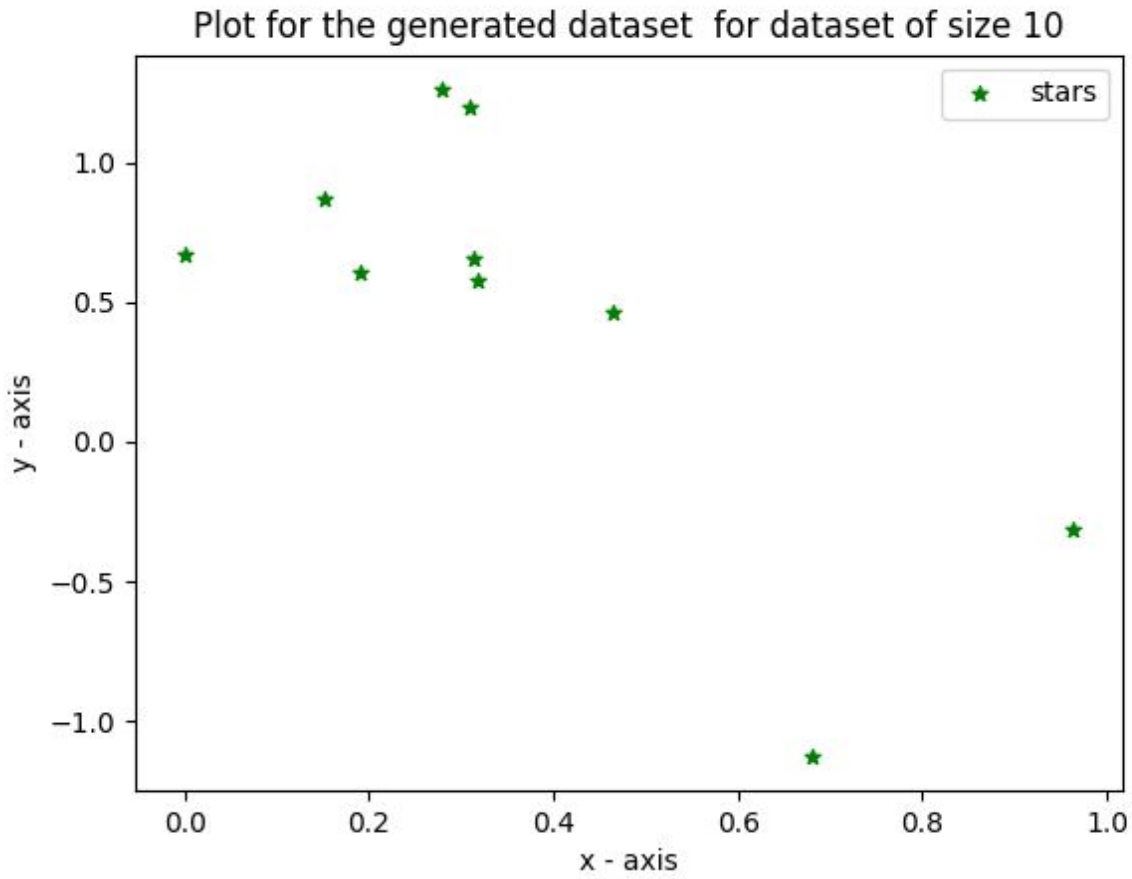
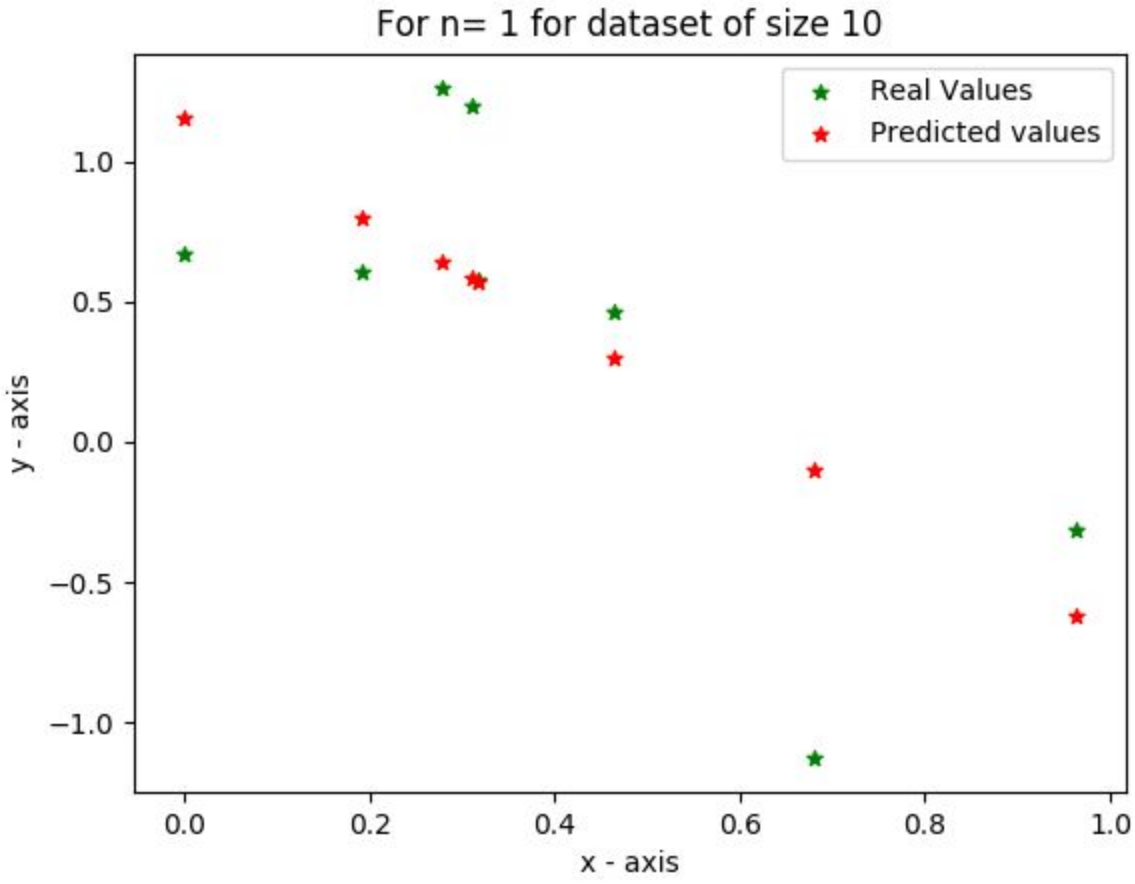
Project 1
ML Assignment

