20 value 265.181538
## iter  30 value 251.832116
## iter  40 value 247.636072
## iter  50 value 244.357698
## iter  60 value 239.628033
## iter  70 value 238.459390
## iter  80 value 238.201519
## final  value 238.199605
## converged
## # weights:  46
## initial  value 484.161987
## iter  10 value 284.690959
## iter  20 value 254.355963
## iter  30 value 242.935945
## iter  40 value 235.463866
## iter  50 value 233.603548
## iter  60 value 233.204971
## iter  70 value 232.043580
## iter  80 value 229.586164
## iter  90 value 229.122929
```

```
## iter 100 value 229.121820
## final  value 229.121820
## stopped after 100 iterations
## # weights:  10
## initial  value 549.633767
## iter  10 value 304.841262
## iter  20 value 291.384589
## iter  30 value 290.216565
## iter  40 value 286.991674
## iter  50 value 276.096593
## iter  60 value 275.963031
## iter  70 value 275.754386
## final  value 275.750057
## converged
## # weights:  28
## initial  value 511.183410
## iter  10 value 294.573726
## iter  20 value 261.320707
## iter  30 value 245.327583
## iter  40 value 239.303864
## iter  50 value 237.679941
## iter  60 value 237.419723
## iter  70 value 237.406458
## iter  80 value 237.348960
## iter  90 value 237.220827
## iter 100 value 237.007574
## final  value 237.007574
## stopped after 100 iterations
## # weights:  46
## initial  value 580.525923
## iter  10 value 279.296818
## iter  20 value 223.311448
## iter  30 value 203.687067
## iter  40 value 194.125518
## iter  50 value 189.373952
## iter  60 value 185.953237
## iter  70 value 185.483292
## iter  80 value 185.304920
## iter  90 value 185.200567
## iter 100 value 185.122953
## final  value 185.122953
## stopped after 100 iterations
## # weights:  46
## initial  value 578.007994
## iter  10 value 289.484321
## iter  20 value 241.625595
## iter  30 value 225.508749
## iter  40 value 210.832894
## iter  50 value 203.721621
## iter  60 value 201.995407
## iter  70 value 198.604126
## iter  80 value 198.138971
## iter  90 value 197.884040
## iter 100 value 197.713604
```

```
## final  value 197.713604
## stopped after 100 iterations
```

```
gbm.ada.1
```

```
## Neural Network
##
## 820 samples
##   5 predictor
##   2 classes: 'Healthy', 'Heart.Disease'
##
## No pre-processing
## Resampling: Cross-Validated (10 fold, repeated 10 times)
## Summary of sample sizes: 738, 737, 738, 738, 738, 738, ...
## Resampling results across tuning parameters:
##
##   size  decay  ROC        Sens       Spec
##   1     0e+00  0.8873818  0.8132885  0.8572924
##   1     1e-04  0.8895341  0.8168397  0.8482558
##   1     1e-01  0.9033646  0.8035513  0.8829125
##   3     0e+00  0.9230757  0.8234679  0.8842968
##   3     1e-04  0.9250854  0.8213462  0.8910022
##   3     1e-01  0.9260744  0.8118333  0.8875969
##   5     0e+00  0.9439748  0.8430385  0.9009468
##   5     1e-04  0.9469135  0.8465897  0.8994574
##   5     1e-01  0.9380939  0.8305321  0.8952215
##
## ROC was used to select the optimal model using the largest value.
## The final values used for the model were size = 5 and decay = 1e-04.
```

Variable importance