The initial Random Data generated for N=10

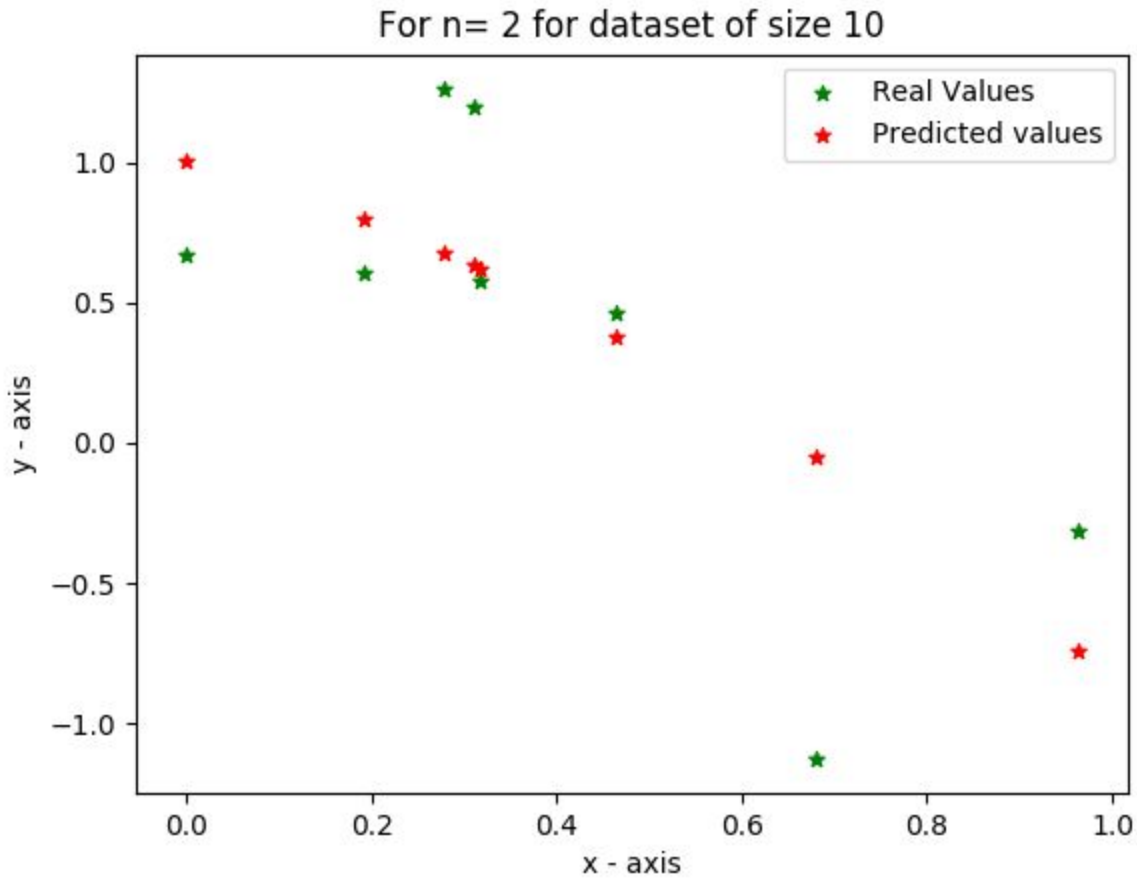
For n=1 Predicted



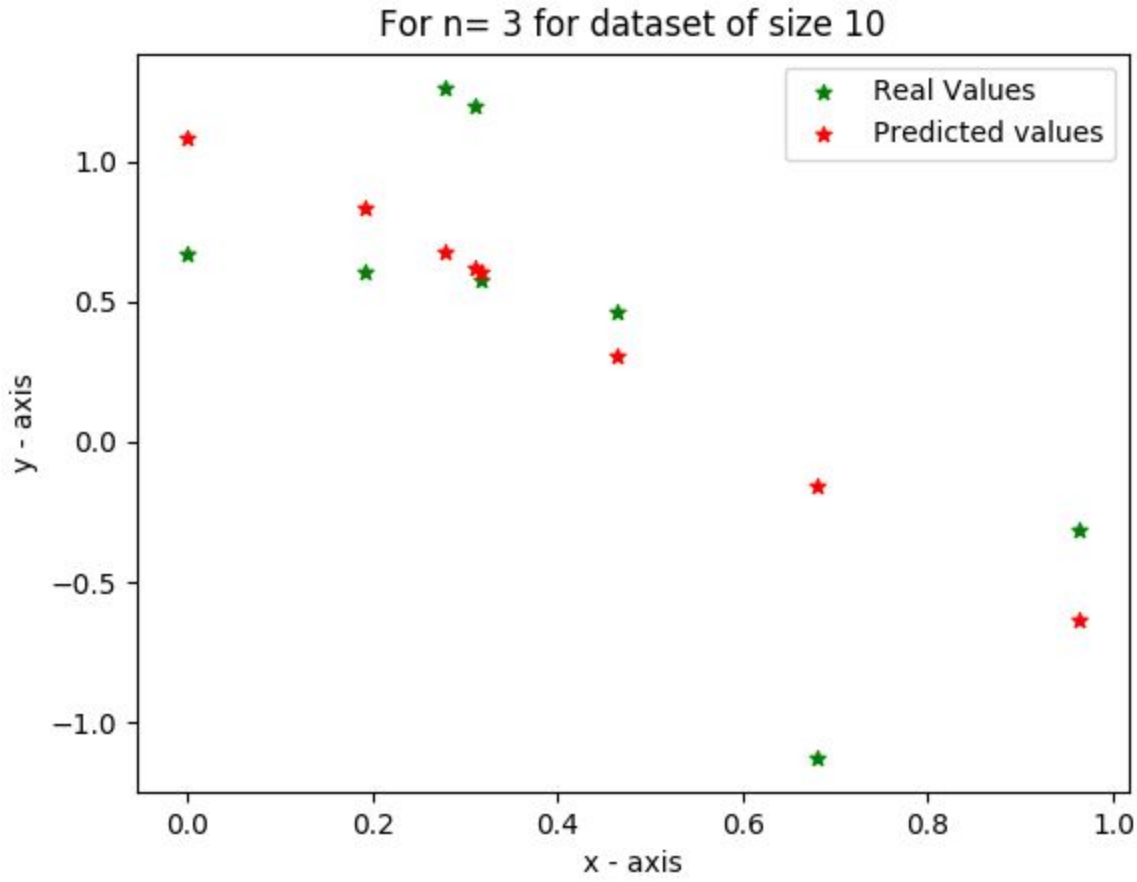
For n=1 Predicted



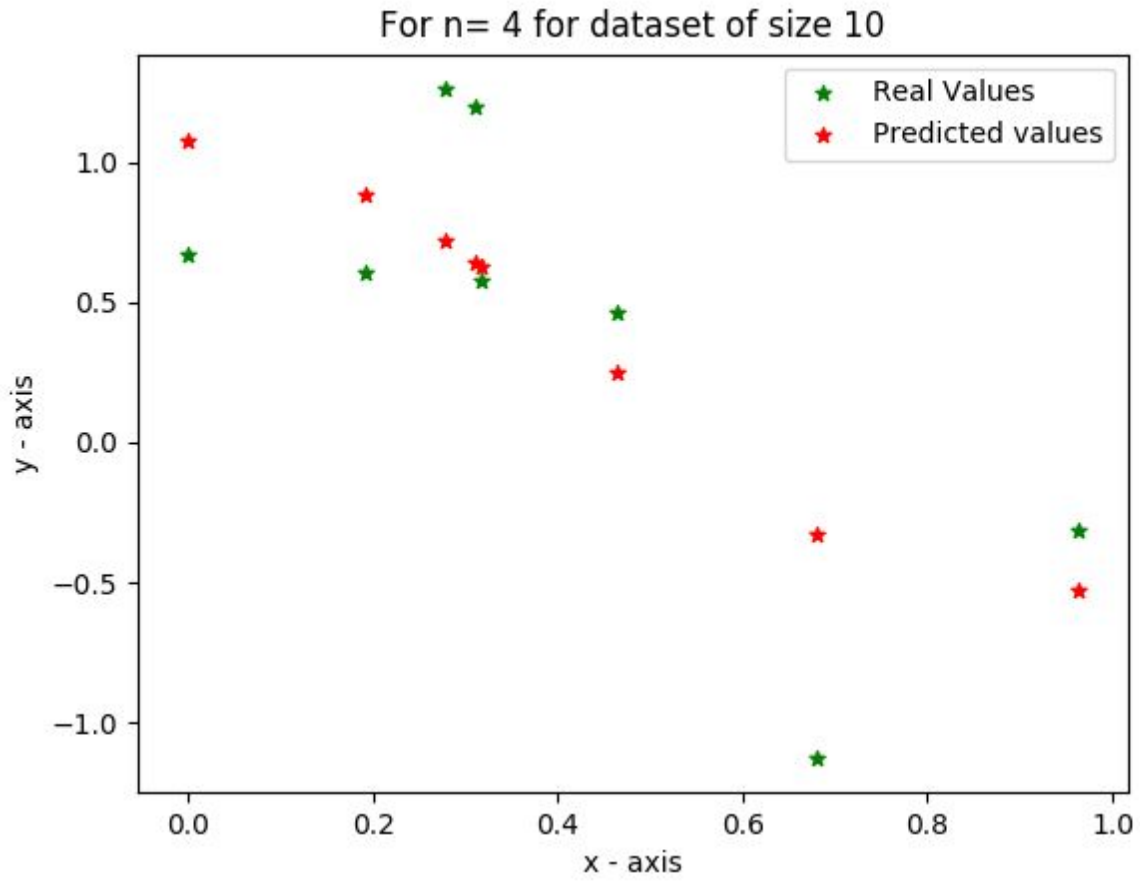
For n=2 Predicted



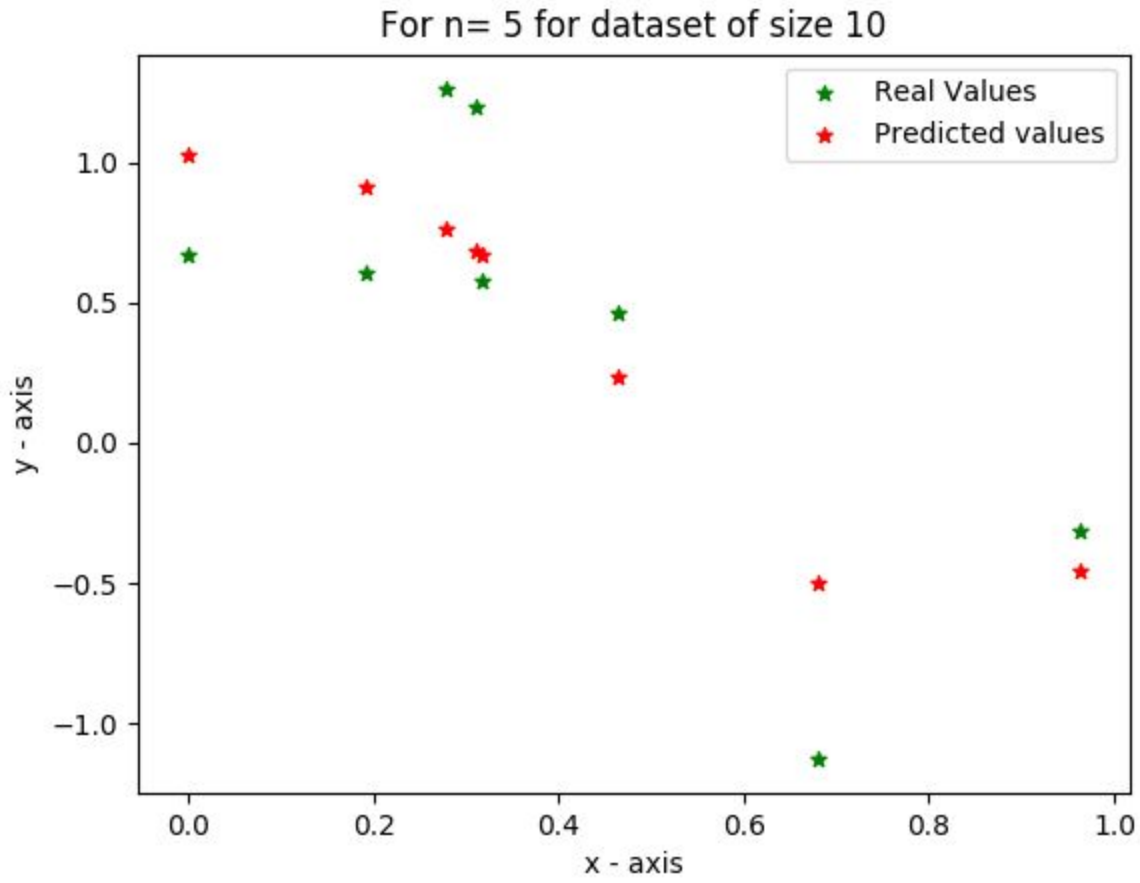
For n=3 Predicted



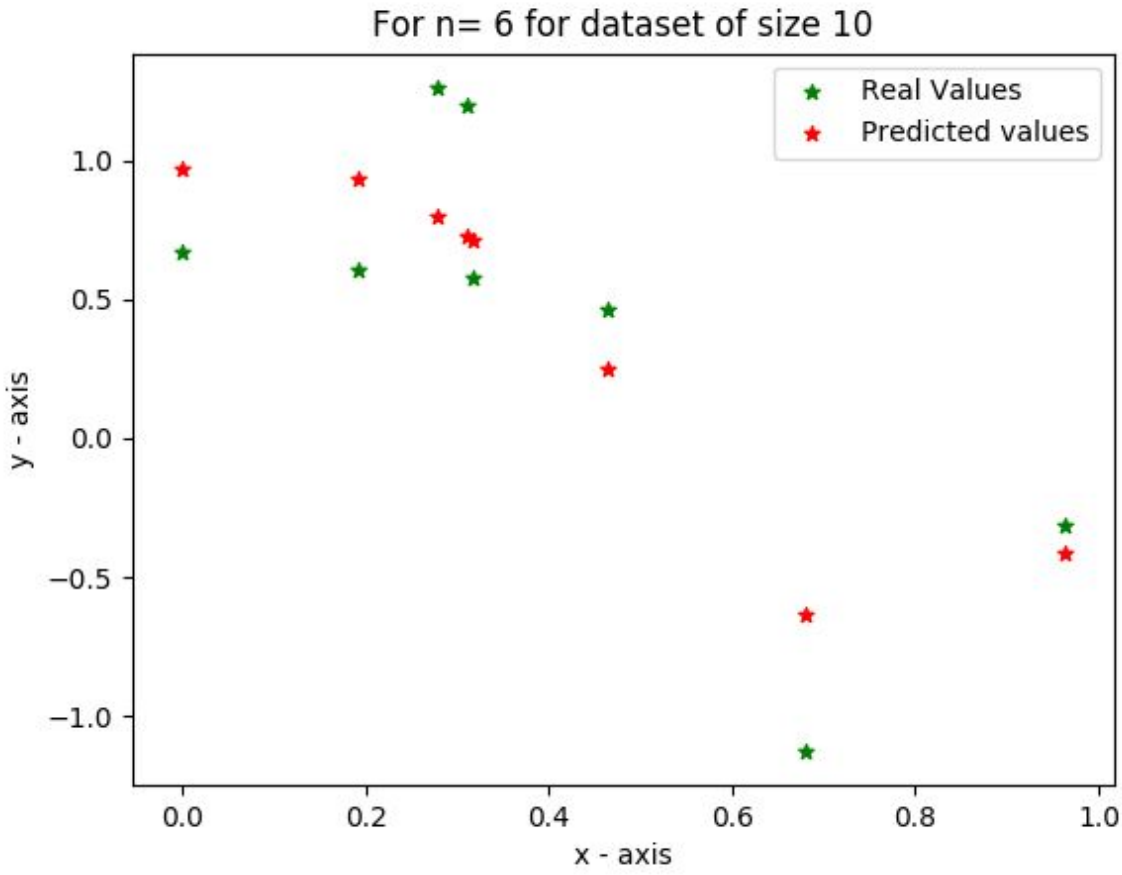
For n=4 Predicted



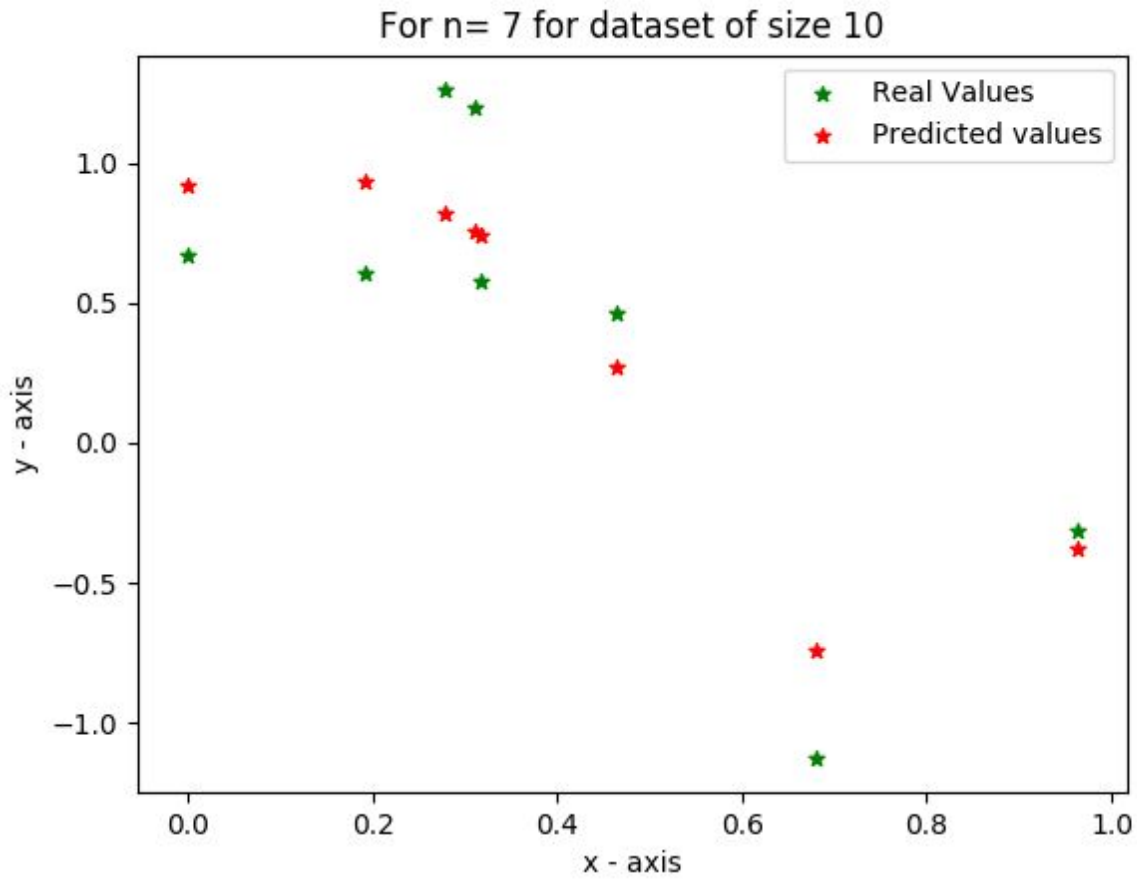
For n=5 Predicted



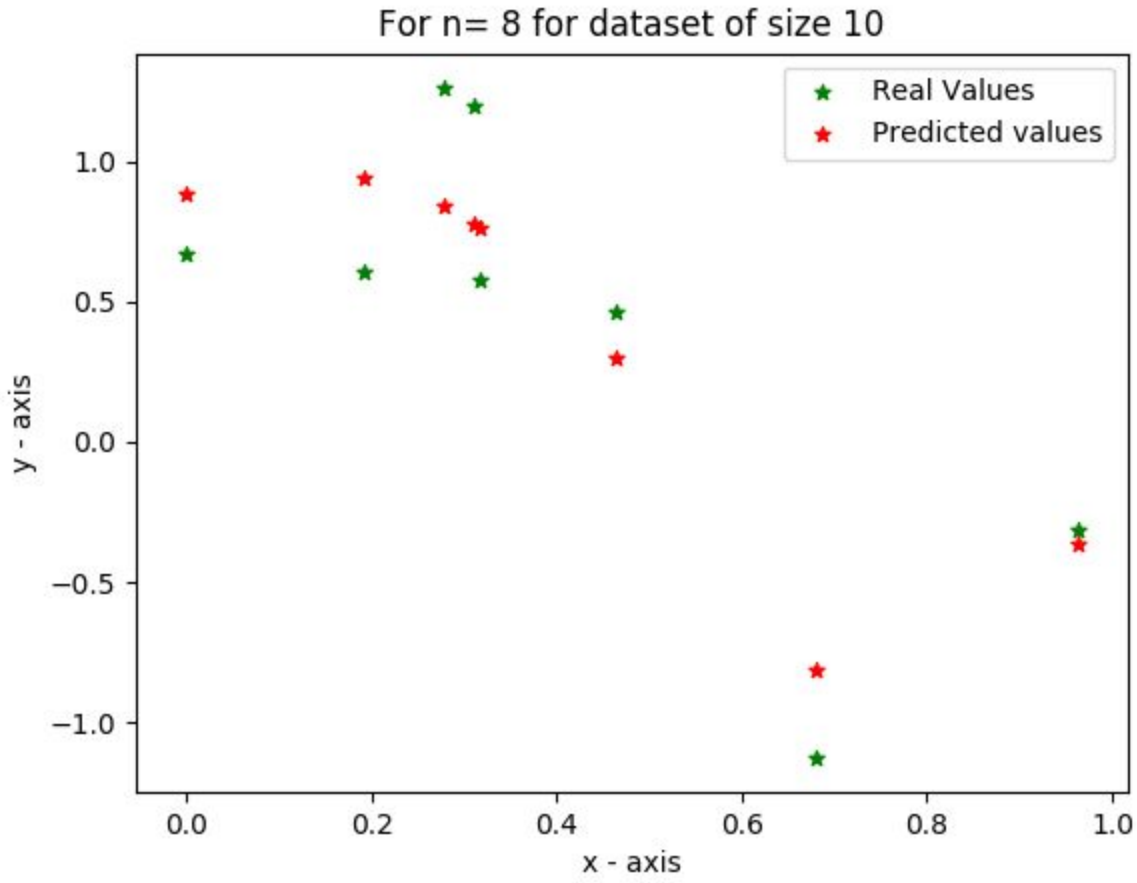
For n=6 Predicted



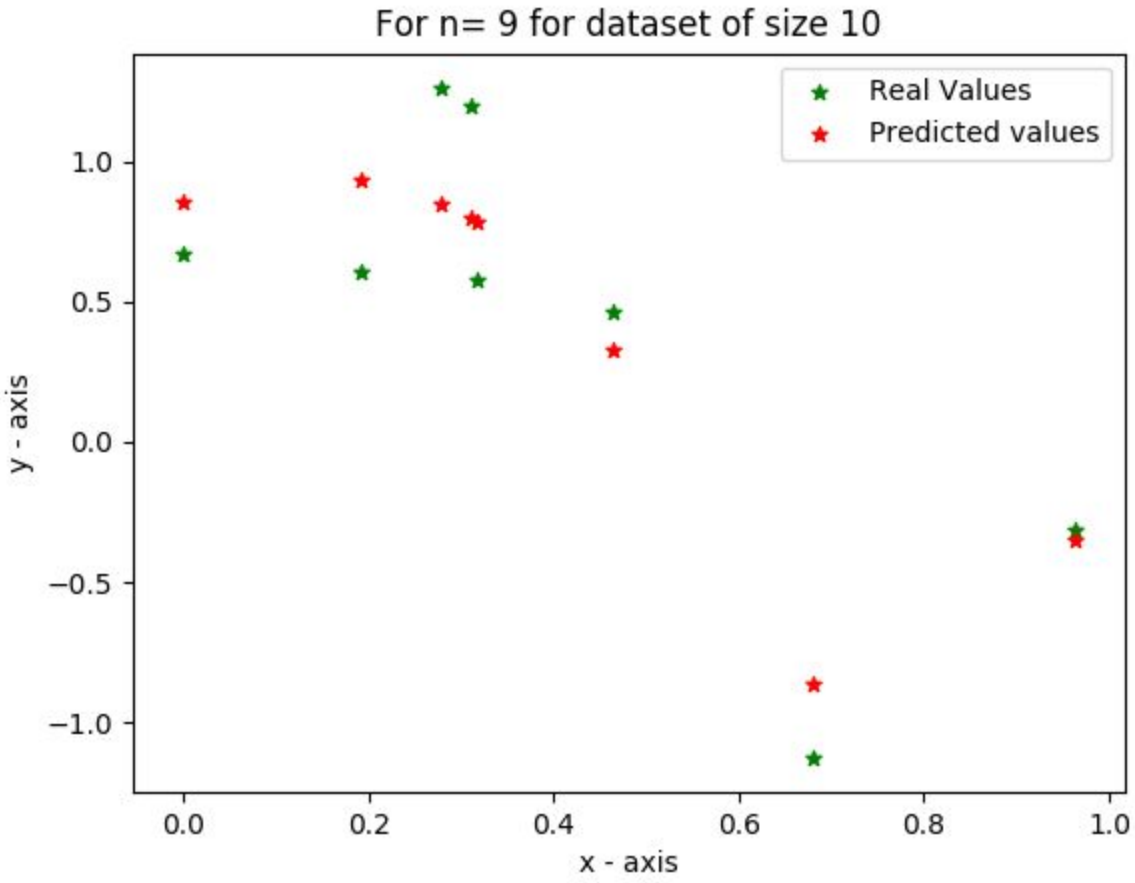
For n=7 Predicted



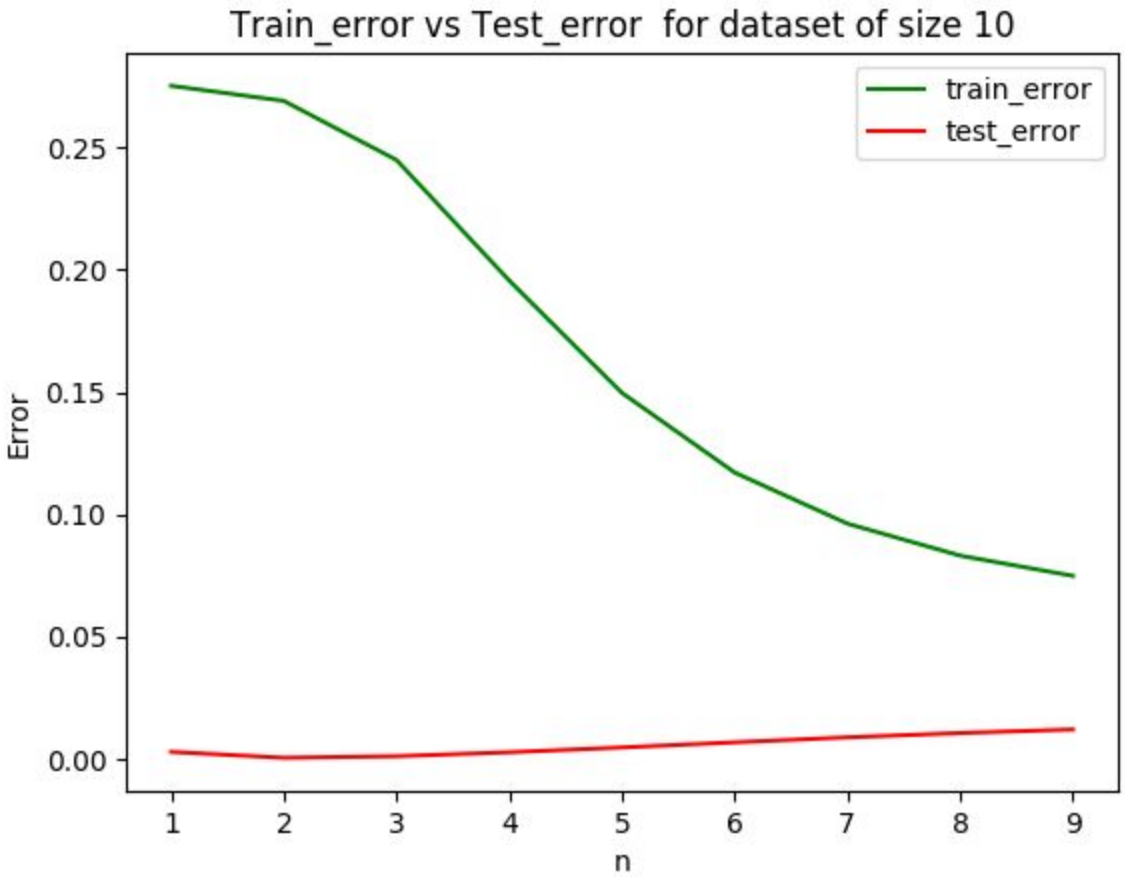
For n=8 Predicted


For n= 8 for dataset of size 10
Real Values
Predicted values
y - axis
x - axis
1.0
0.5
0.0
−0.5
−1.0
0.0
0.2
0.4
0.6
0.8
1.0

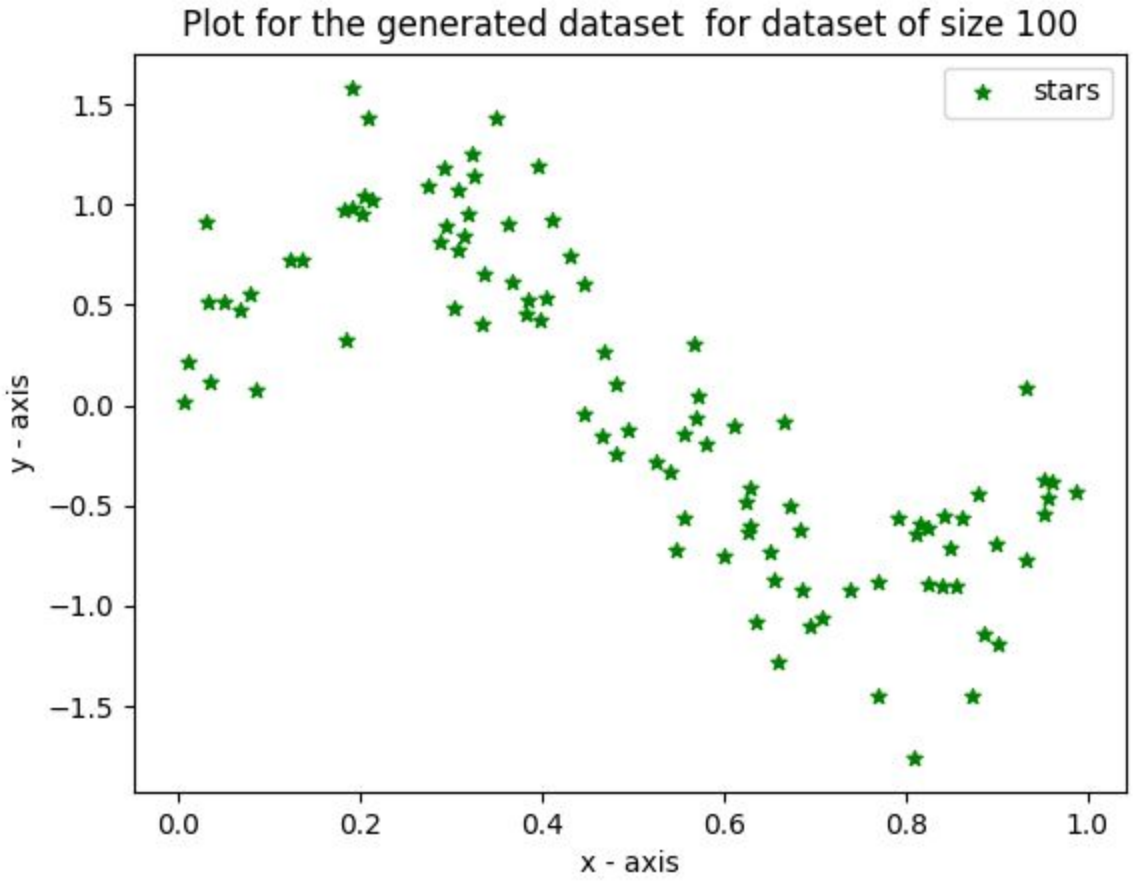
For n=9

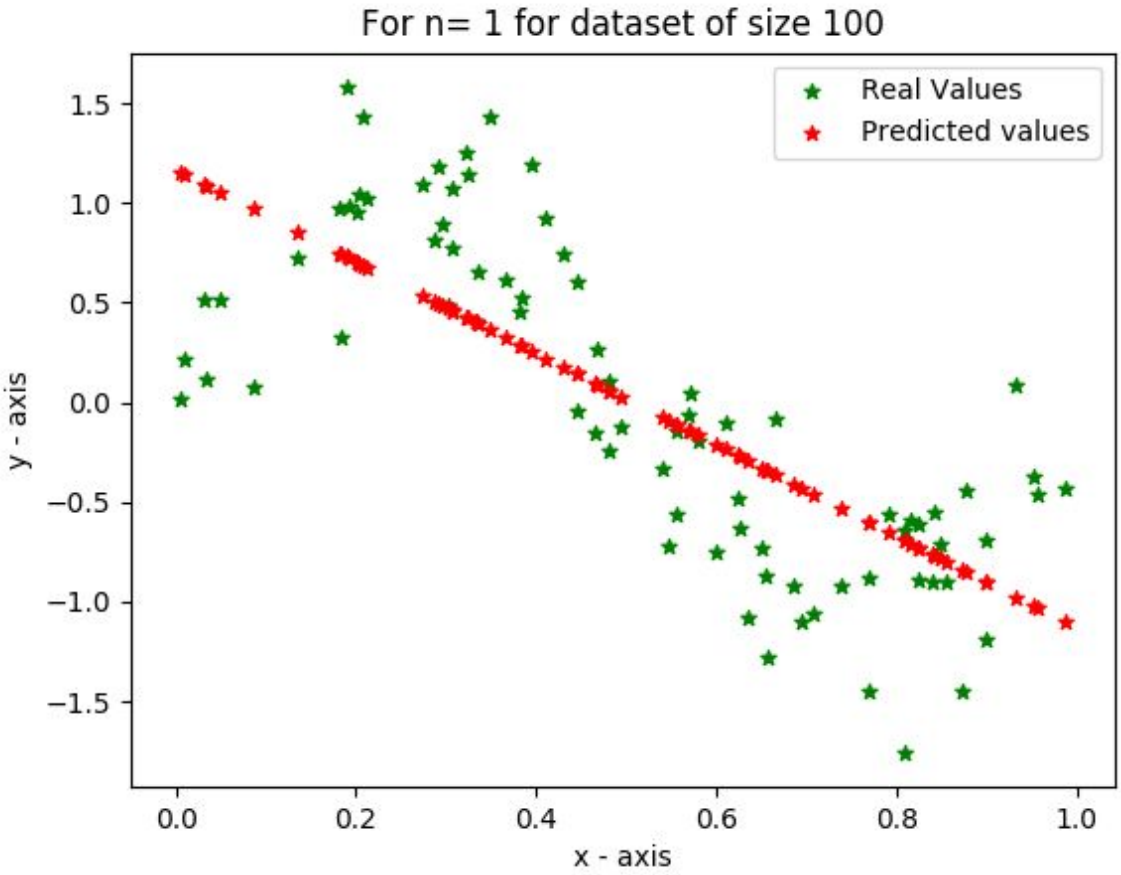


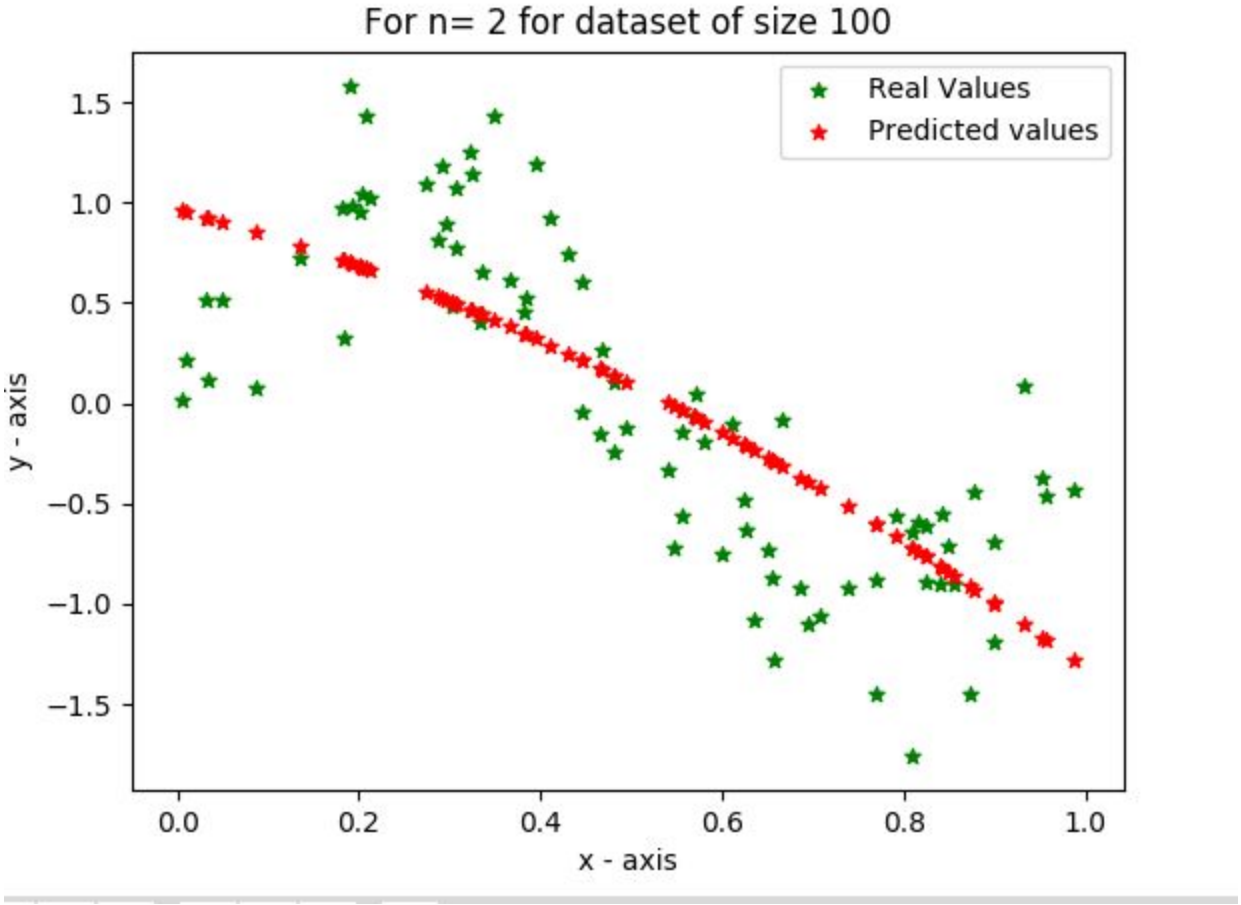
Train Error vs Test Error

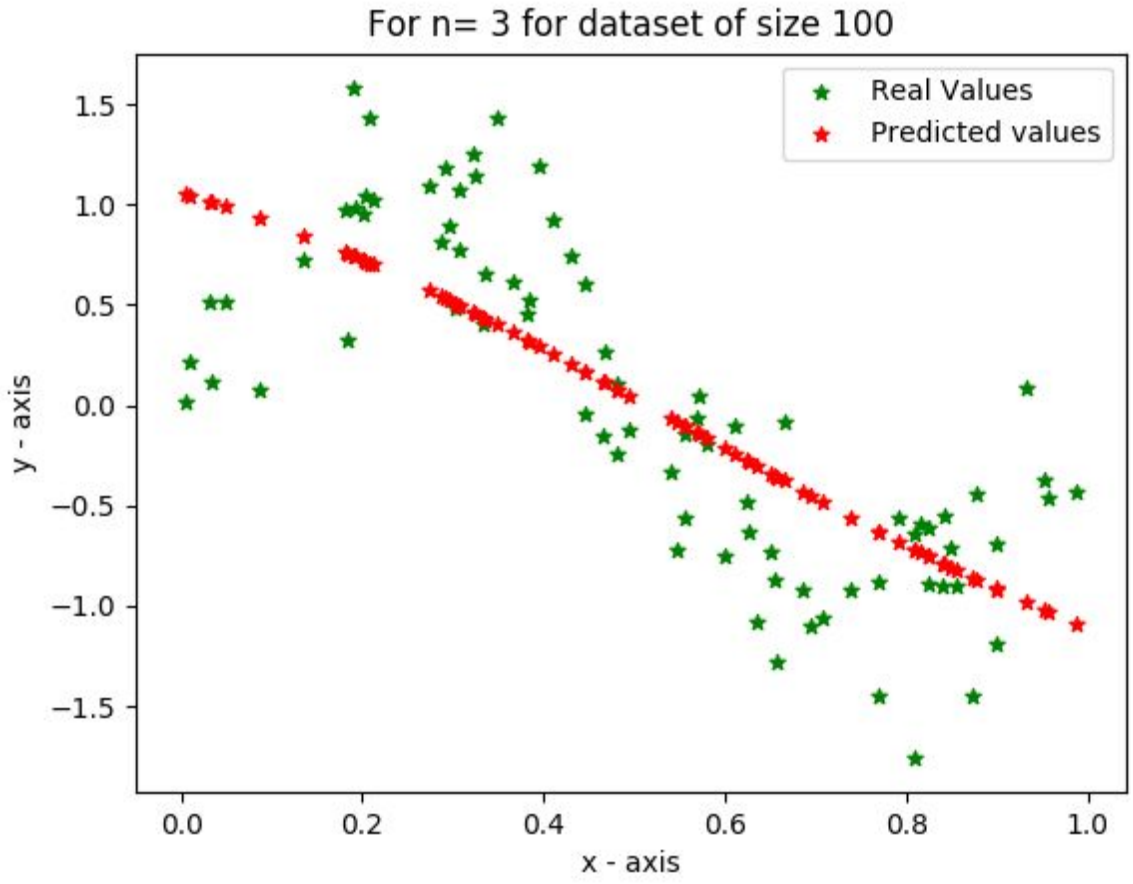


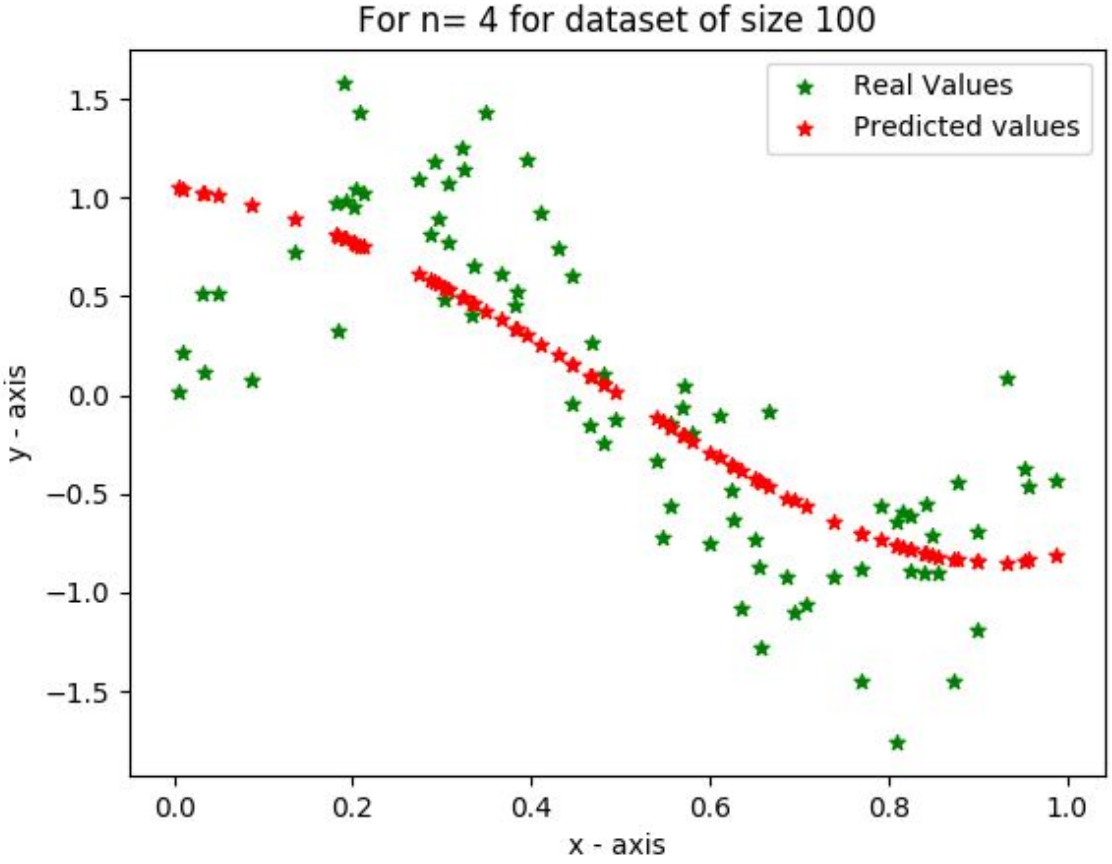
Dataset generated for size 100

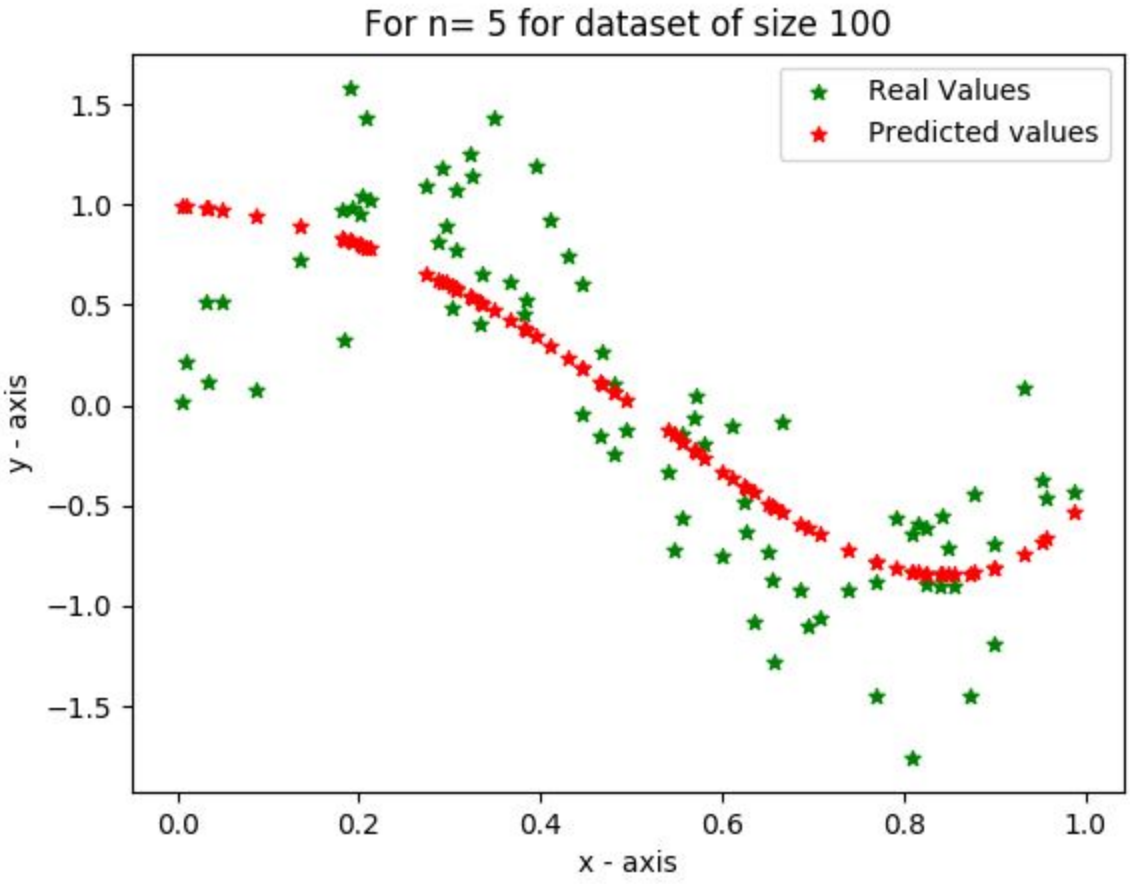

Plot for the generated dataset for dataset of size 100
stars
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