```
varImp(gbm.ada.1)
```

```
## nnet variable importance
##
##                               Overall
## sexMale                        100.00
## exangExercise Induced Angina    92.05
## ca                              78.23
## oldpeak                         53.44
## cpChest Pain Type 3             26.27
## cpChest Pain Type 2             22.55
## cpChest Pain Type 1              0.00
```

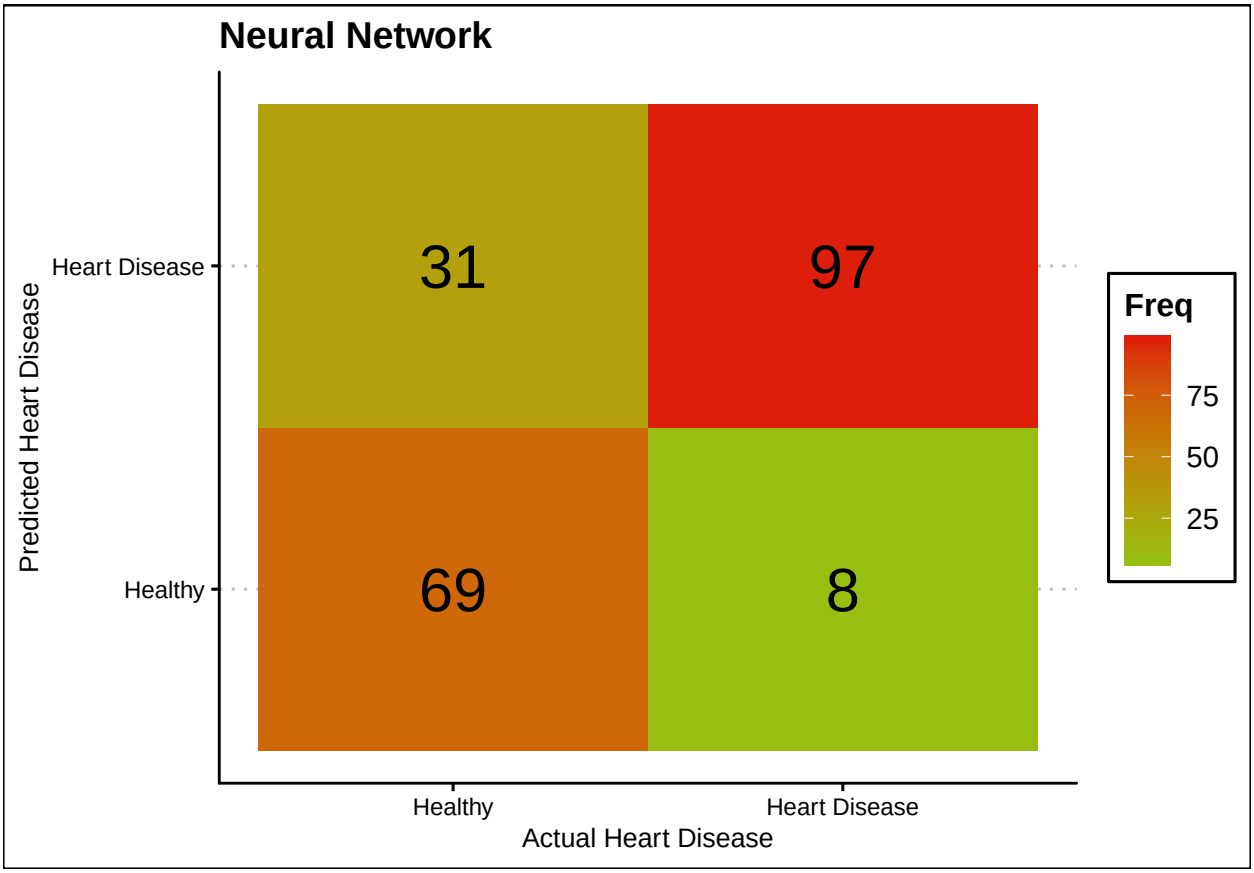
```
pred <- predict(gbm.ada.1,ValidSet)
levels(pred)[2] <- "Heart Disease"
t<-table(ValidSet$target, pred)
t.df<-as.data.frame(t)
res<-caret::confusionMatrix(t, positive="Heart Disease")
res
```

```
## Confusion Matrix and Statistics
##
##               pred
##                Healthy Heart Disease
##   Healthy            69            31
```

```
##   Heart Disease       8           97
##
##                Accuracy : 0.8098
##                  95% CI : (0.7492, 0.8611)
##     No Information Rate : 0.6244
##     P-Value [Acc > NIR] : 6.903e-09
##
##                   Kappa : 0.6172
##
##  Mcnemar's Test P-Value : 0.000427
##
##             Sensitivity : 0.7578
##             Specificity : 0.8961
##          Pos Pred Value : 0.9238
##          Neg Pred Value : 0.6900
##              Prevalence : 0.6244
##          Detection Rate : 0.4732
##    Detection Prevalence : 0.5122
##       Balanced Accuracy : 0.8270
##
##        'Positive' Class : Heart Disease
##
```

Confusion Matrix

```
ggplot(data = t.df, aes(x = Var1, y = pred, label=Freq)) +
  geom_tile(aes(fill = Freq)) +
  scale_fill_gradient(low = "#97BE11",high = "#DC1E0B") +
  theme_clean() +
  xlab("Actual Heart Disease") +
  ylab("Predicted Heart Disease") +
  geom_text(size=8) +
  ggtitle("Neural Network")
```


Neural Network
Heart Disease
Healthy
Predicted Heart Disease
31
97
69
8
Freq
75
50
25
Healthy
Heart Disease
Actual Heart Disease