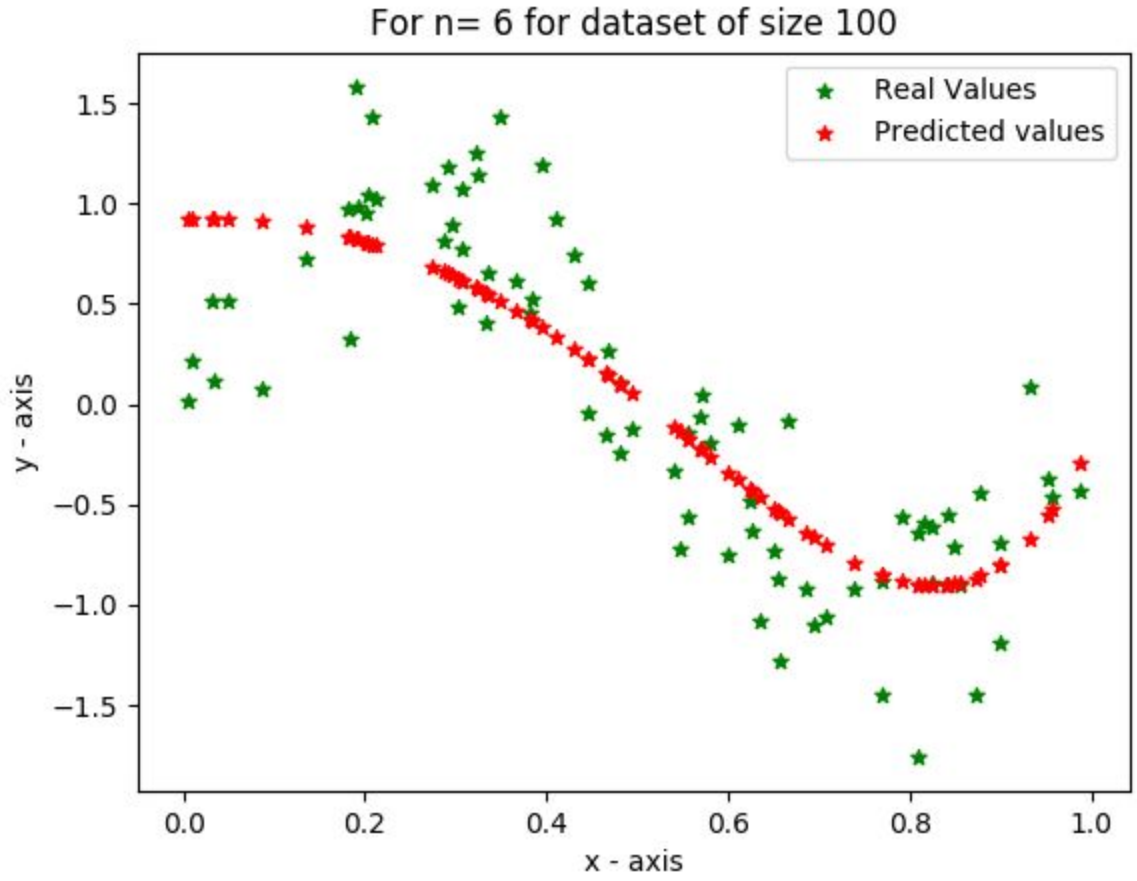

For n= 1 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

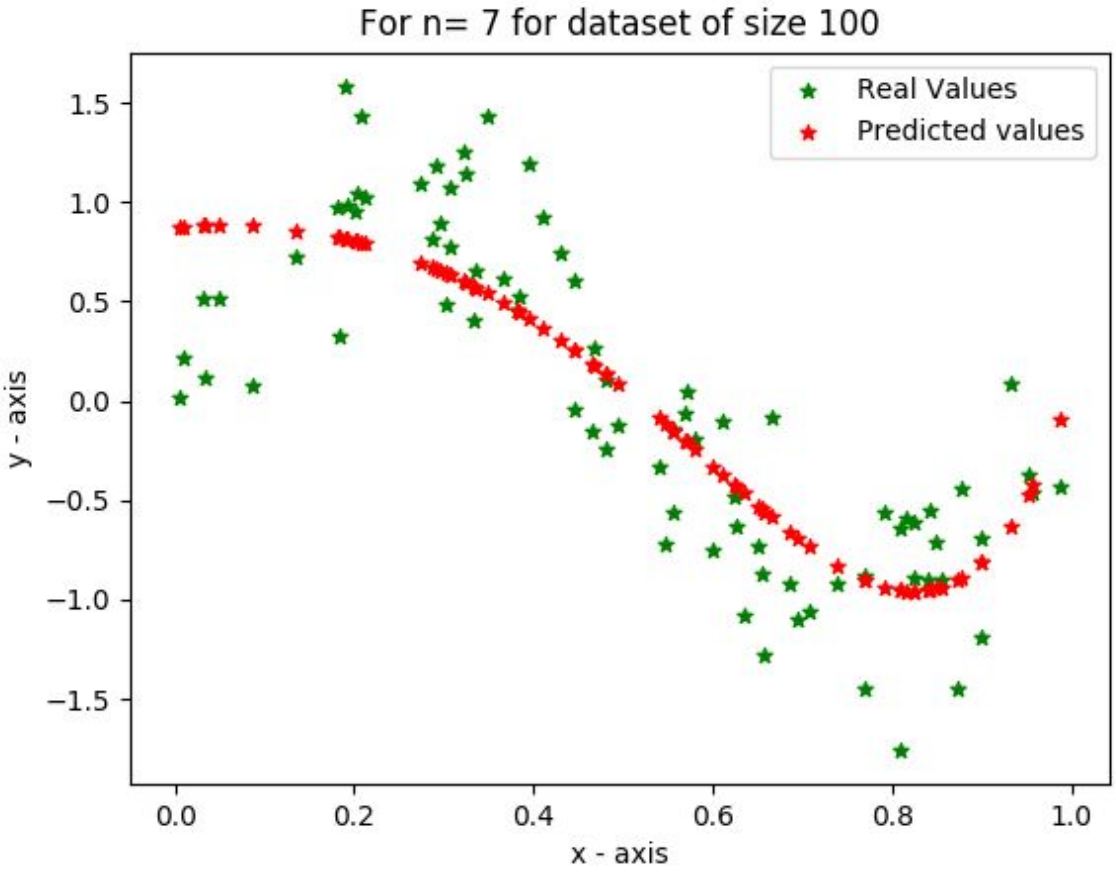

For n= 2 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

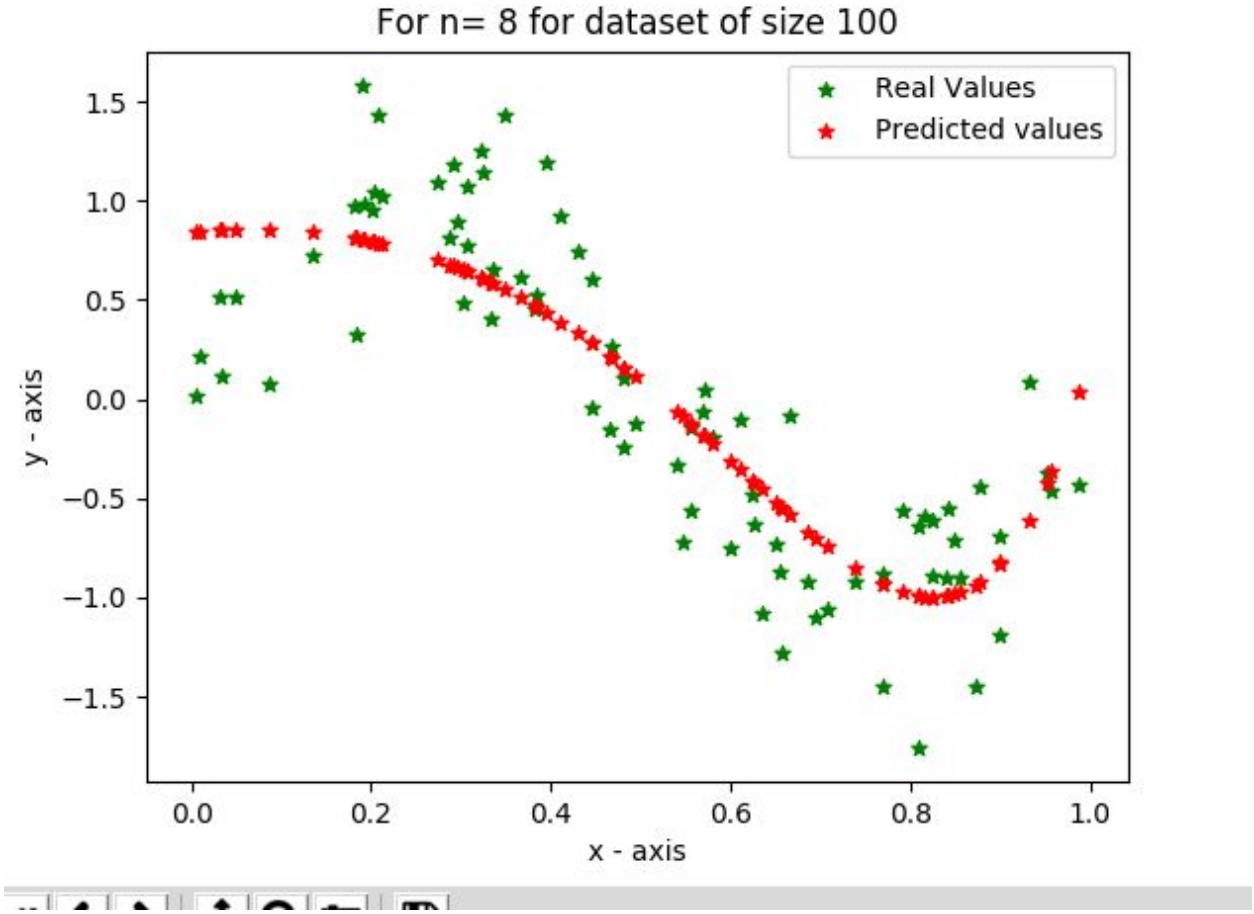

For n= 3 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

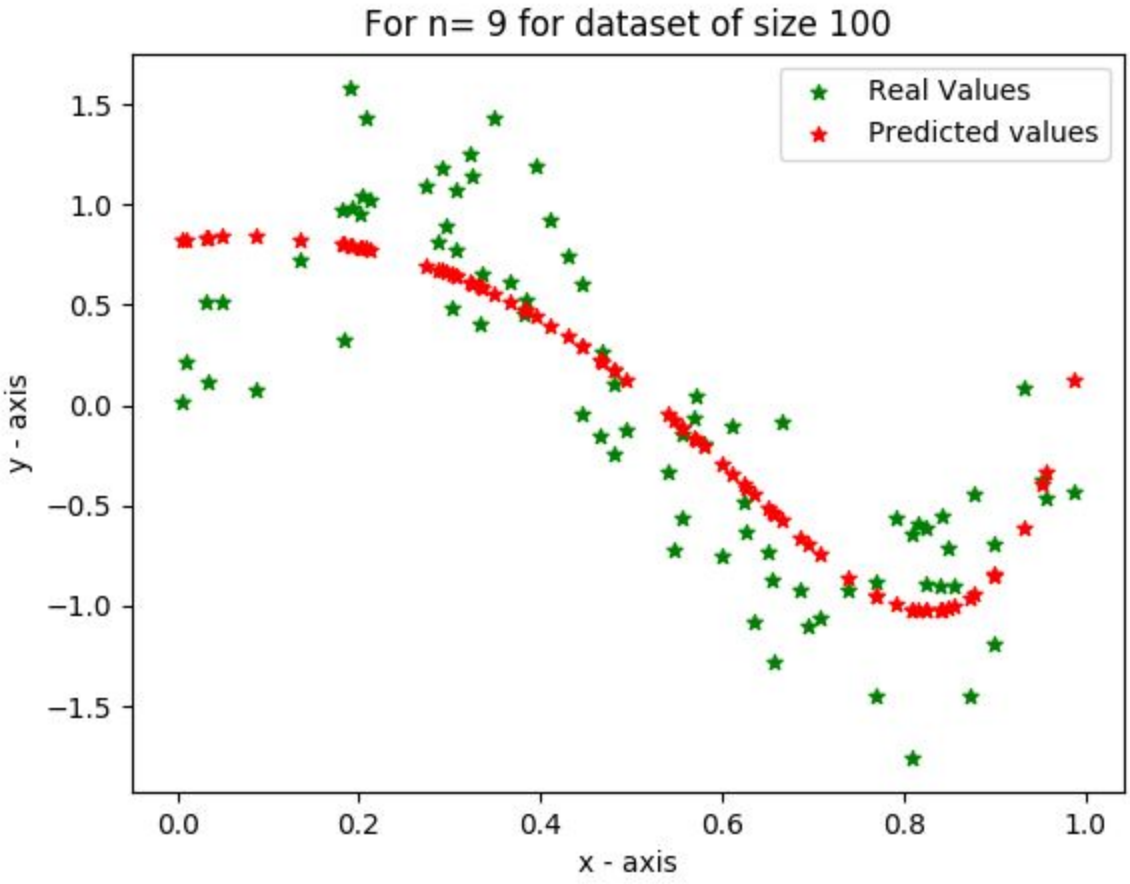

For n= 4 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

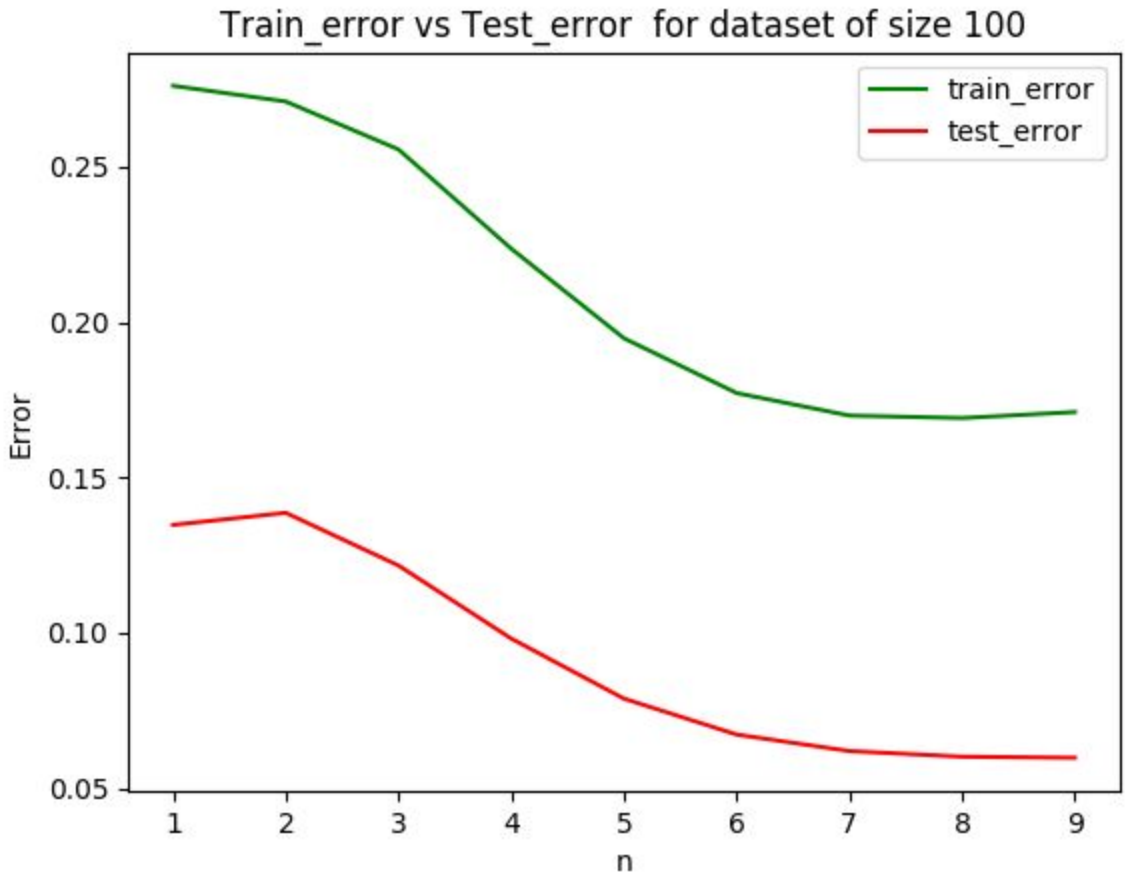

For n= 5 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

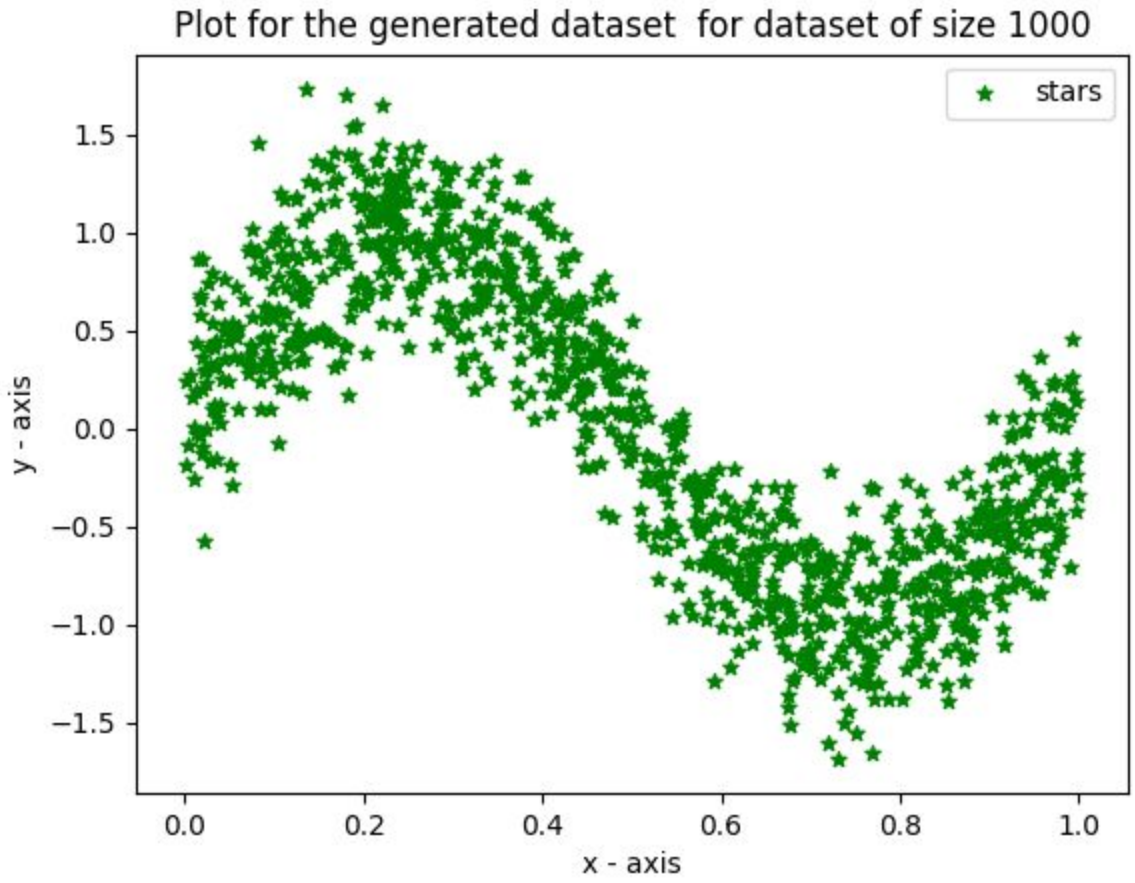

For n= 6 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

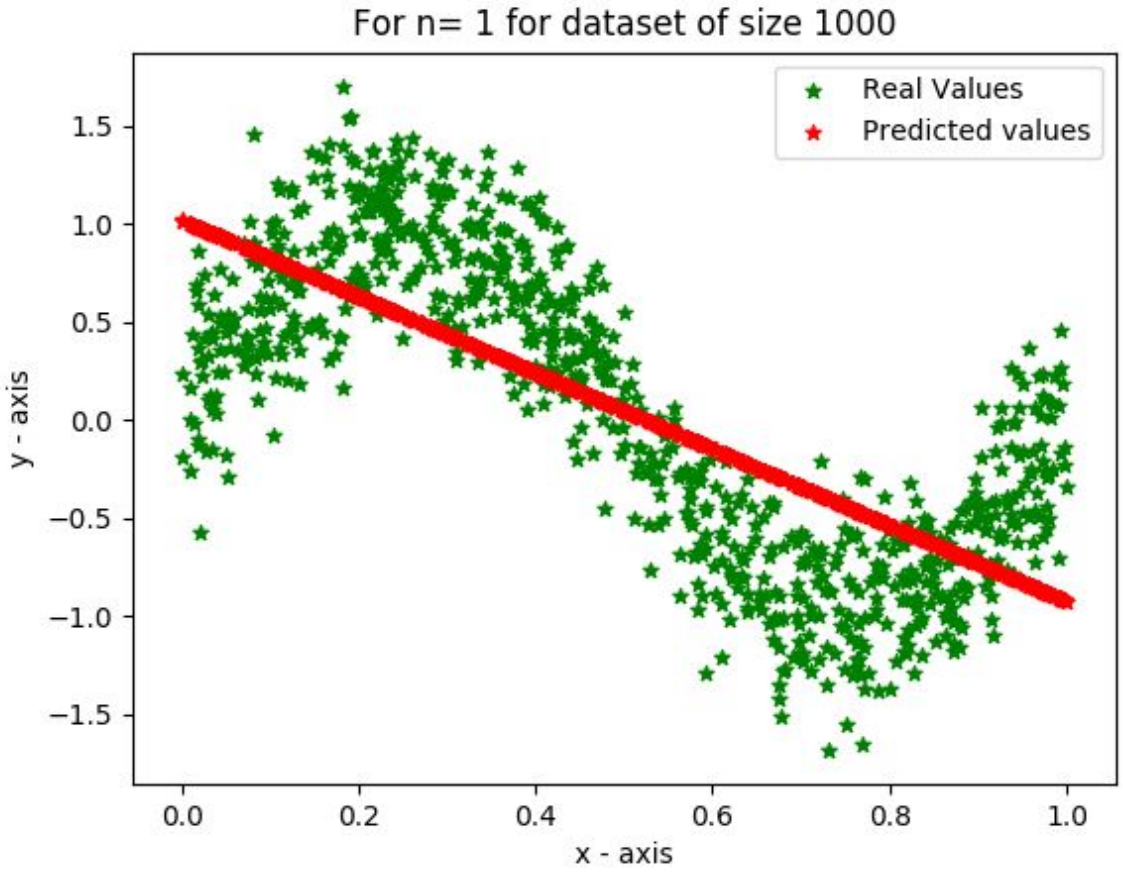

For n= 7 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

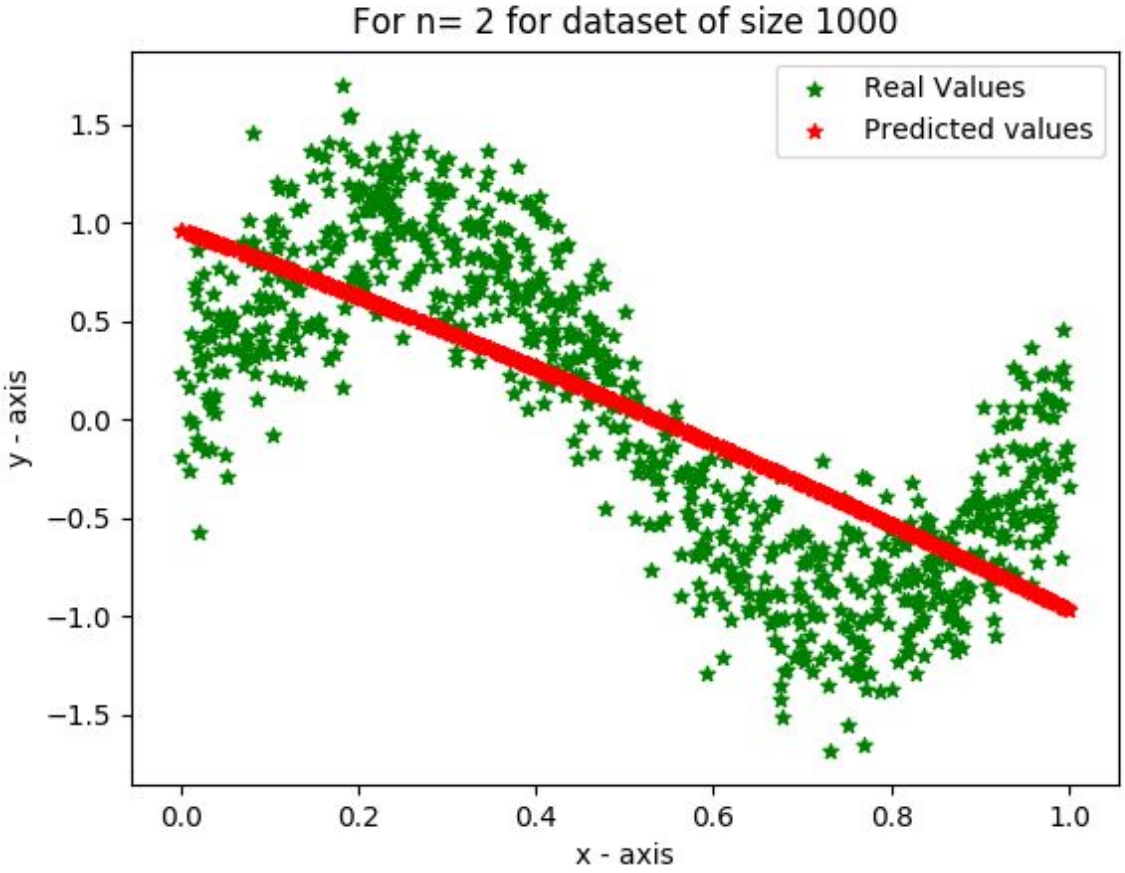

For n= 8 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

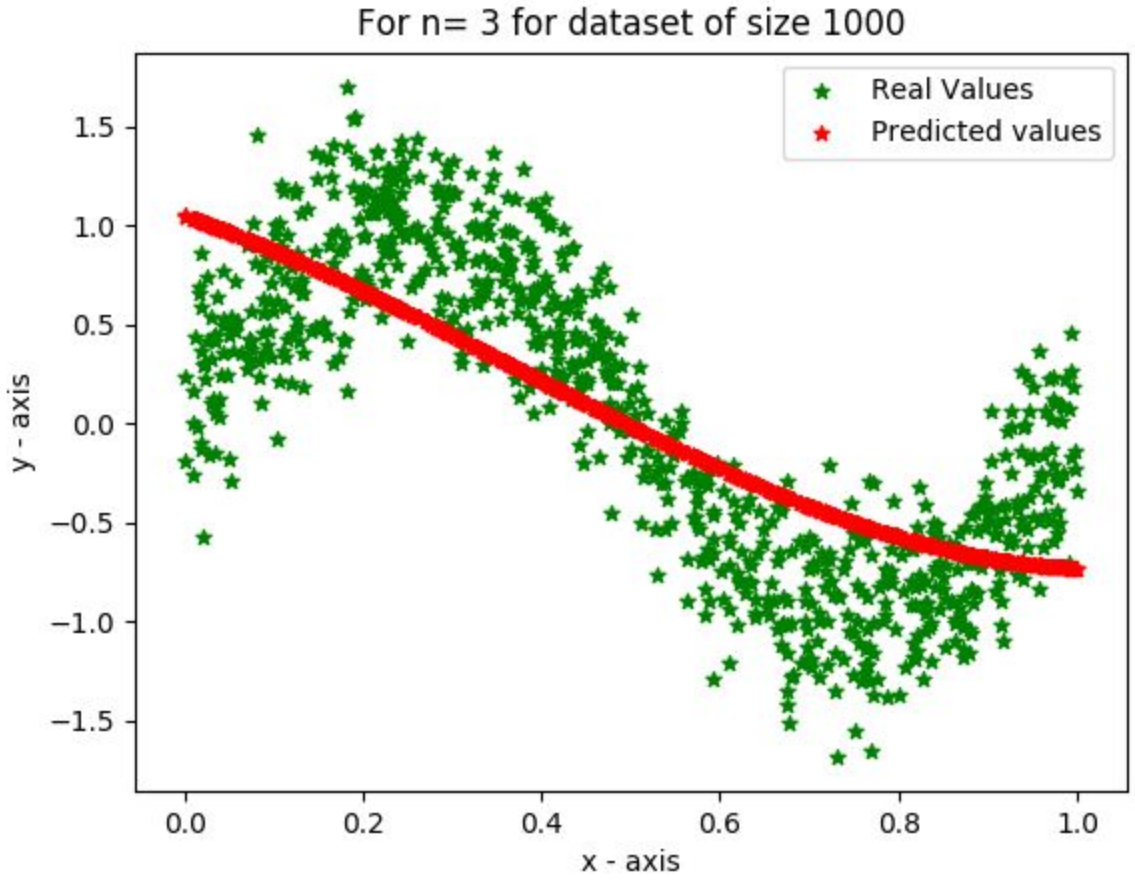

For n= 9 for dataset of size 100
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

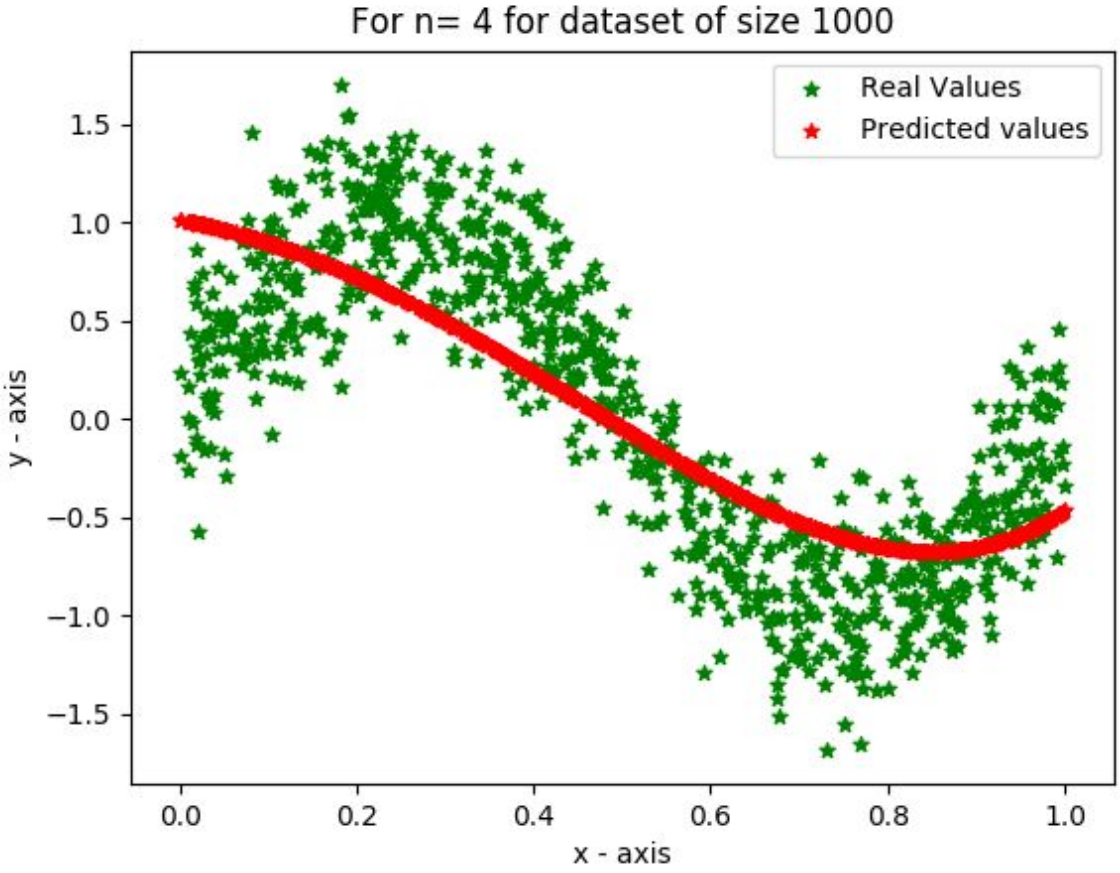

Train_error vs Test_error for dataset of size 100
train_error
test_error
Error
n
0.25
0.20
0.15
0.10
0.05
1
2
3
4
5
6
7
8
9

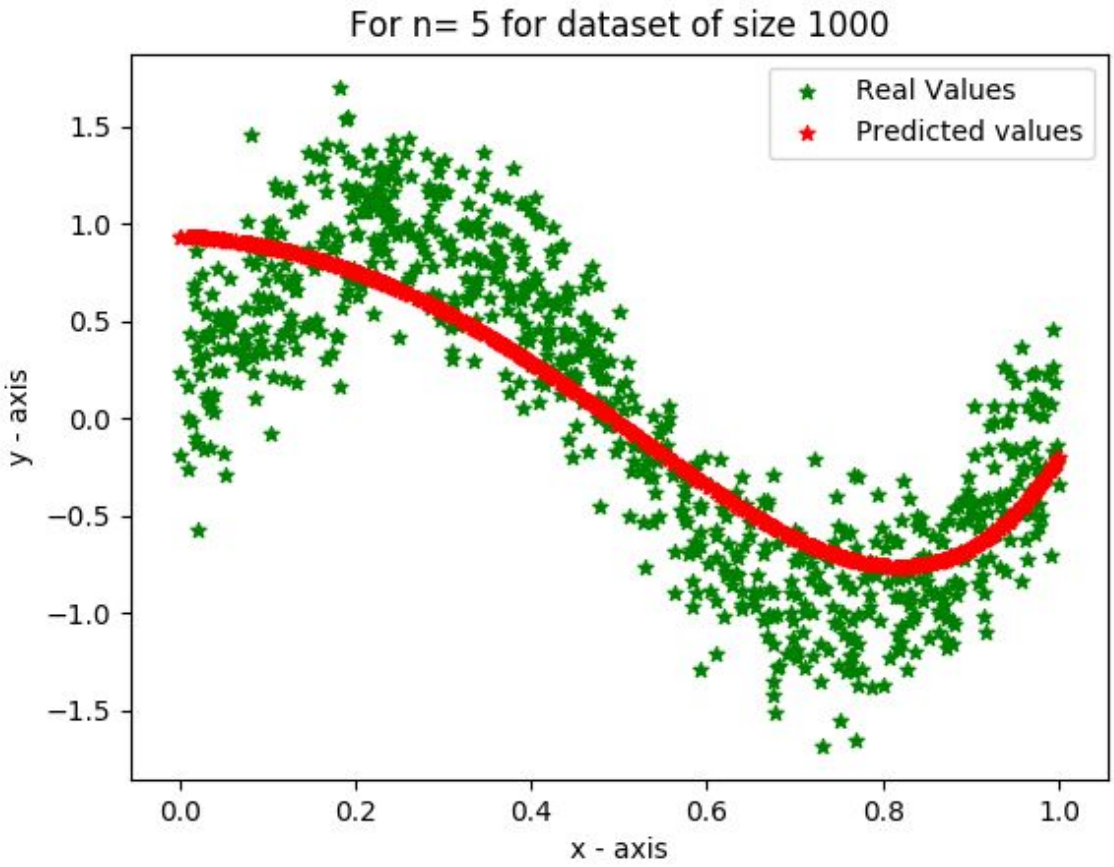

Plot for the generated dataset for dataset of size 1000
stars
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

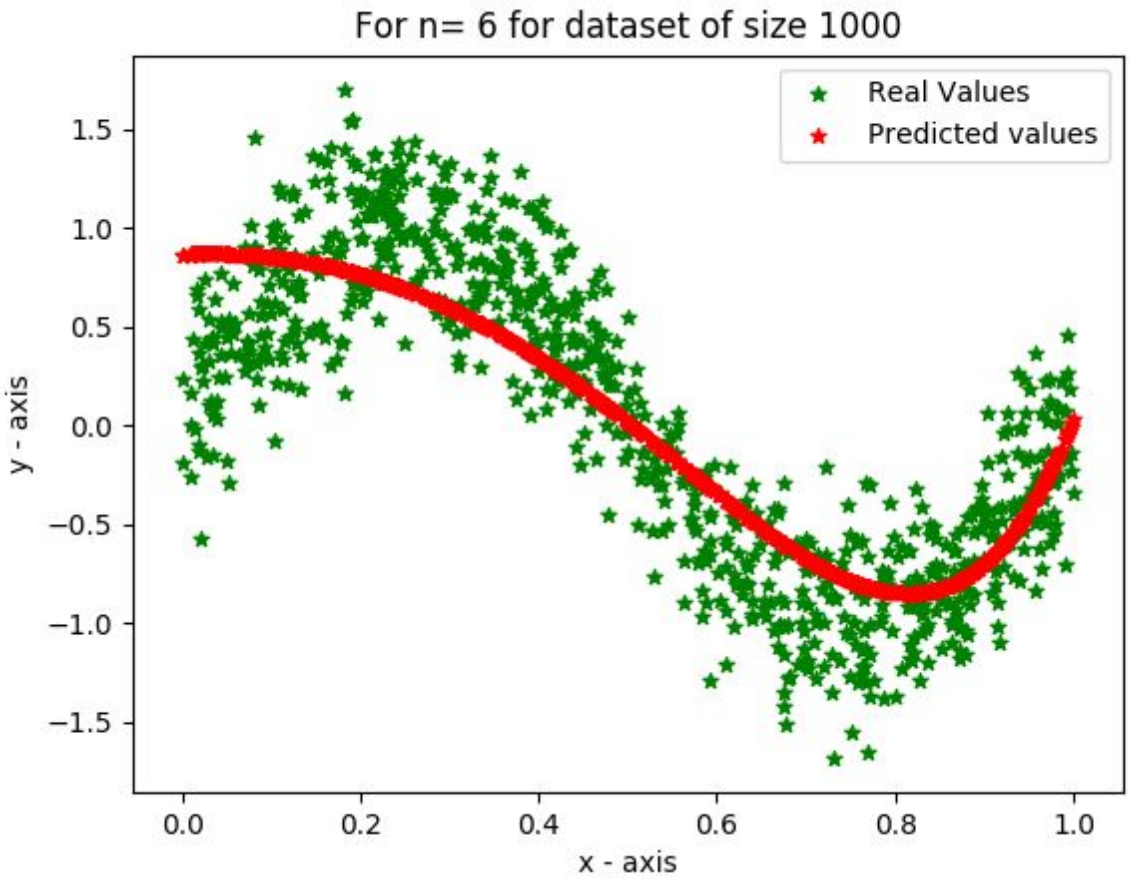

For n= 1 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

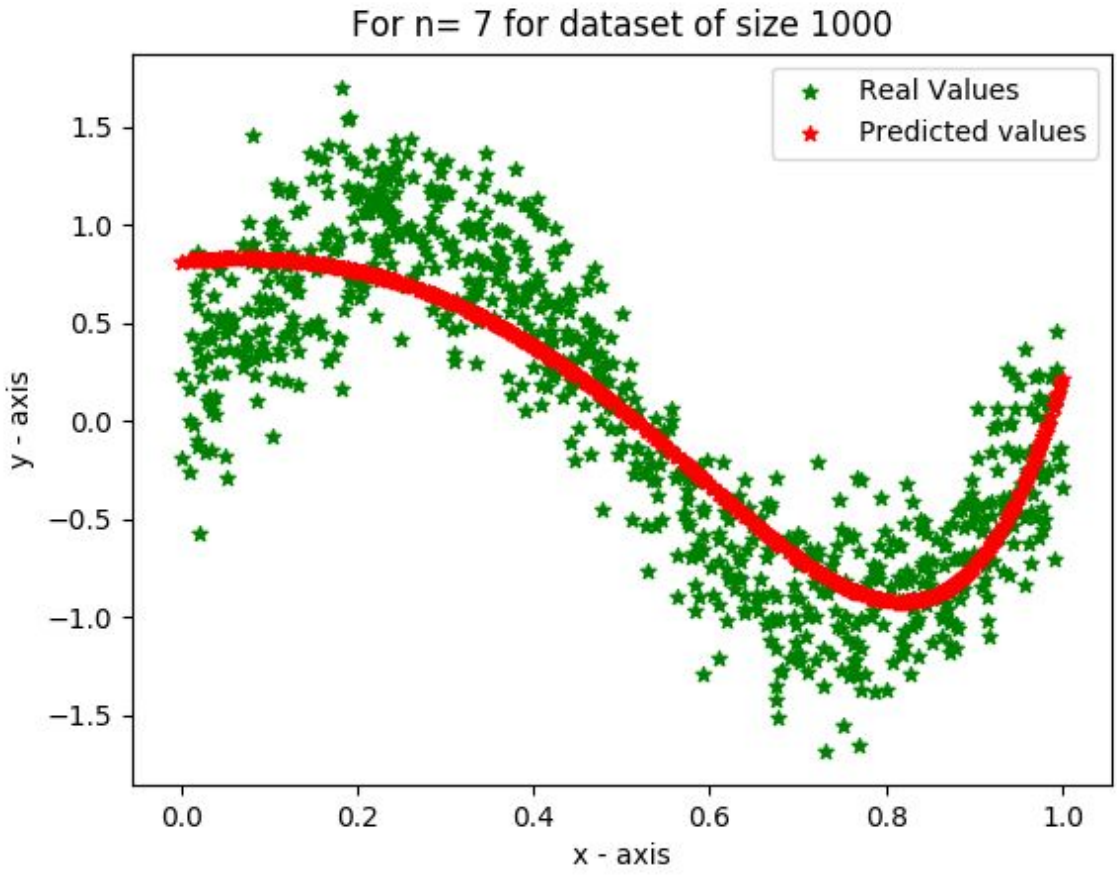

For n= 2 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

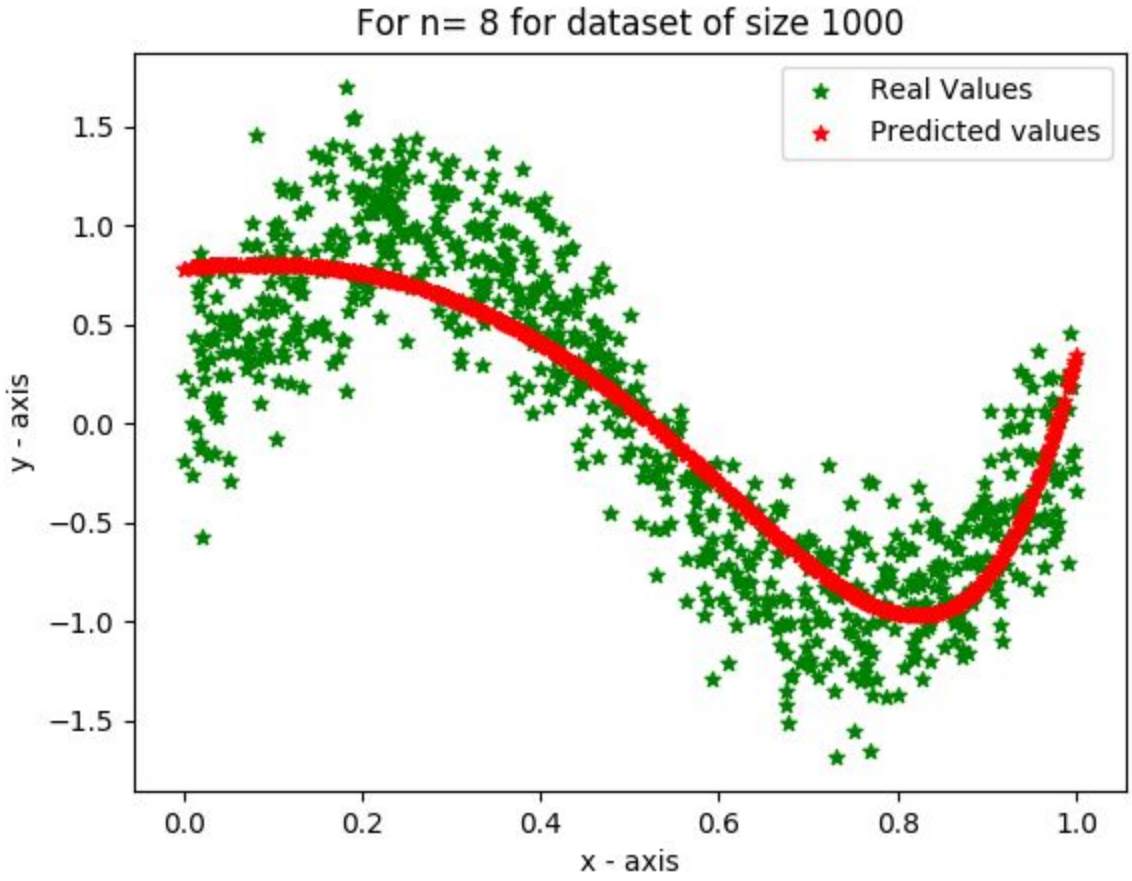

For n= 3 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

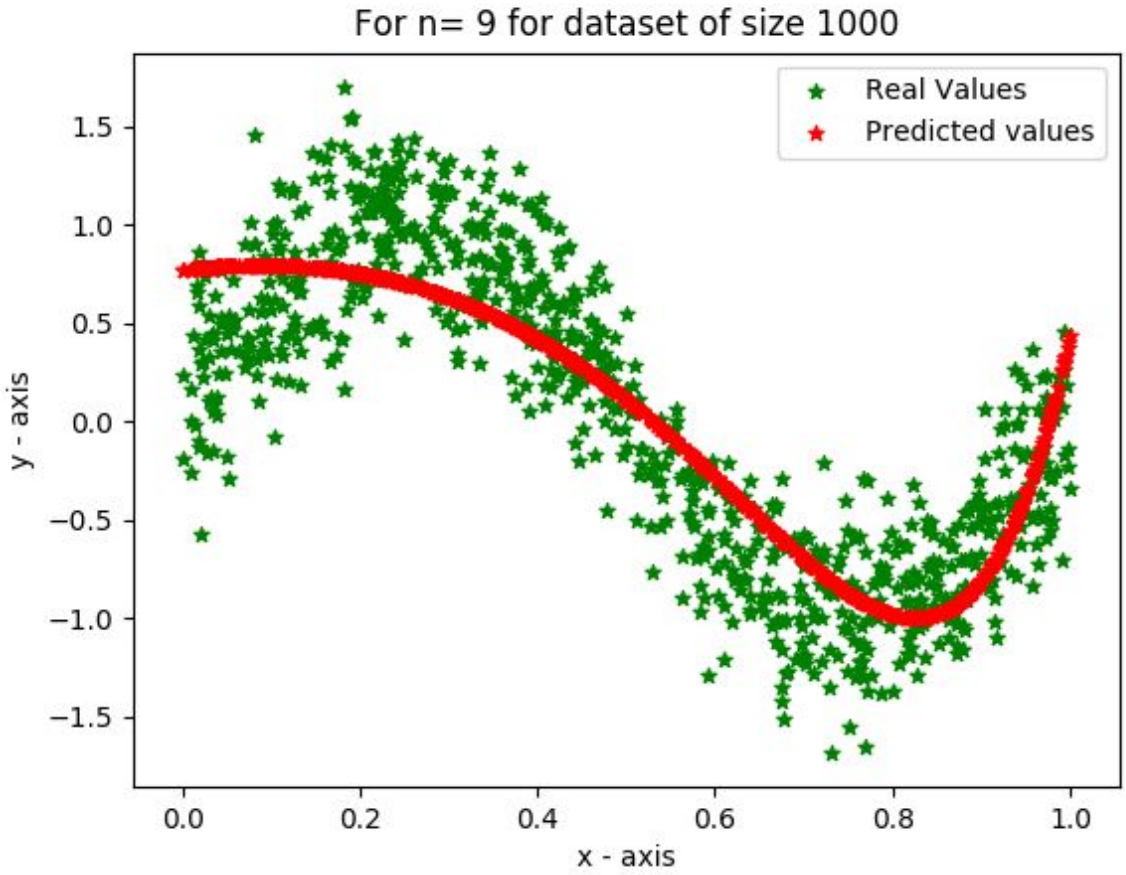

For n= 4 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0


For n= 5 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

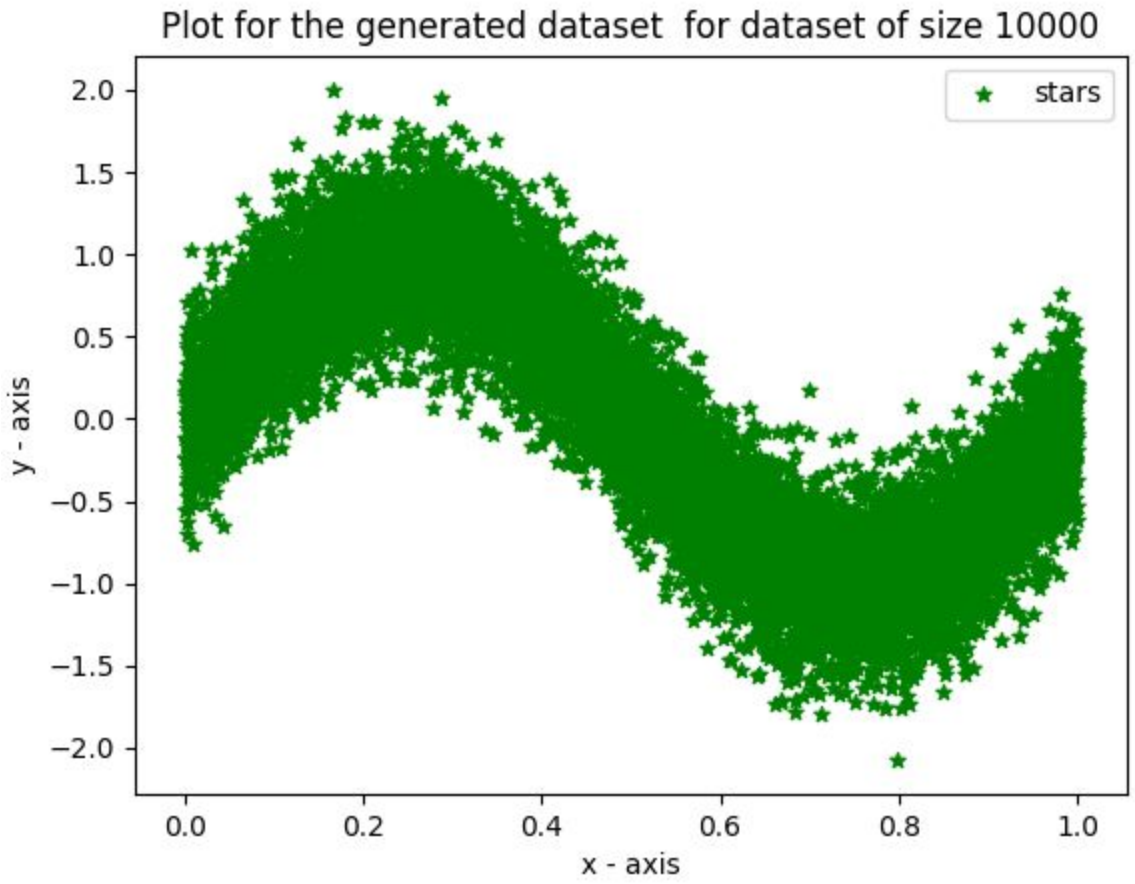

For n= 6 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

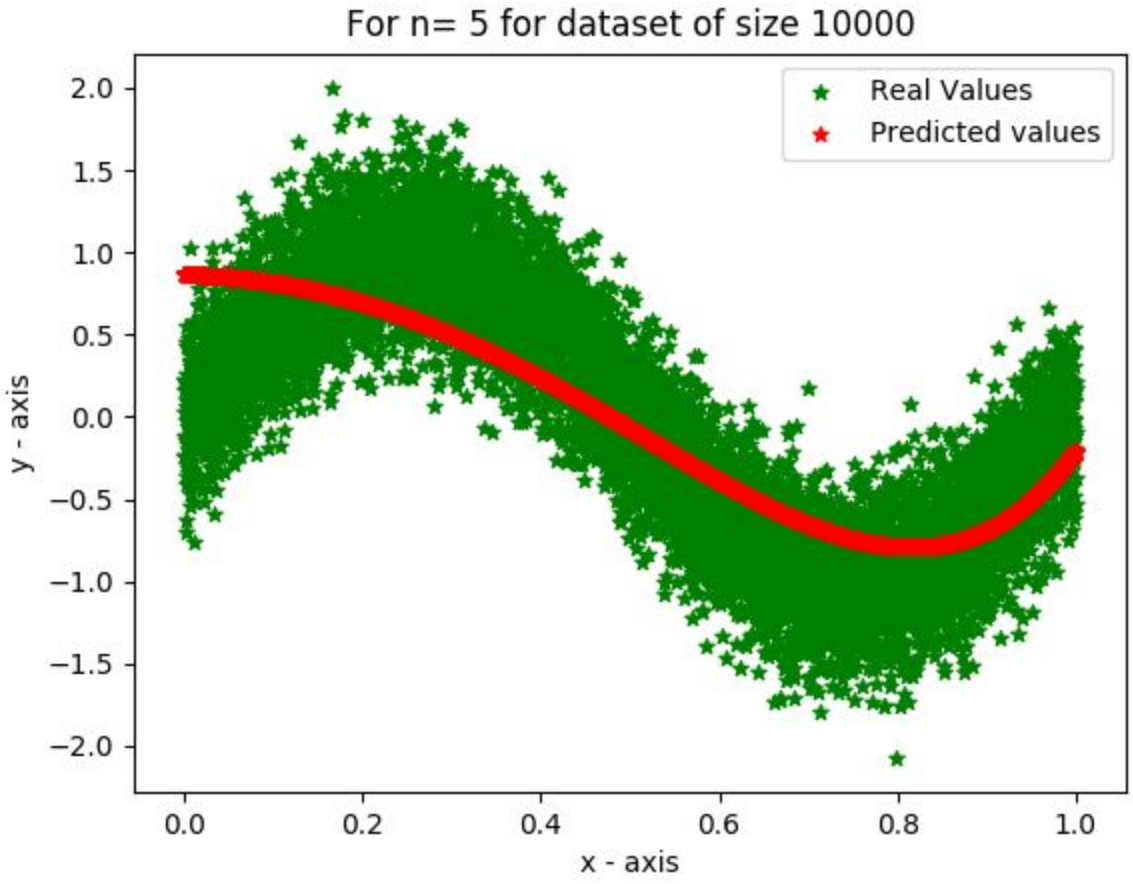

For n= 7 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

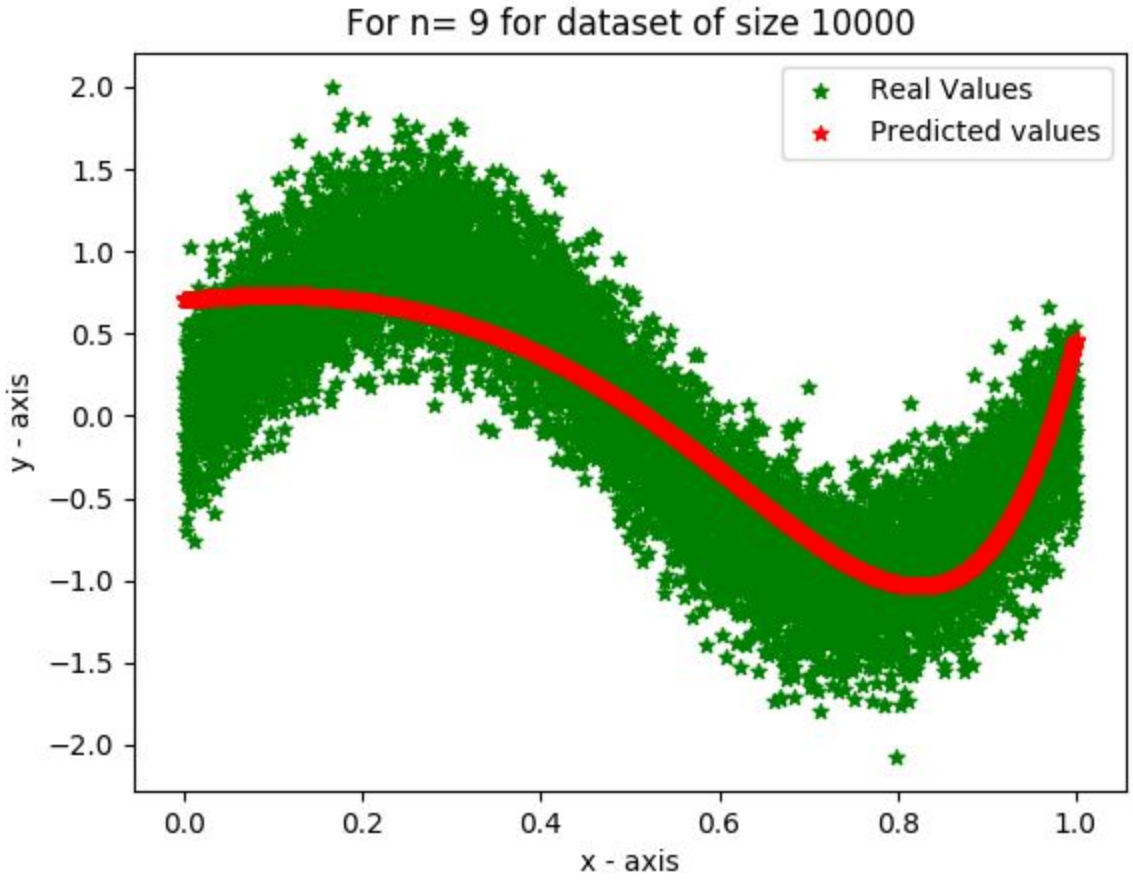

For n= 8 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

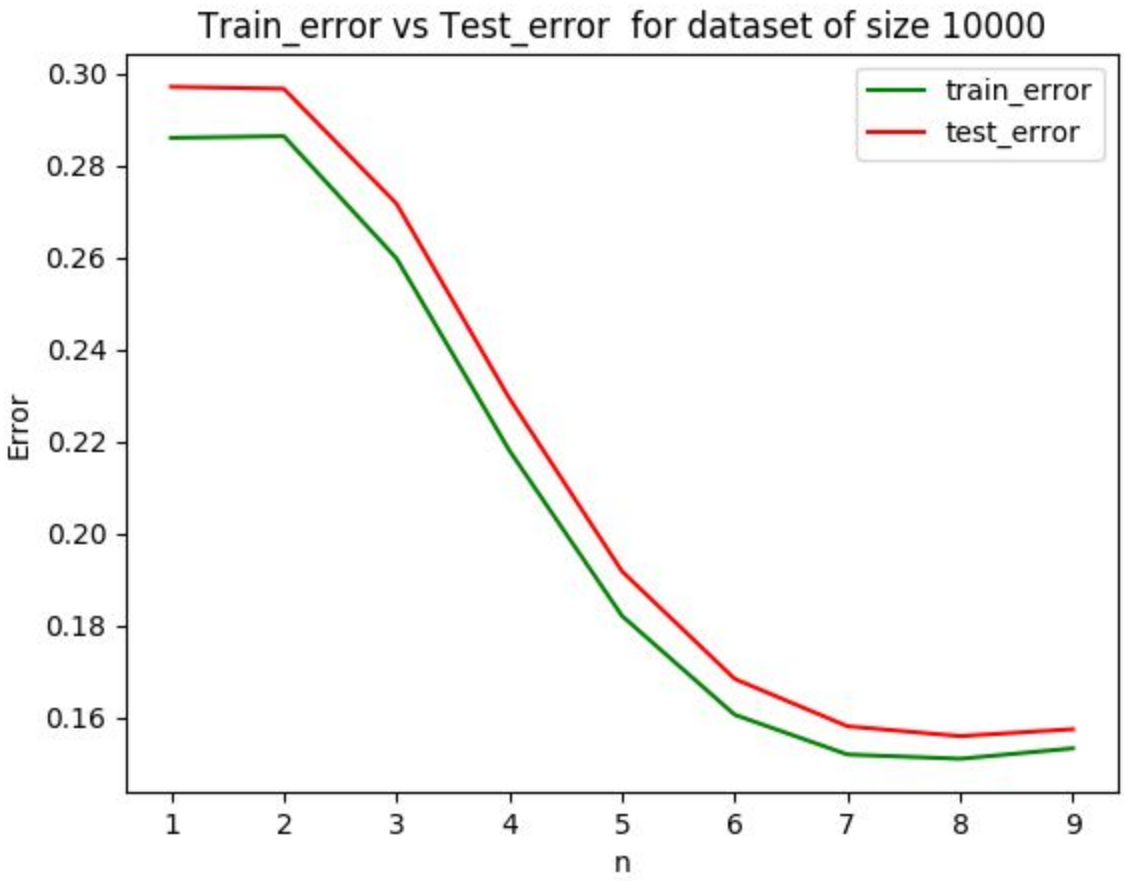

For n= 9 for dataset of size 1000
Real Values
Predicted values
y - axis
x - axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.0
0.2
0.4
0.6
0.8
1.0

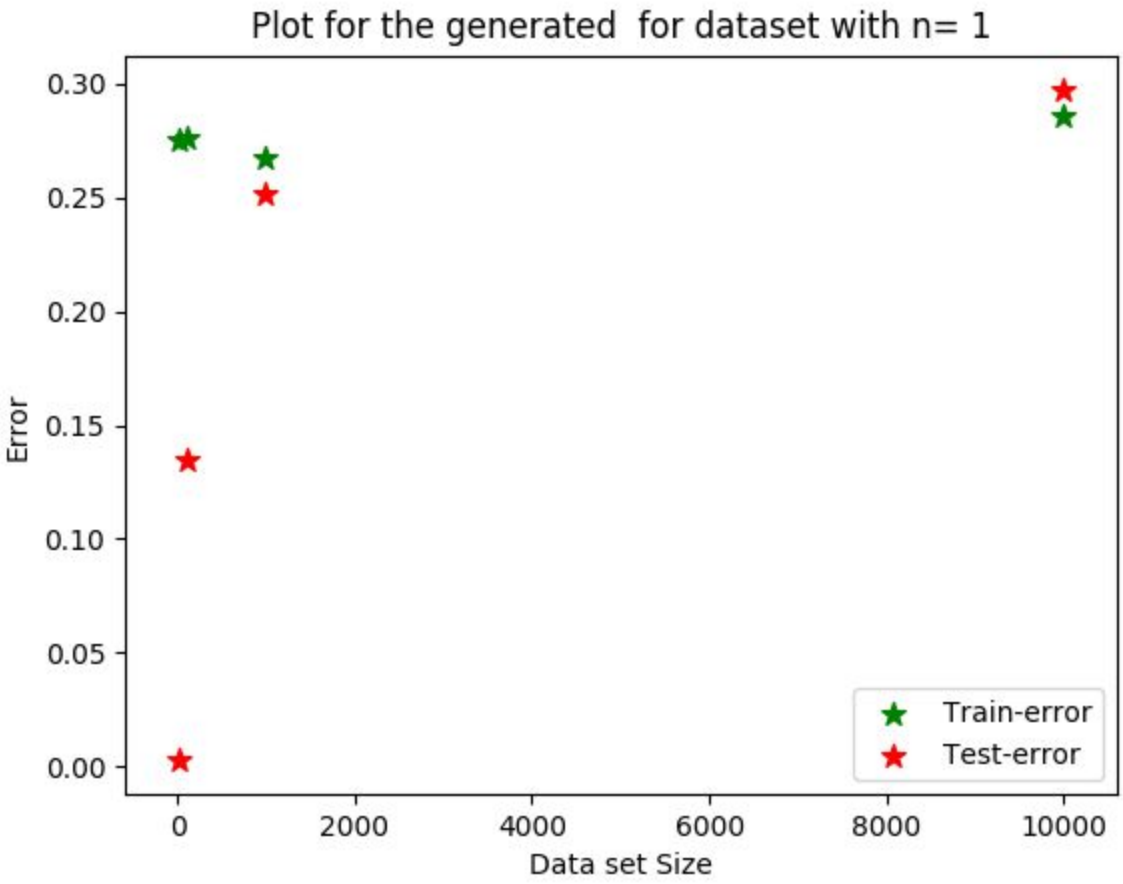

Train_error vs Test_error for dataset of size 1000
train_error
test_error
Error
0.26
0.24
0.22
0.20
0.18
0.16
0.14
1
2
3
4
5
6
7
8
9
n

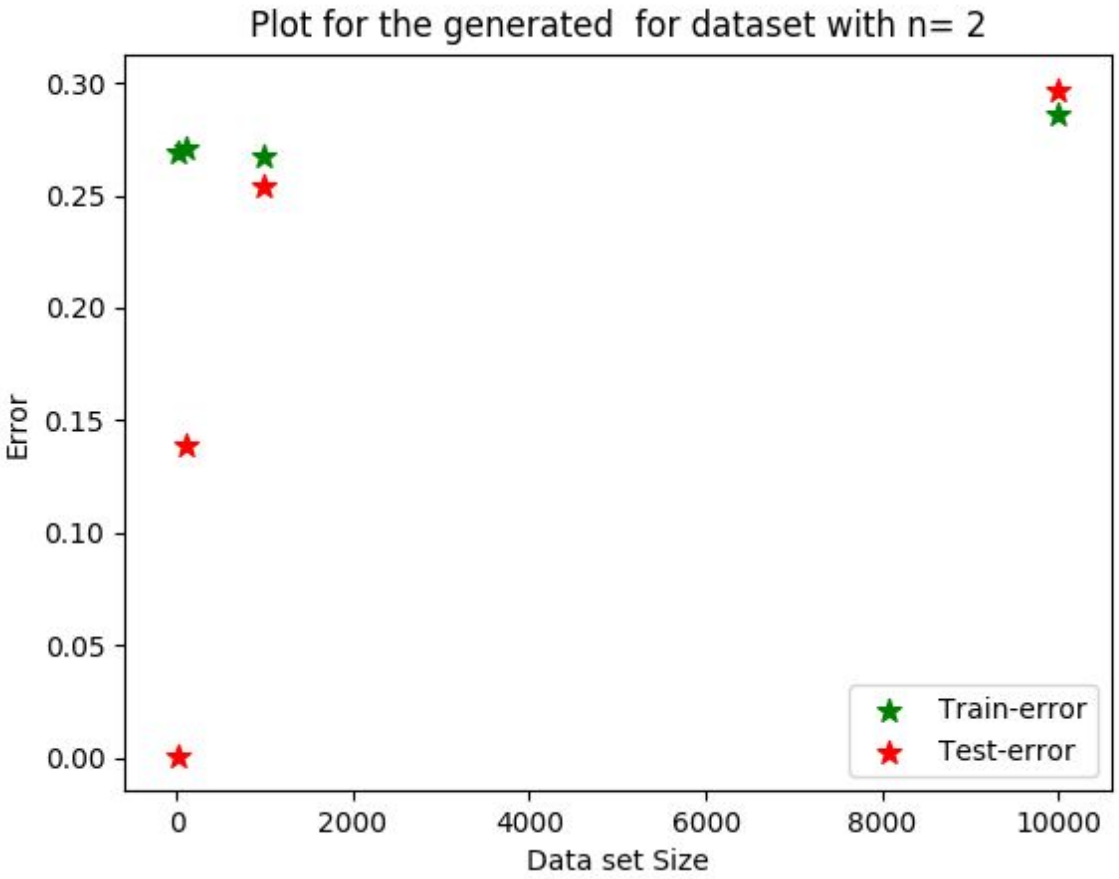

Plot for the generated dataset for dataset of size 10000
stars
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

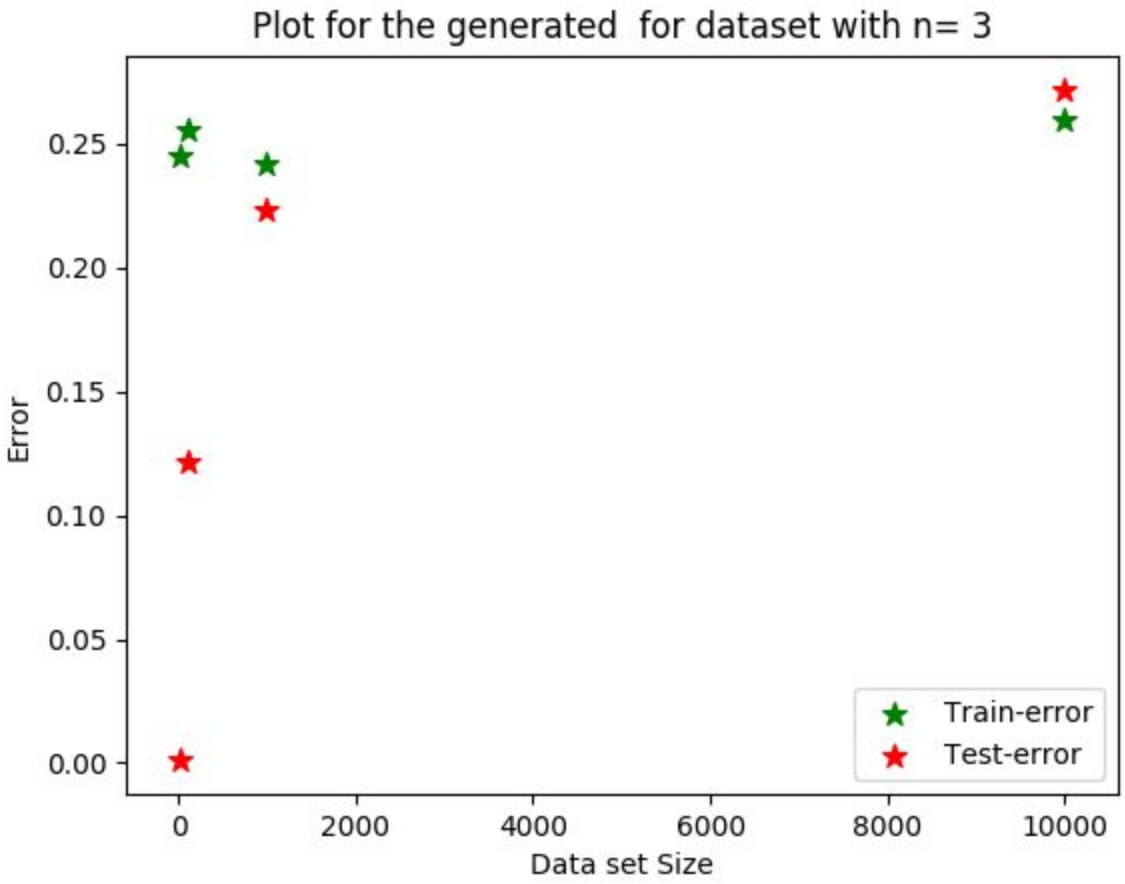

For n= 5 for dataset of size 10000
Real Values
Predicted values
y - axis
x - axis
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0.0
0.2
0.4
0.6
0.8
1.0

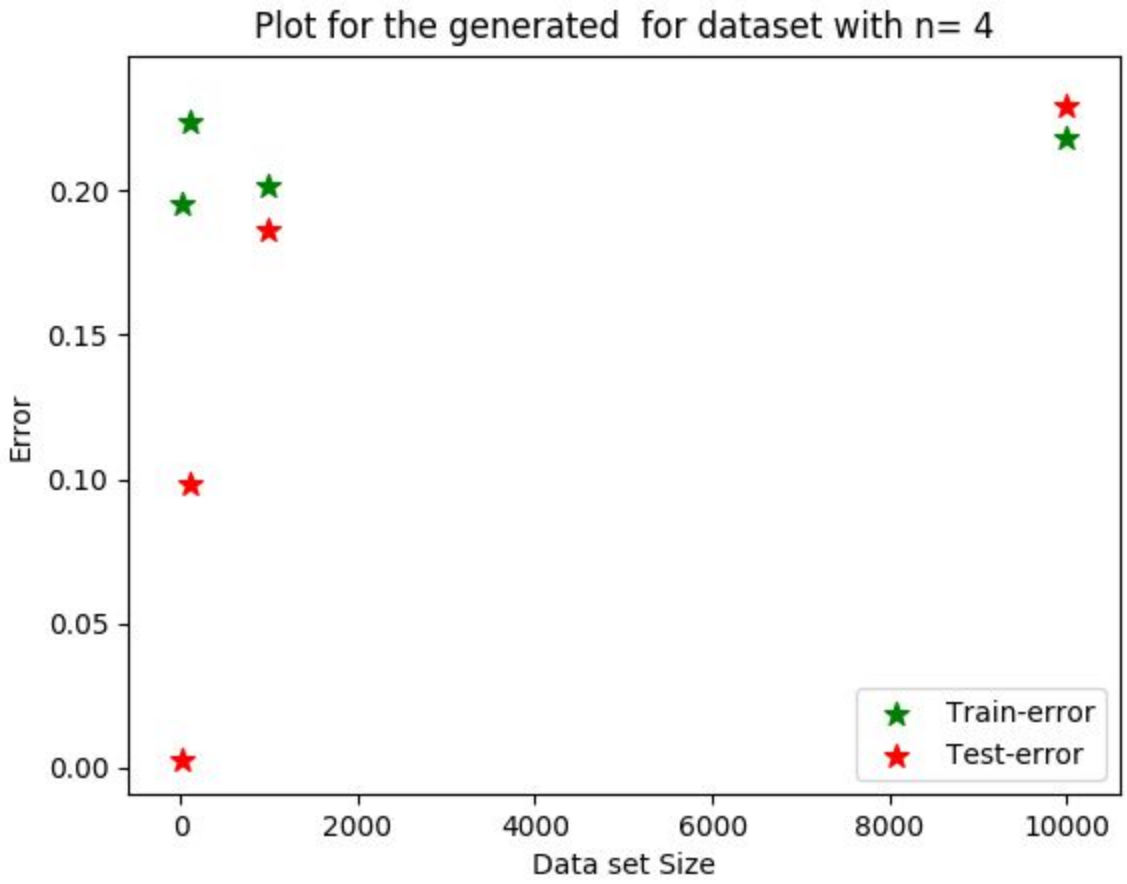

For n= 9 for dataset of size 10000
Real Values
Predicted values
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

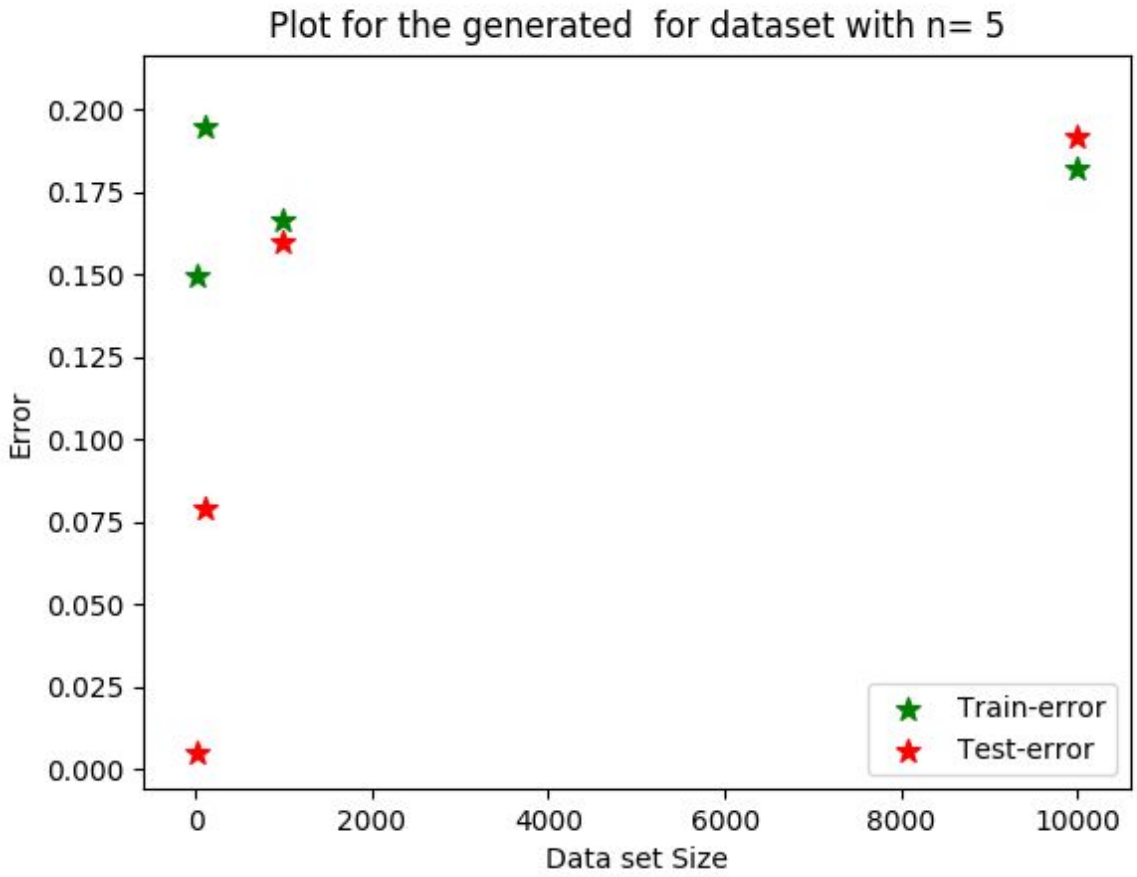

Train_error vs Test_error for dataset of size 10000
train_error
test_error
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
Error
1
2
3
4
5
6
7
8
9
n

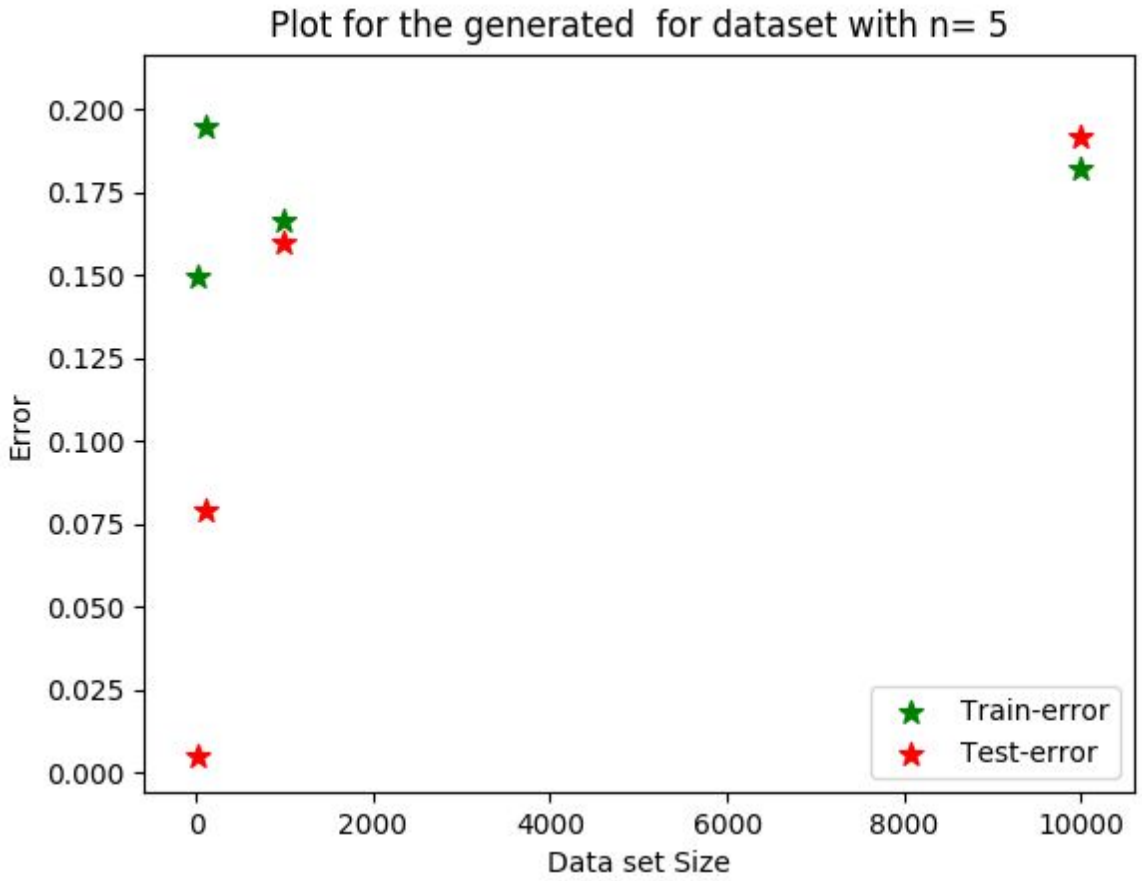

Plot for the generated for dataset with n= 1
Error
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
2000
4000
6000
8000
10000
Data set Size
Train-error
Test-error

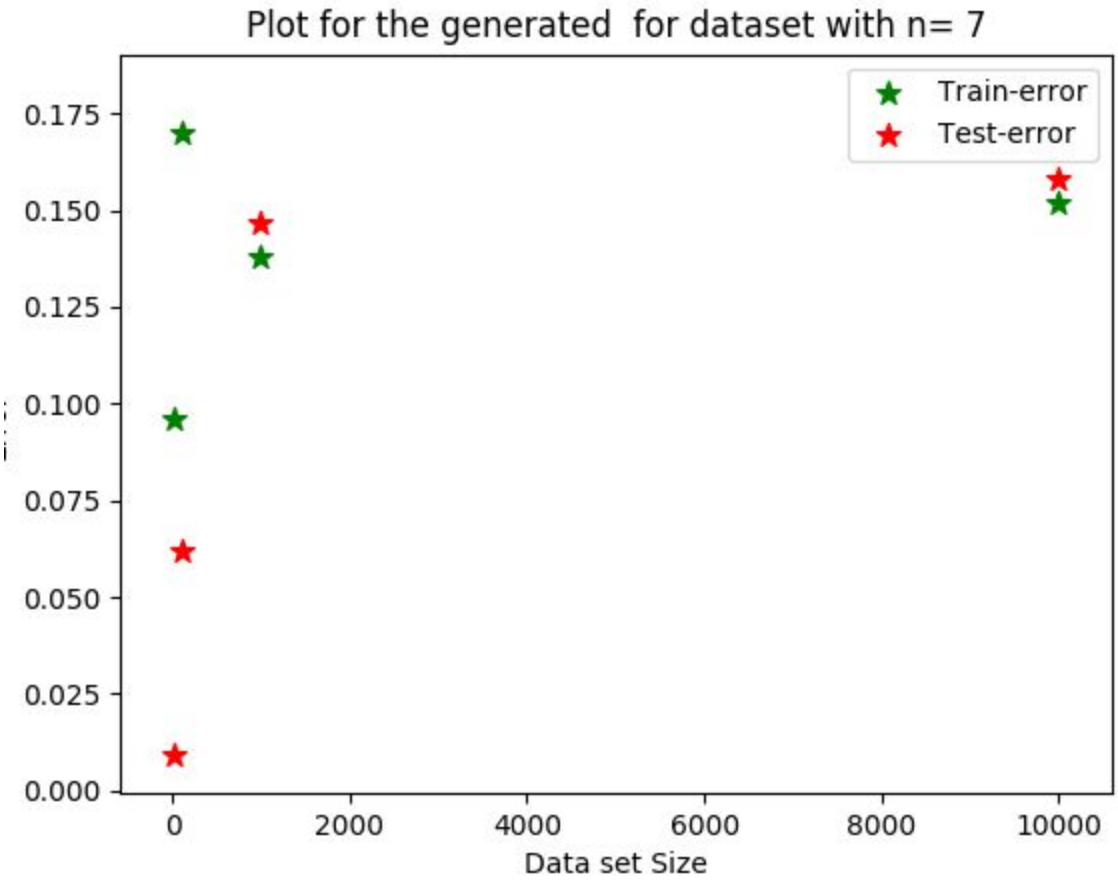

Plot for the generated for dataset with n= 2
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Error
0
2000
4000
6000
8000
10000
Data set Size
Train-error
Test-error

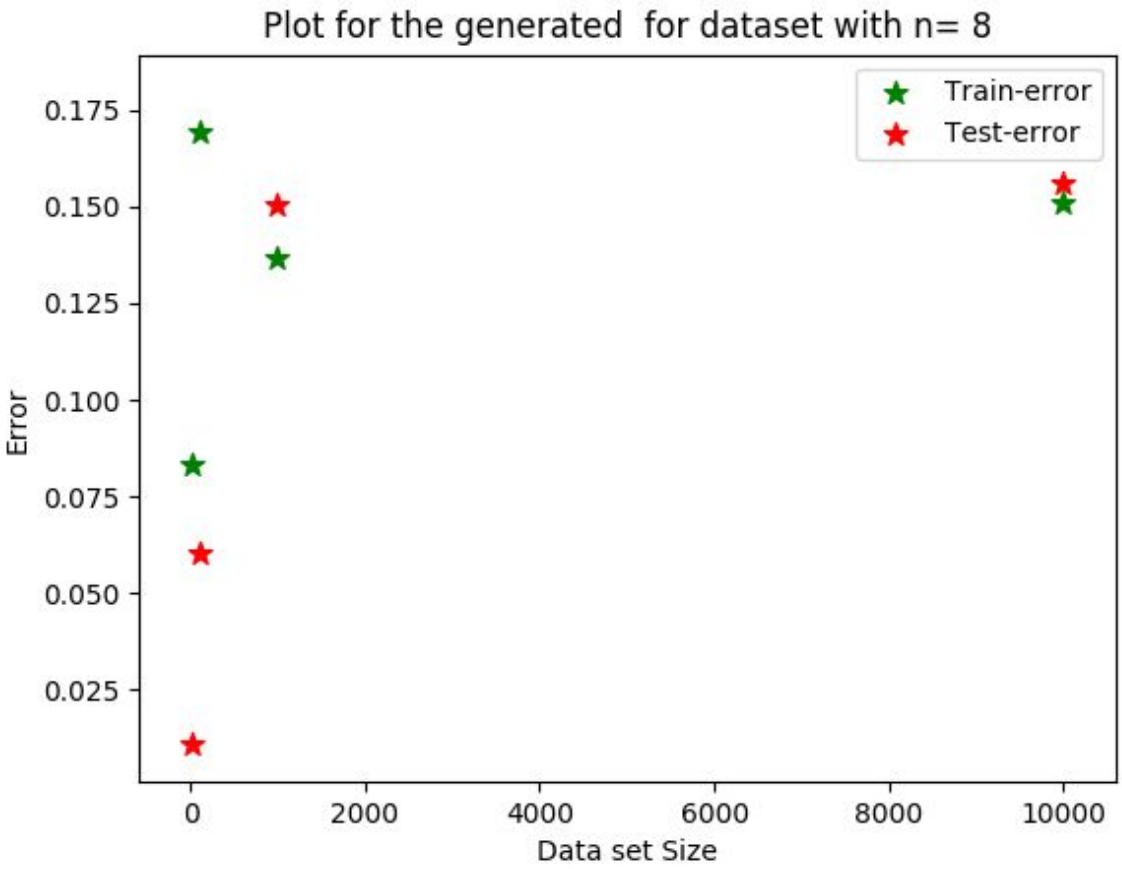

Plot for the generated for dataset with n= 3
Error
0.25
0.20
0.15
0.10
0.05
0.00
0
2000
4000
6000
8000
10000
Data set Size
Train-error
Test-error

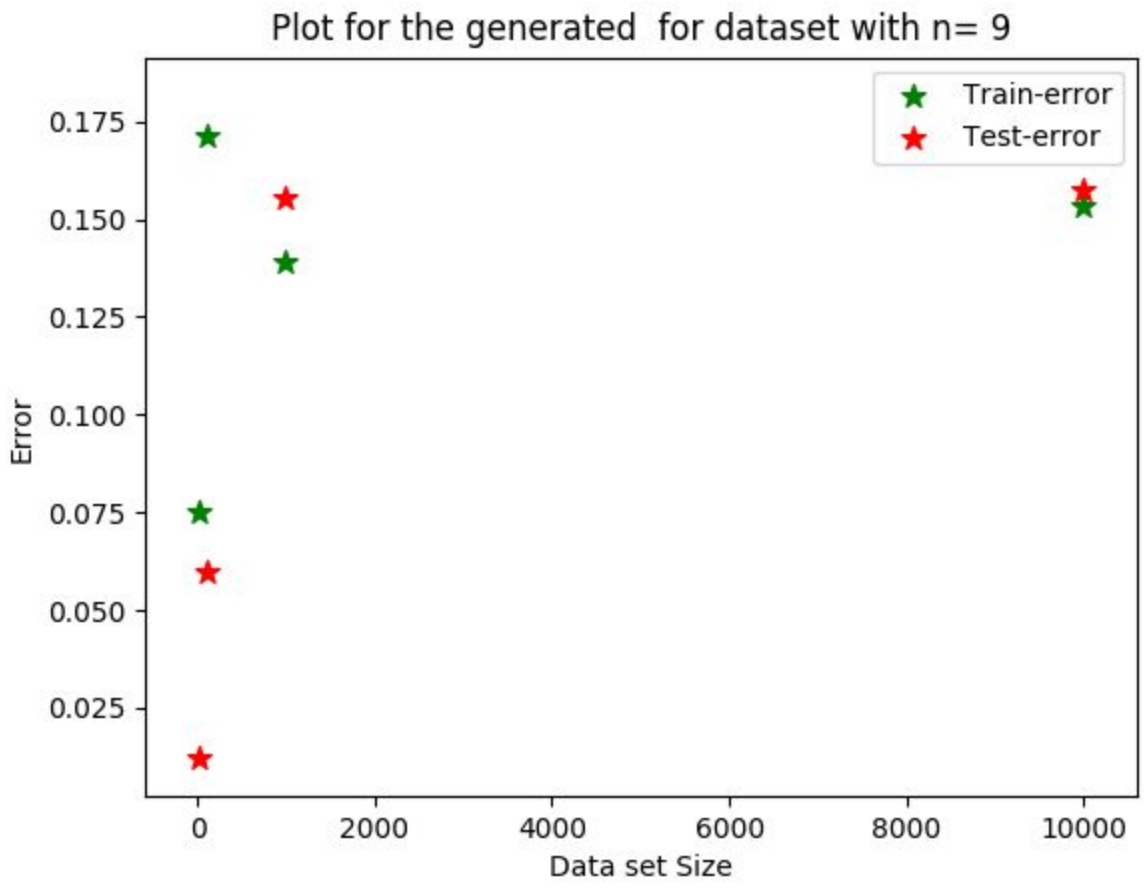

Plot for the generated for dataset with n= 4
Error
0.20
0.15
0.10
0.05
0.00
0
2000
4000
6000
8000
10000
Data set Size
Train-error
Test-error


Plot for the generated for dataset with n= 5
Error
Data set Size
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
2000
4000
6000
8000
10000
Train-error
Test-error

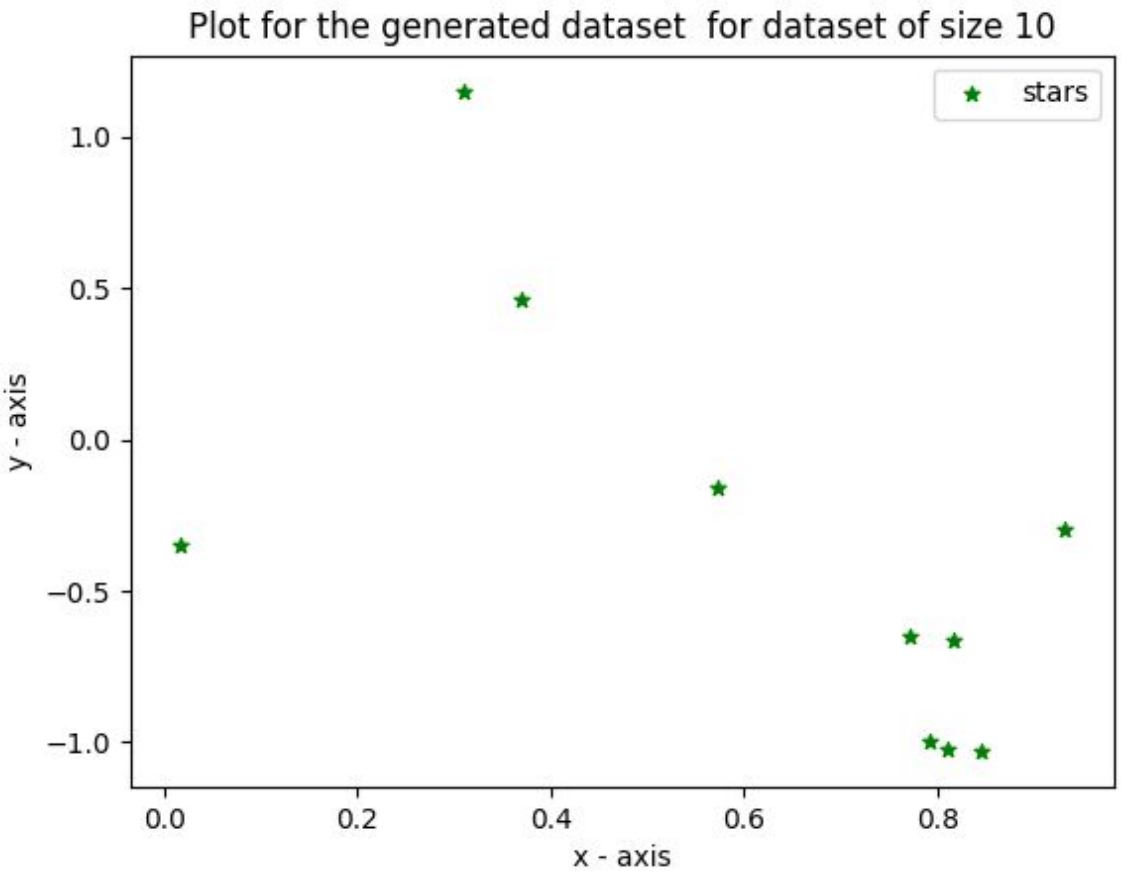

Plot for the generated for dataset with n= 5
Error
Data set Size
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
2000
4000
6000
8000
10000
Train-error
Test-error

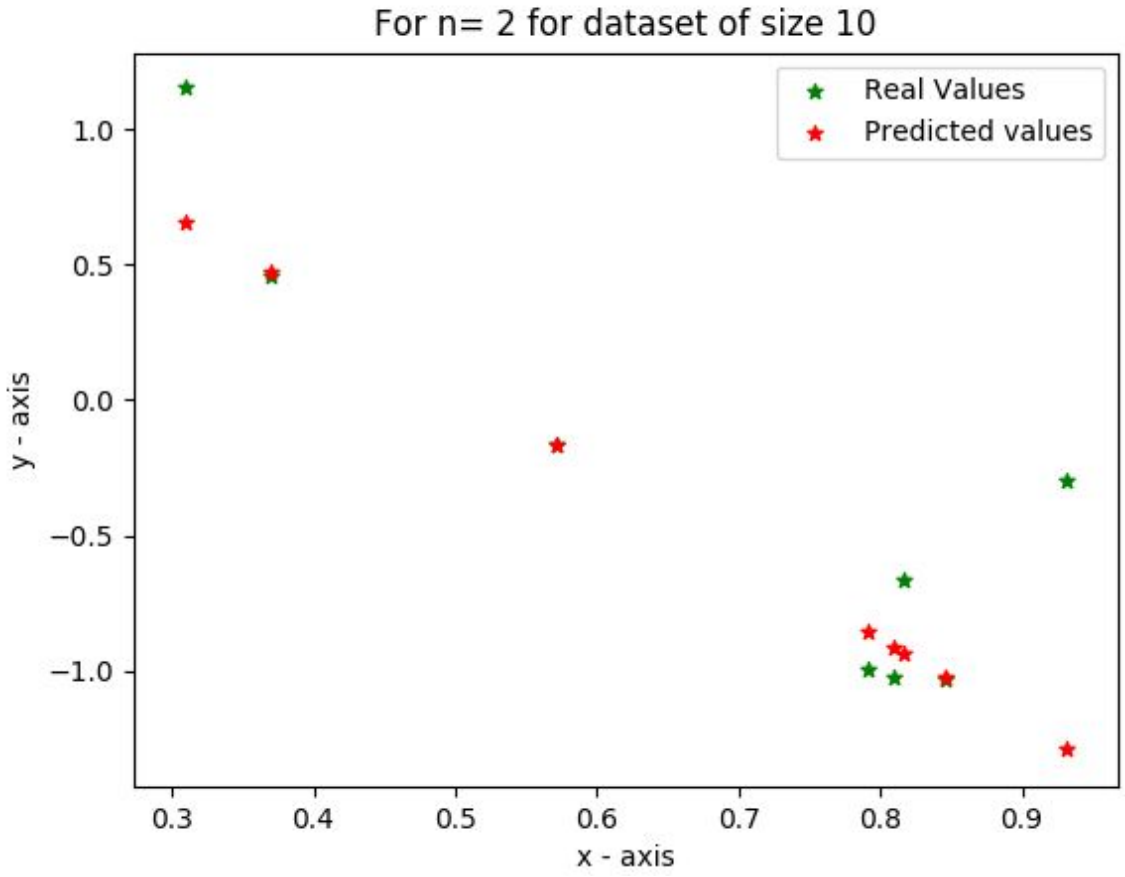

Plot for the generated for dataset with n= 7
Train-error
Test-error
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
2000
4000
6000
8000
10000
Data set Size

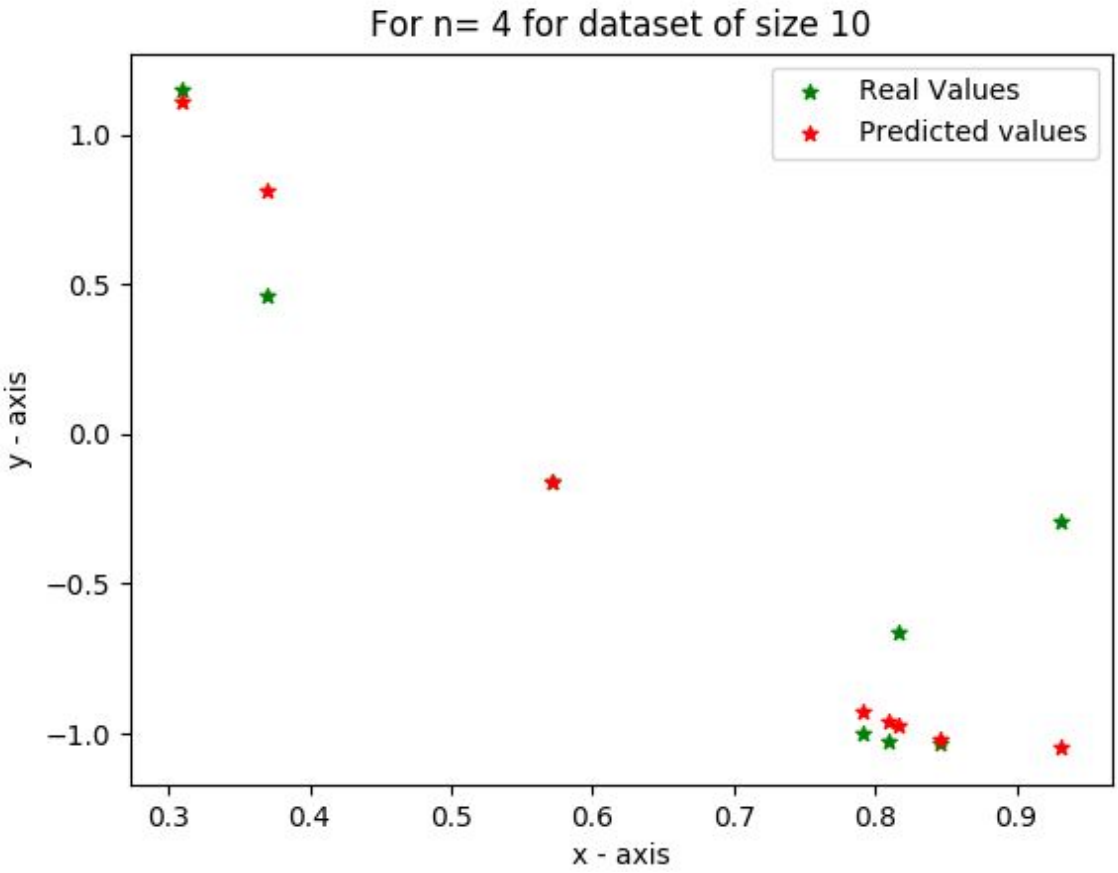

Plot for the generated for dataset with n= 8
Train-error
Test-error
0.175
0.150
0.125
0.100
0.075
0.050
0.025
Error
0
2000
4000
6000
8000
10000
Data set Size

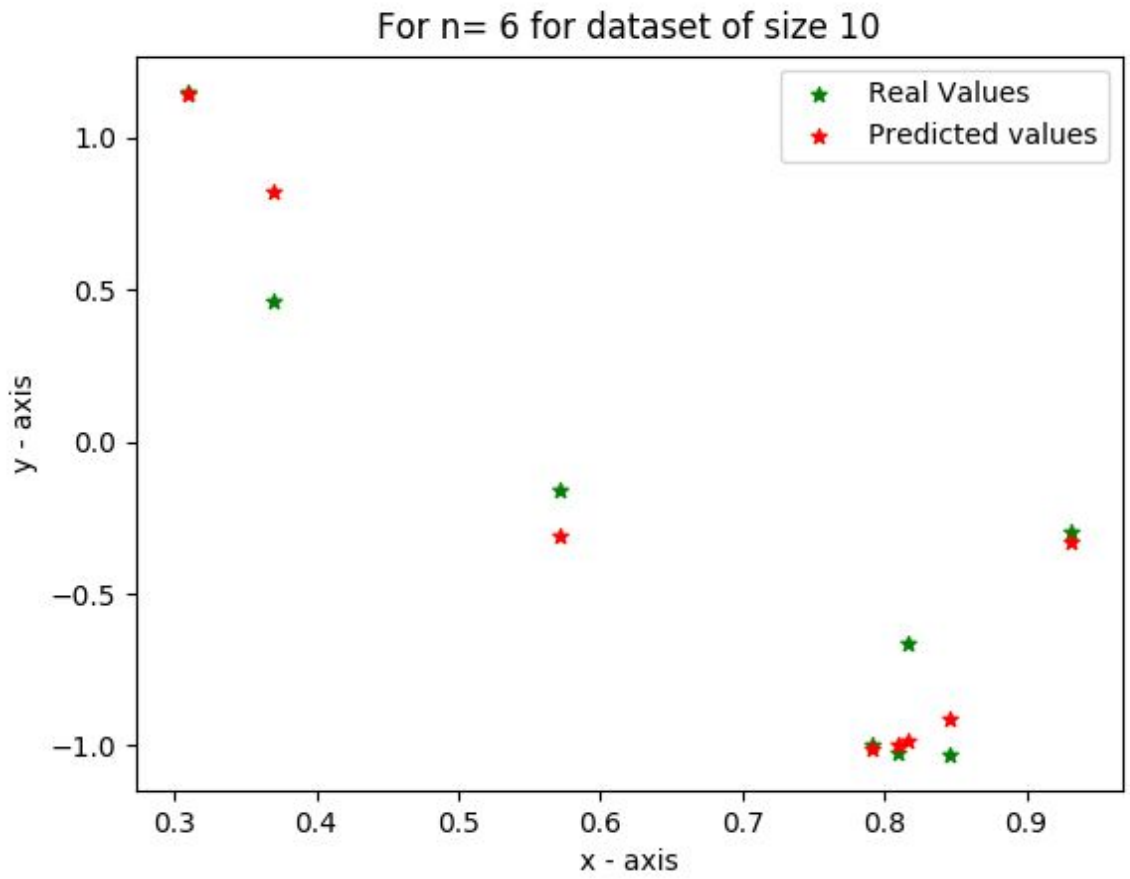


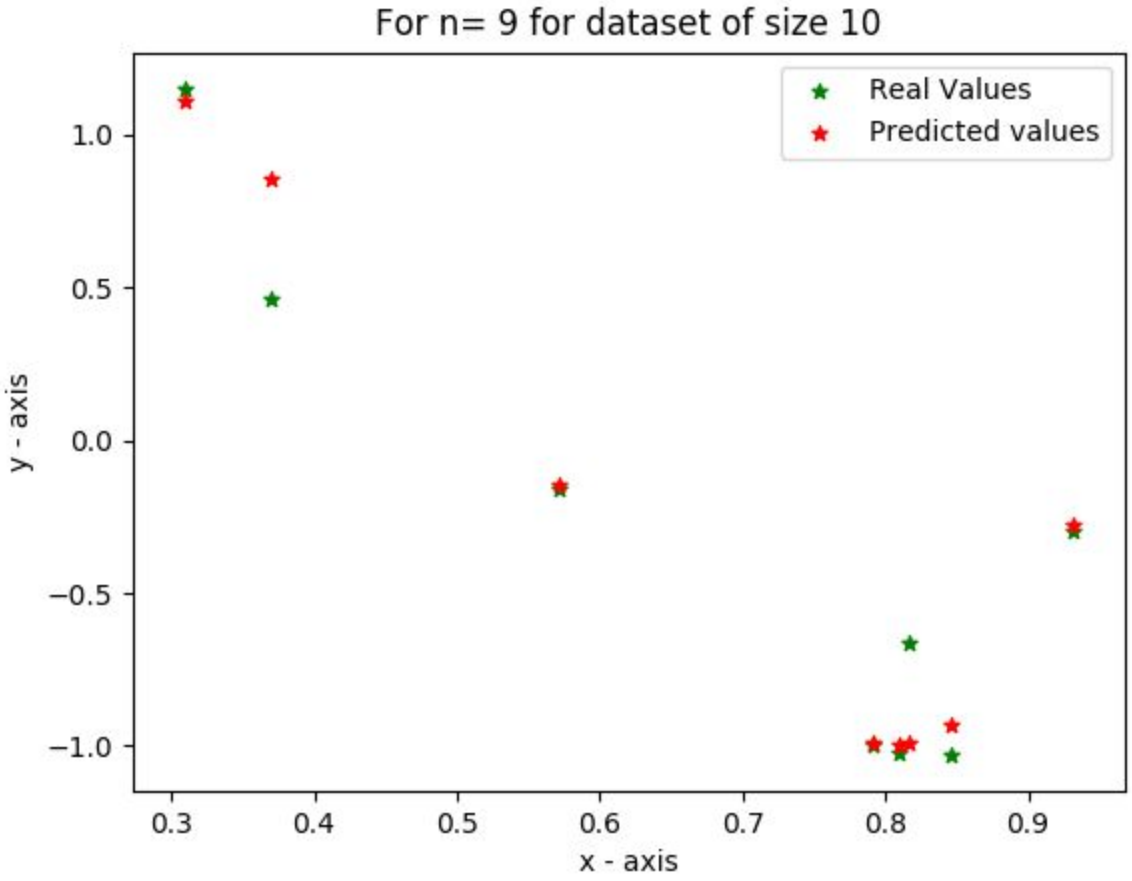
For Gradient descent with mean error function


Plot for the generated dataset for dataset of size 10
stars
1.0
0.5
0.0
−0.5
−1.0
y - axis
0.0
0.2
0.4
0.6
0.8
x - axis

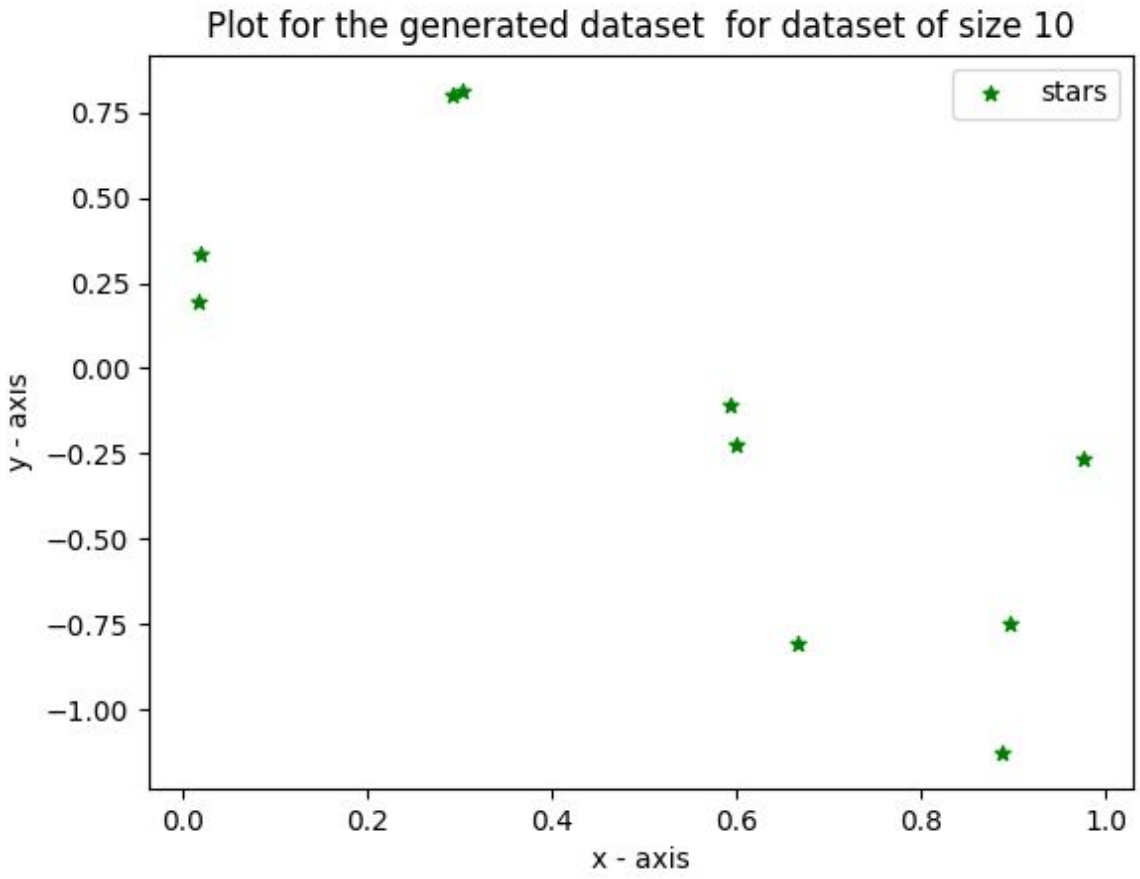

For n= 2 for dataset of size 10
Real Values
Predicted values
1.0
0.5
0.0
−0.5
−1.0
y - axis
0.3
0.4
0.5
0.6
0.7
0.8
0.9
x - axis

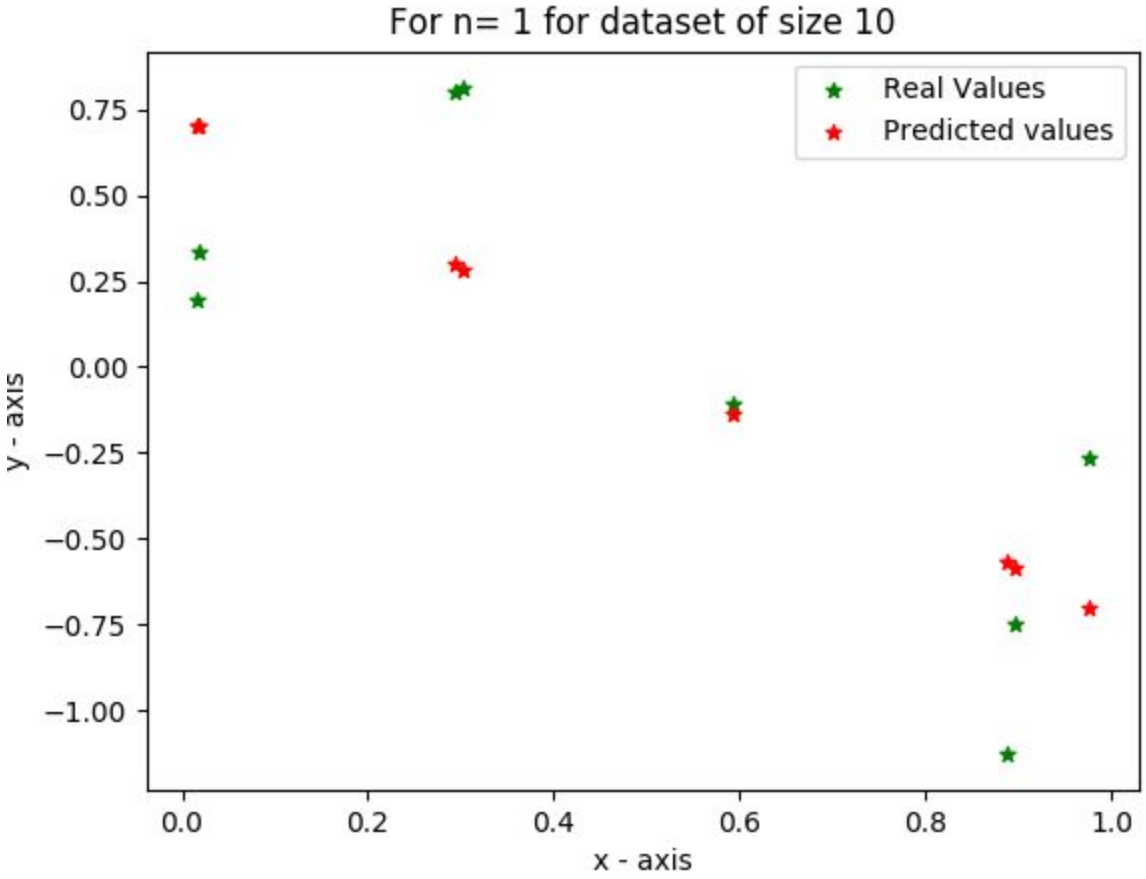

For n= 4 for dataset of size 10
Real Values
Predicted values
1.0
0.5
0.0
−0.5
−1.0
y - axis
0.3
0.4
0.5
0.6
0.7
0.8
0.9
x - axis

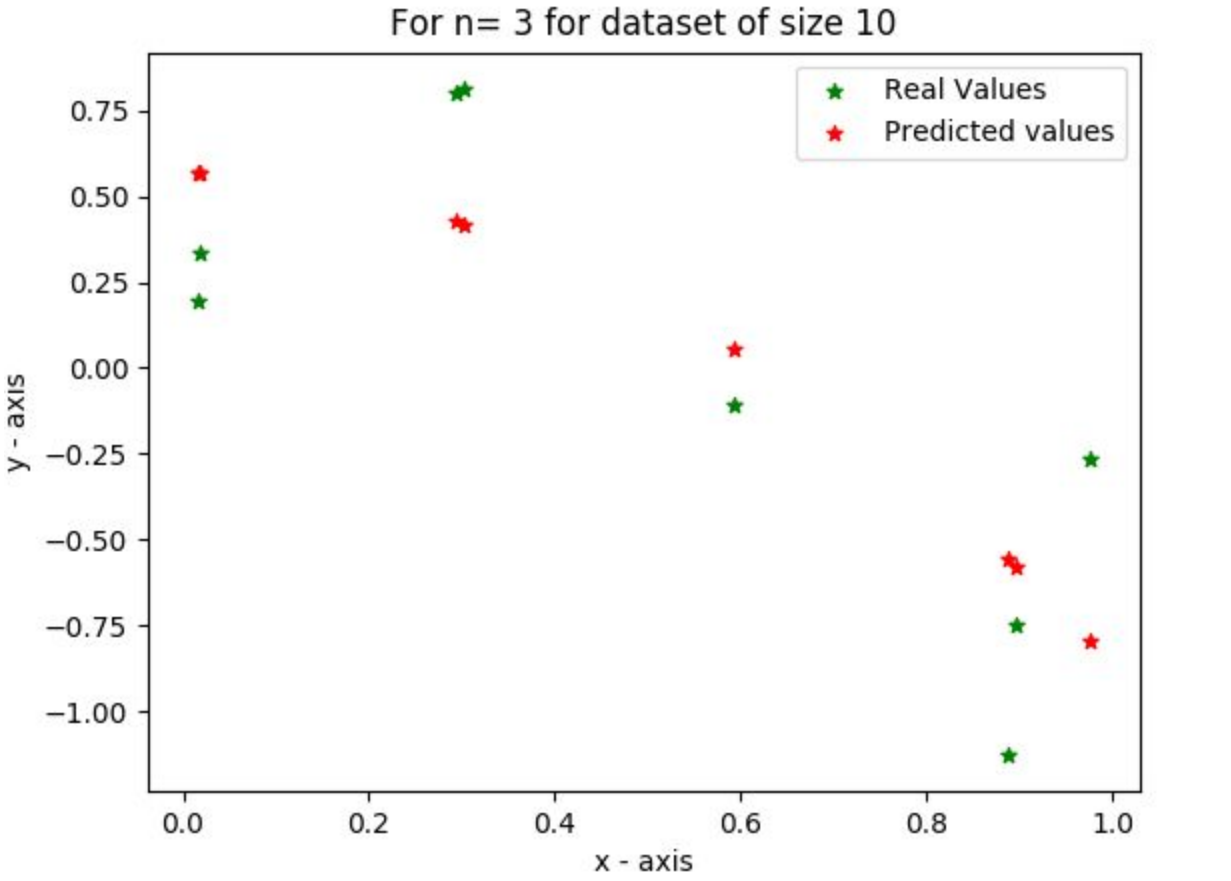

For n= 6 for dataset of size 10
Real Values
Predicted values
1.0
0.5
0.0
−0.5
−1.0
y - axis
0.3
0.4
0.5
0.6
0.7
0.8
0.9
x - axis

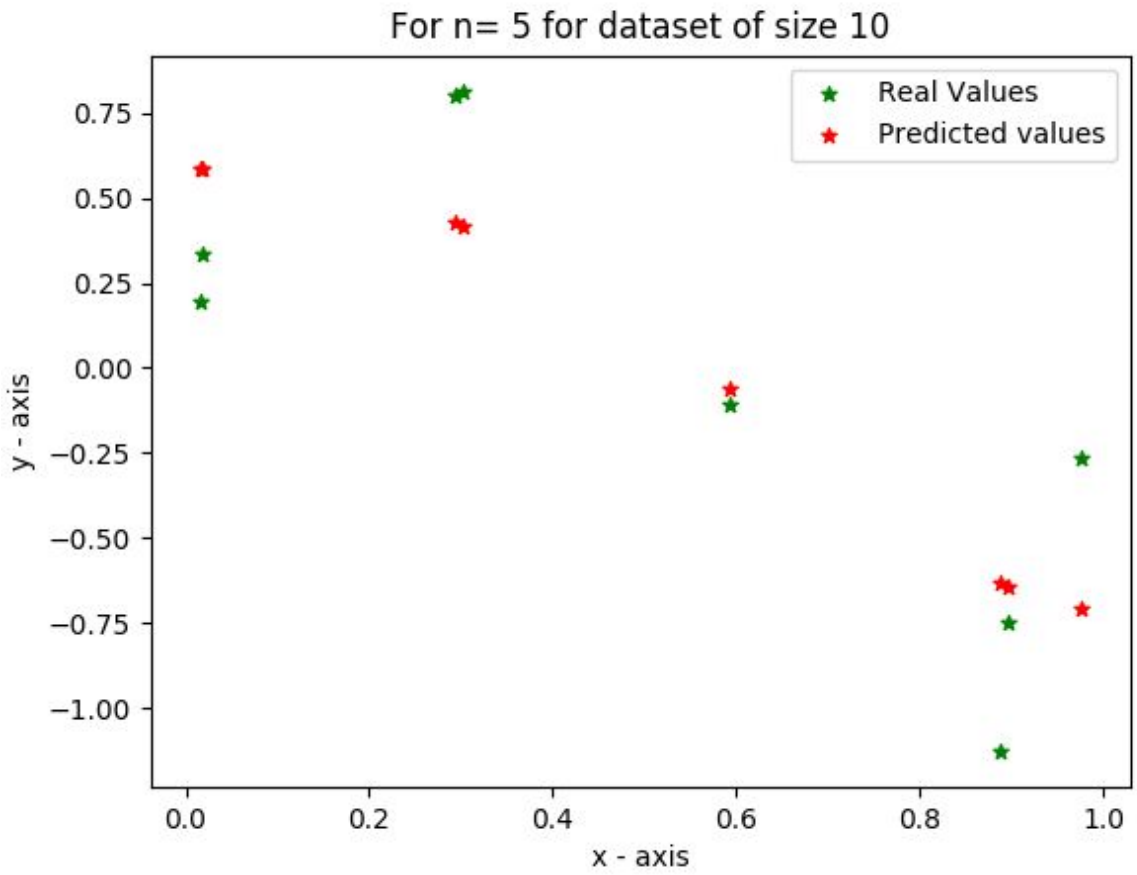

For n= 9 for dataset of size 10
Real Values
Predicted values
1.0
0.5
0.0
−0.5
−1.0
y - axis
0.3
0.4
0.5
0.6
0.7
0.8
0.9
x - axis

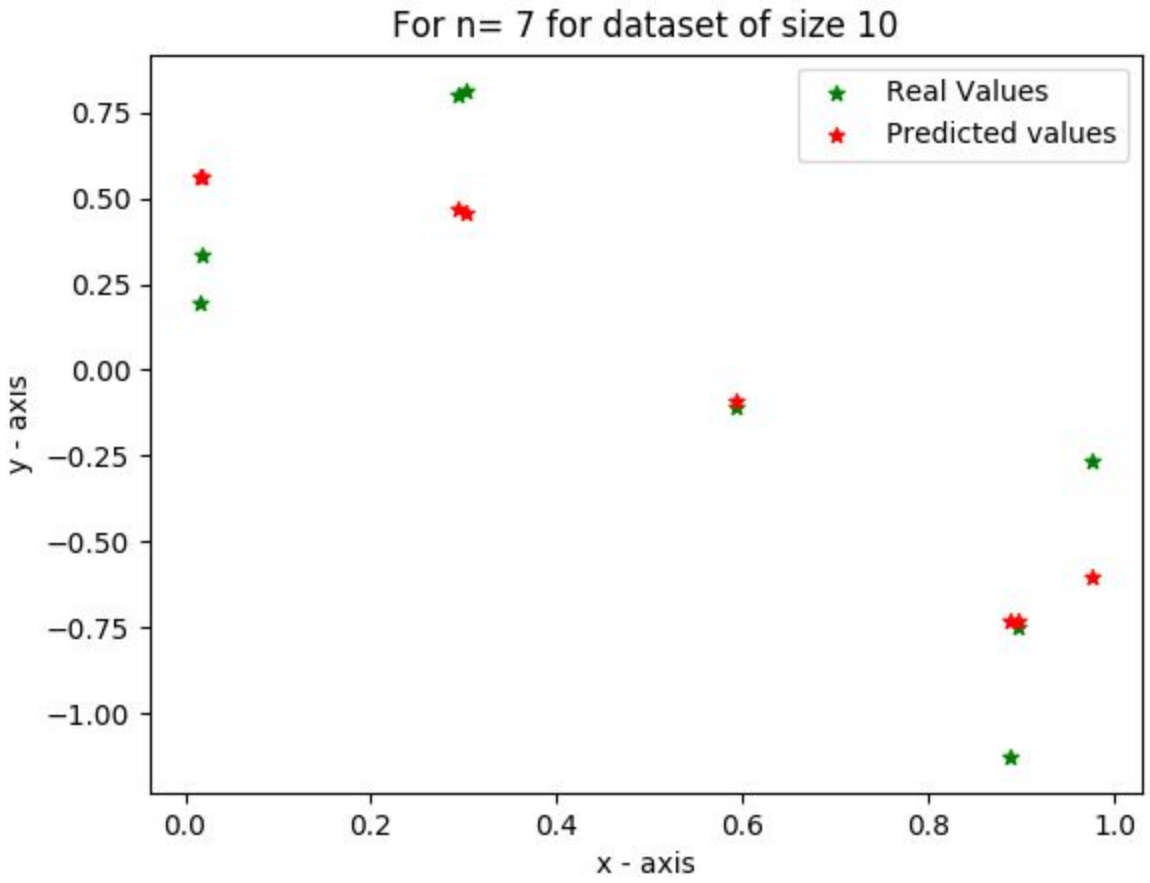
For gradient descent with Fourth error function

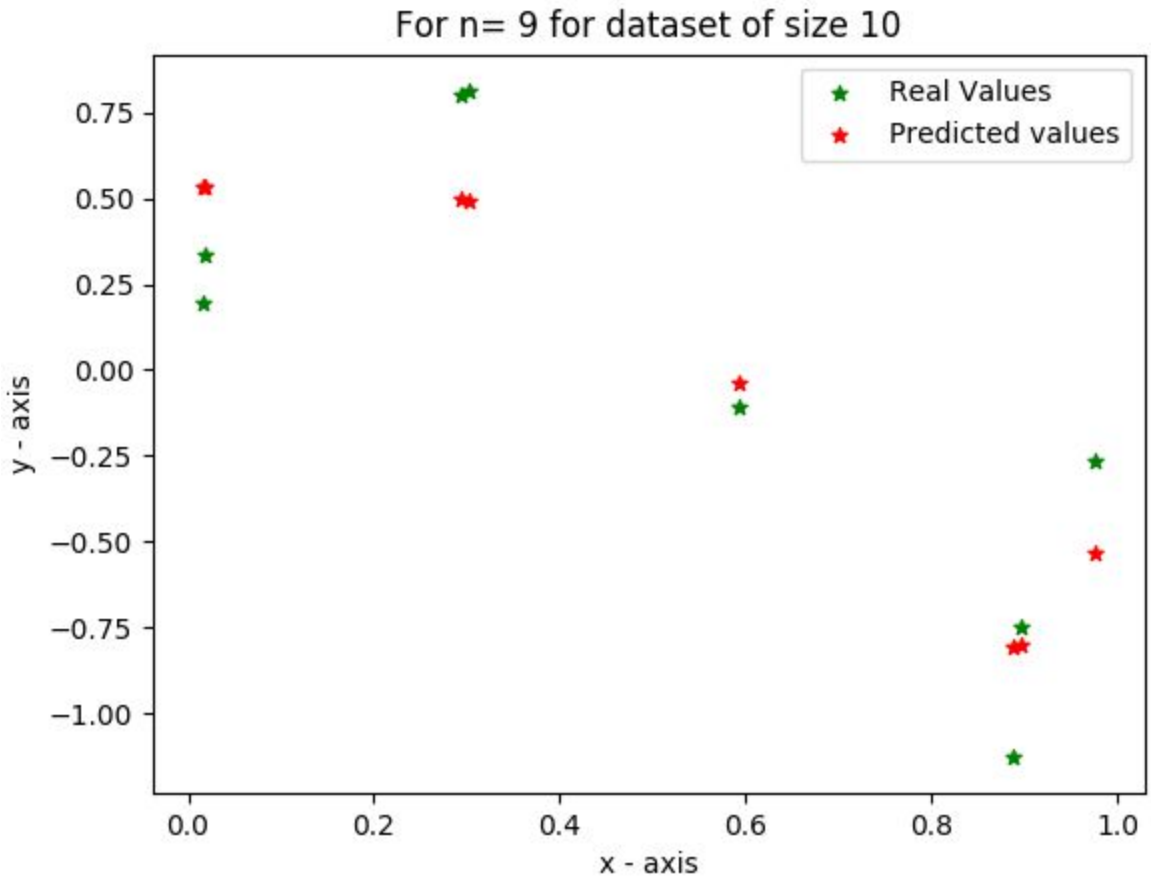

Plot for the generated dataset for dataset of size 10
stars
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

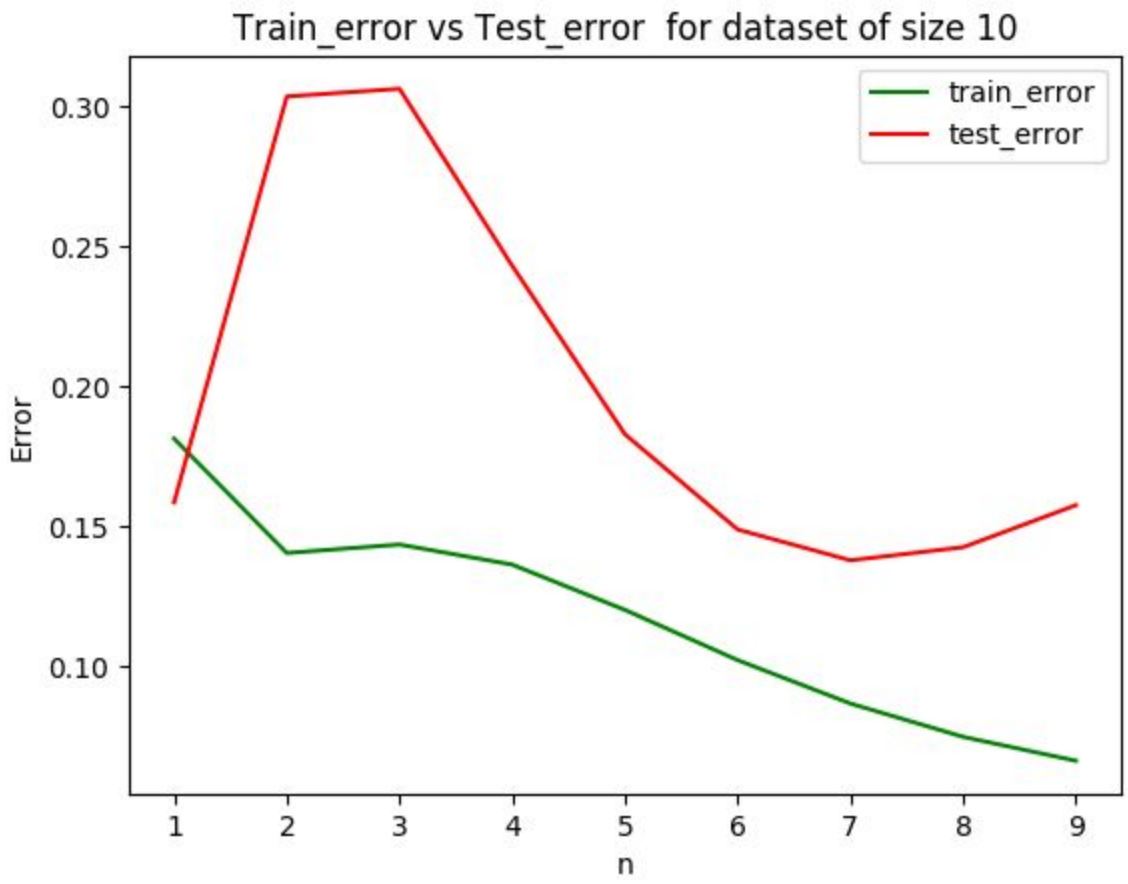

For n= 1 for dataset of size 10
Real Values
Predicted values
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis


For n= 3 for dataset of size 10
Real Values
Predicted values
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

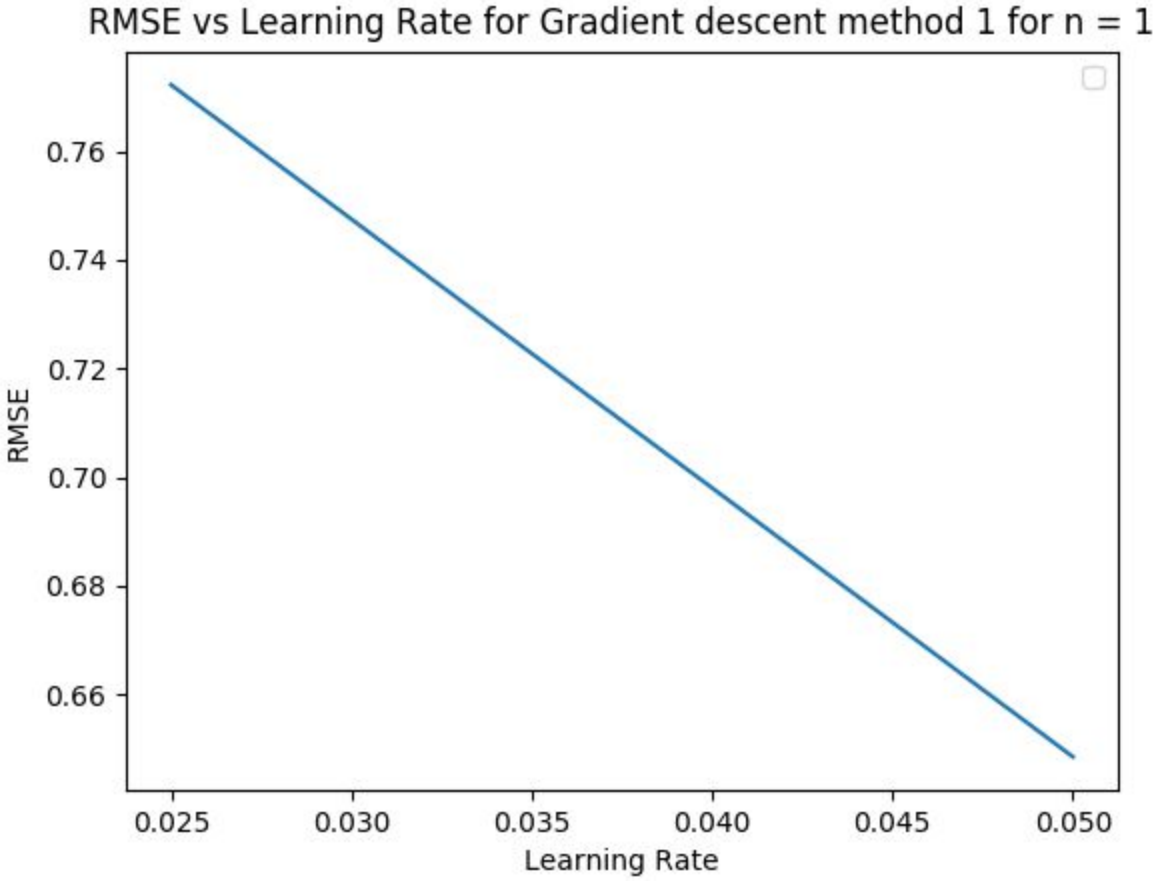

For n= 5 for dataset of size 10
Real Values
Predicted values
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

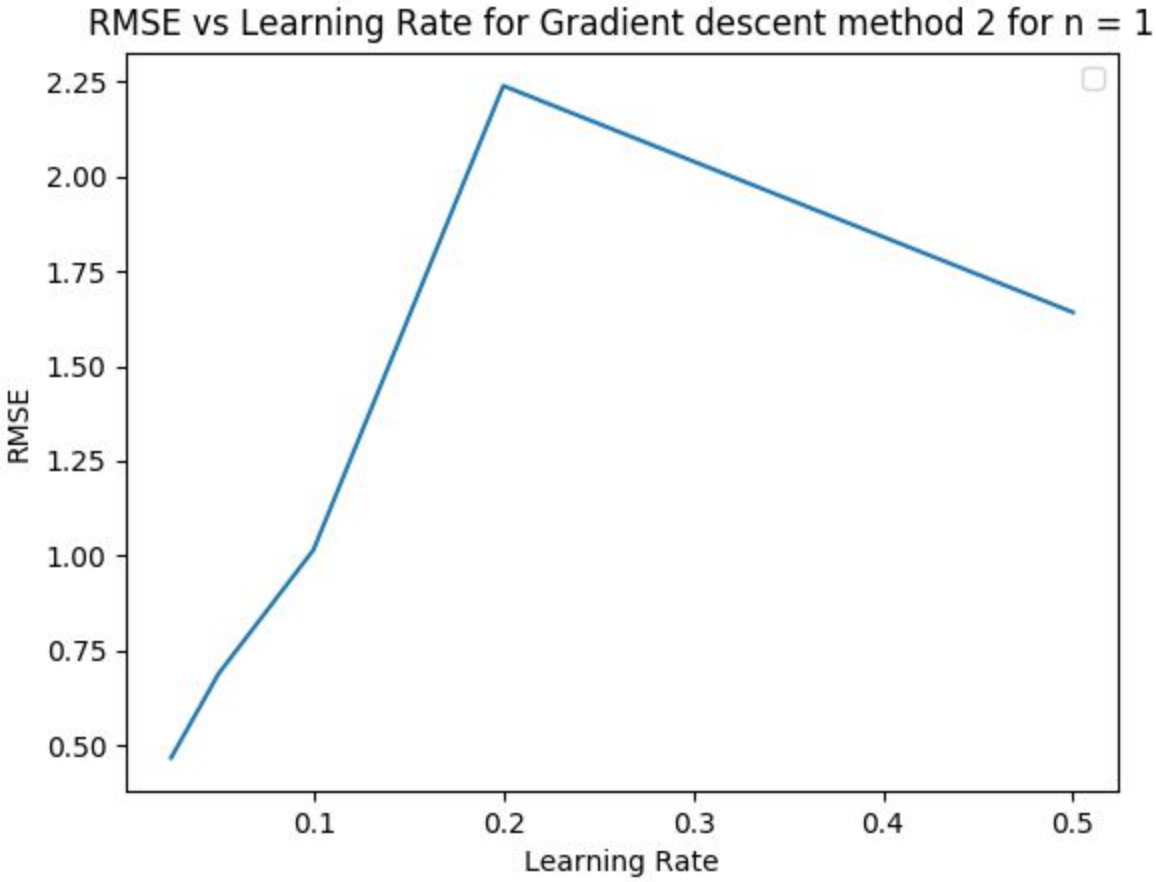

For n= 7 for dataset of size 10
Real Values
Predicted values
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

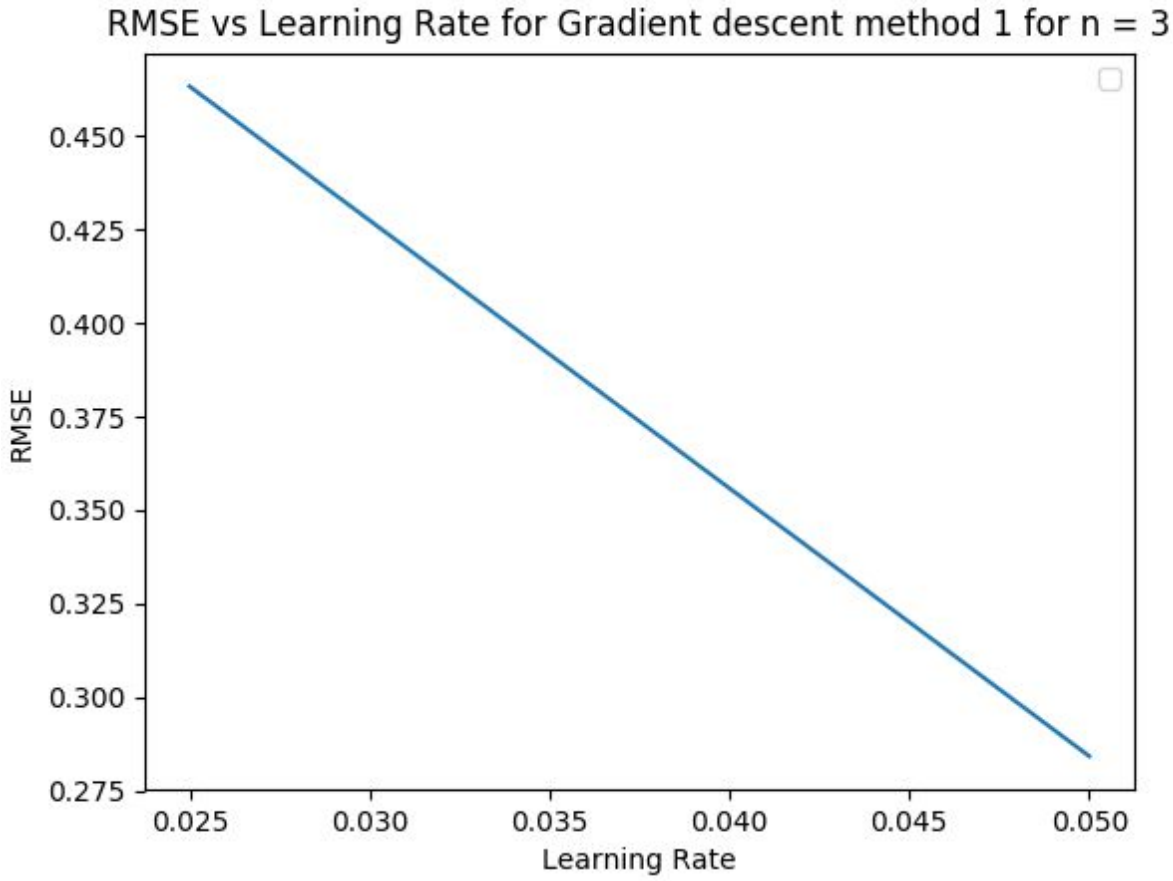

For n= 9 for dataset of size 10
Real Values
Predicted values
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
y - axis
0.0
0.2
0.4
0.6
0.8
1.0
x - axis

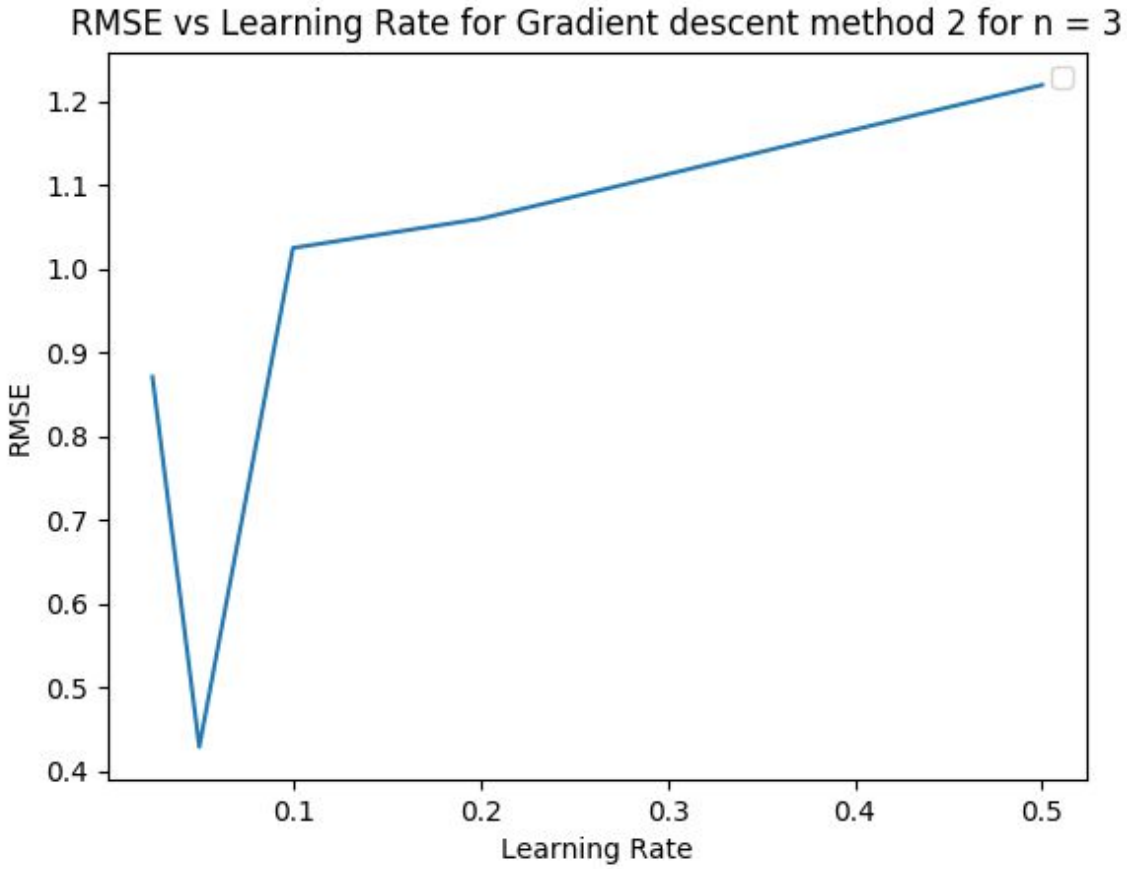


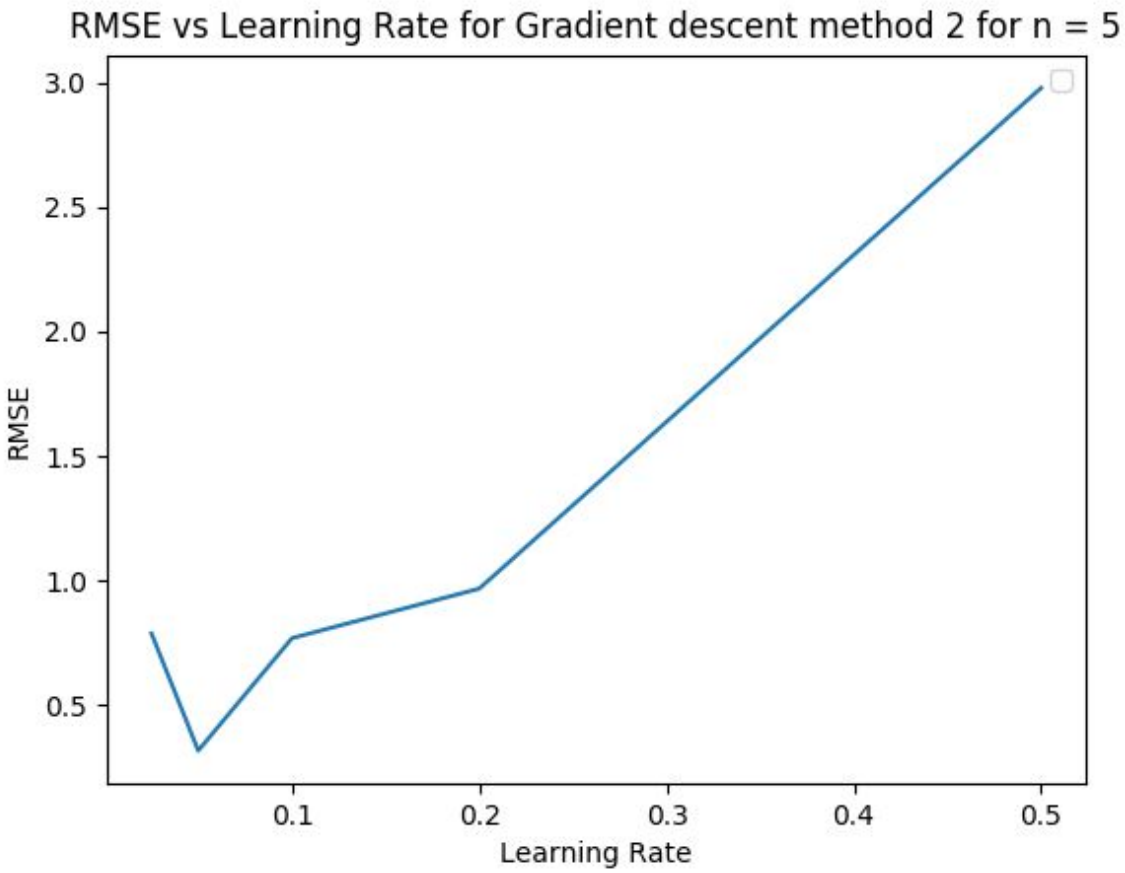
RMSE vs alpha

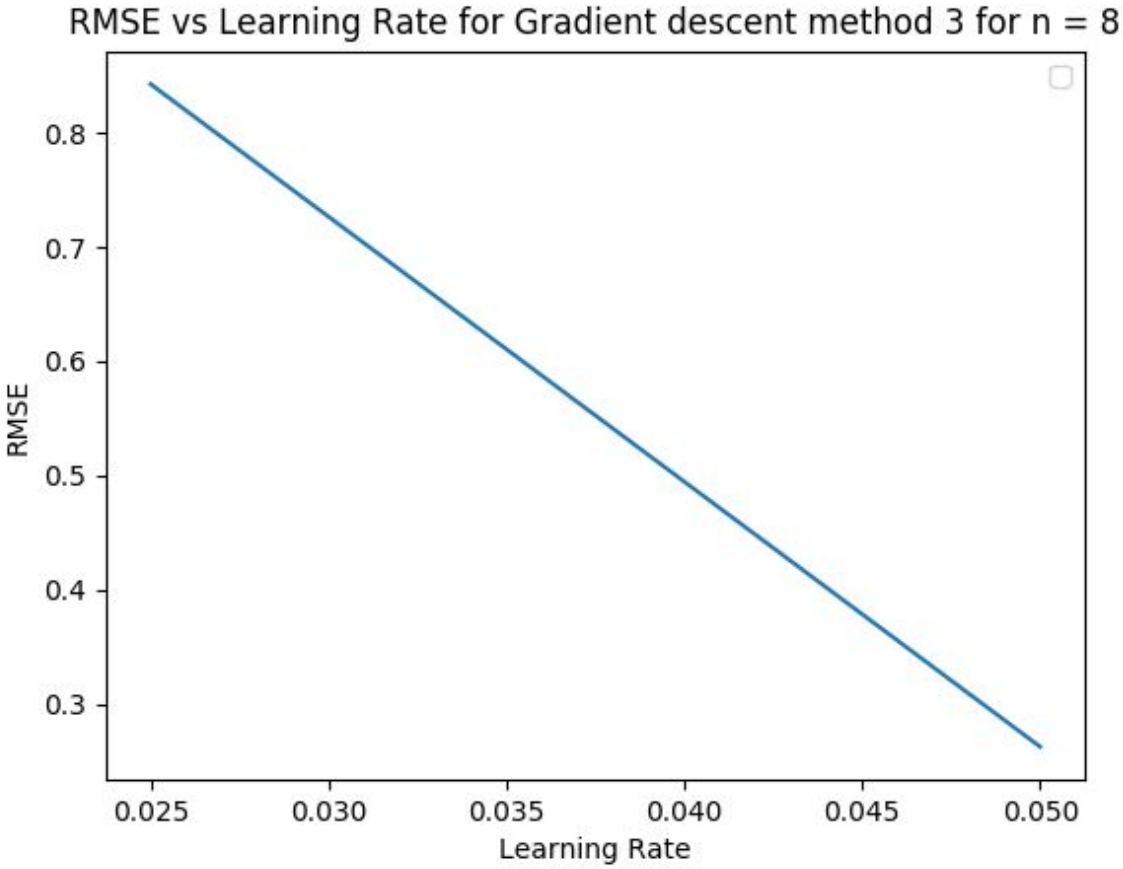

RMSE vs Learning Rate for Gradient descent method 1 for n = 1
RMSE
0.76
0.74
0.72
0.70
0.68
0.66
0.025
0.030
0.035
0.040
0.045
0.050
Learning Rate


RMSE vs Learning Rate for Gradient descent method 2 for n = 1
RMSE
Learning Rate
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.1
0.2
0.3
0.4
0.5


RMSE vs Learning Rate for Gradient descent method 1 for n = 3
RMSE
0.450
0.425
0.400
0.375
0.350
0.325
0.300
0.275
0.025
0.030
0.035
0.040
0.045
0.050
Learning Rate


RMSE vs Learning Rate for Gradient descent method 2 for n = 3
RMSE
Learning Rate
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.1
0.2
0.3
0.4
0.5


RMSE vs Learning Rate for Gradient descent method 2 for n = 5
RMSE
Learning Rate
3.0
2.5
2.0
1.5
1.0
0.5
0.1
0.2
0.3
0.4
0.5


RMSE vs Learning Rate for Gradient descent method 3 for n = 8
RMSE
0.8
0.7
0.6
0.5
0.4
0.3
0.025
0.030
0.035
0.040
0.045
0.050
Learning Rate