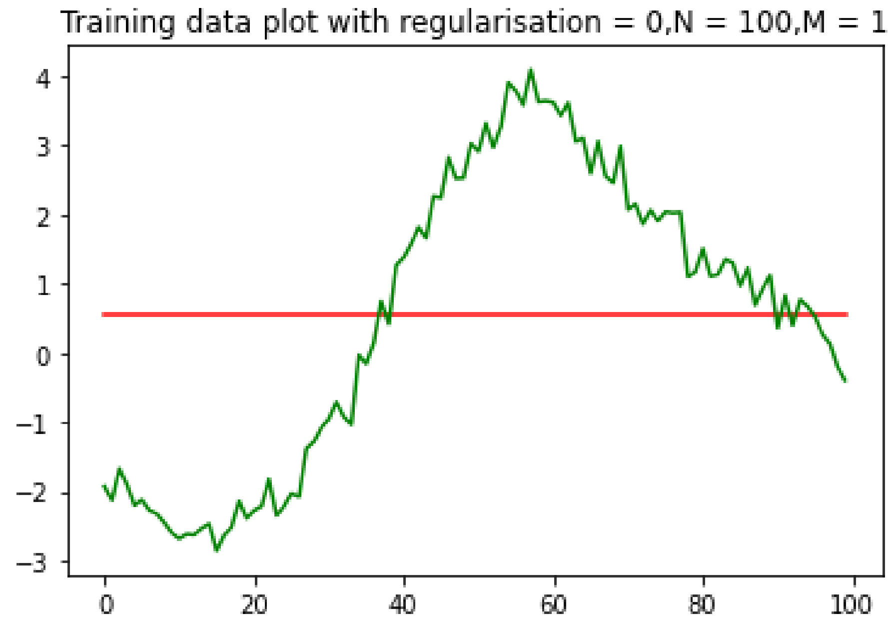
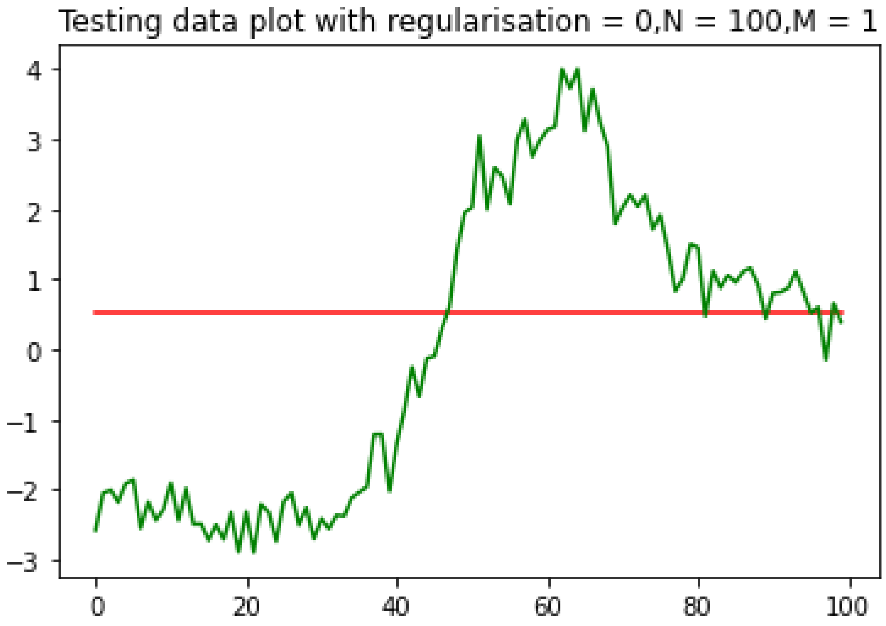
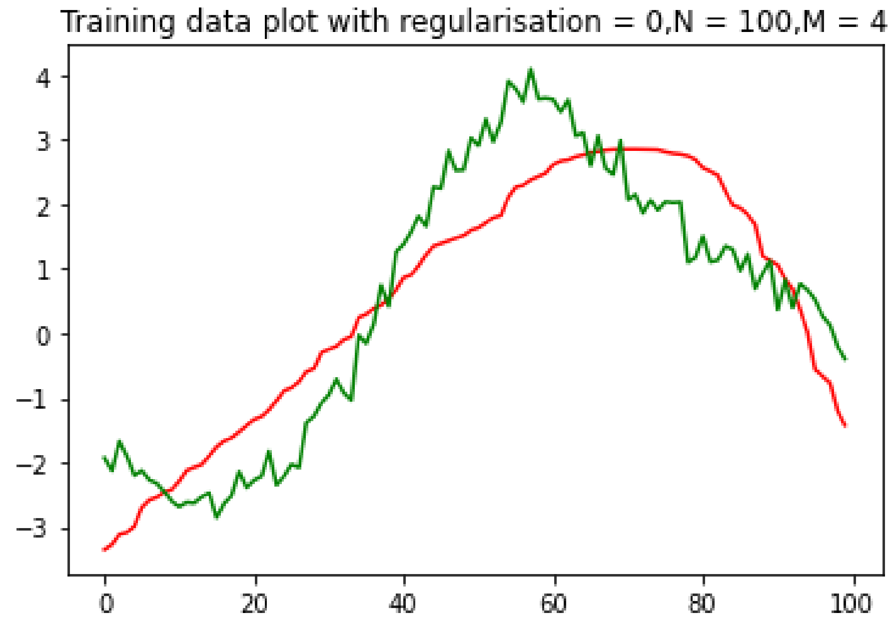
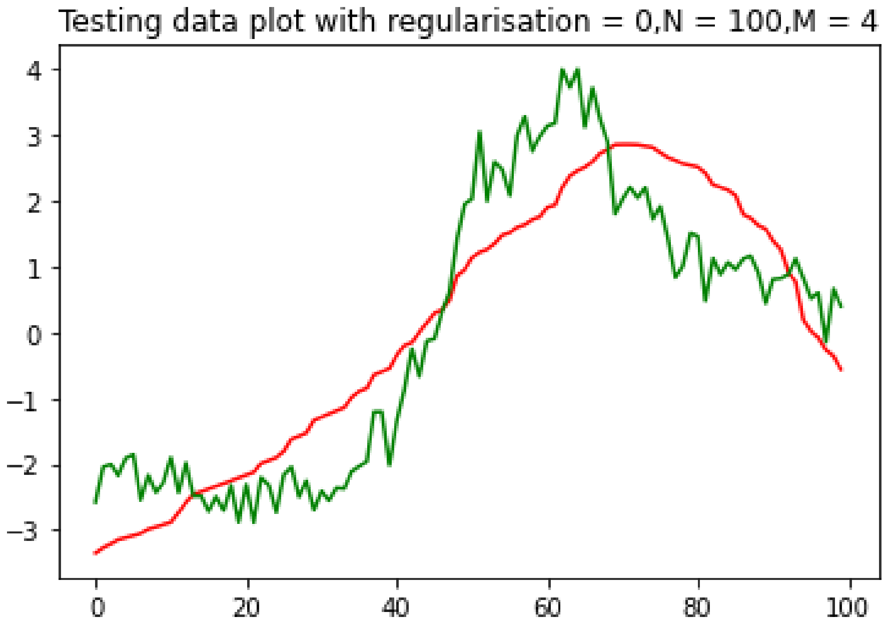
PART-1 :-

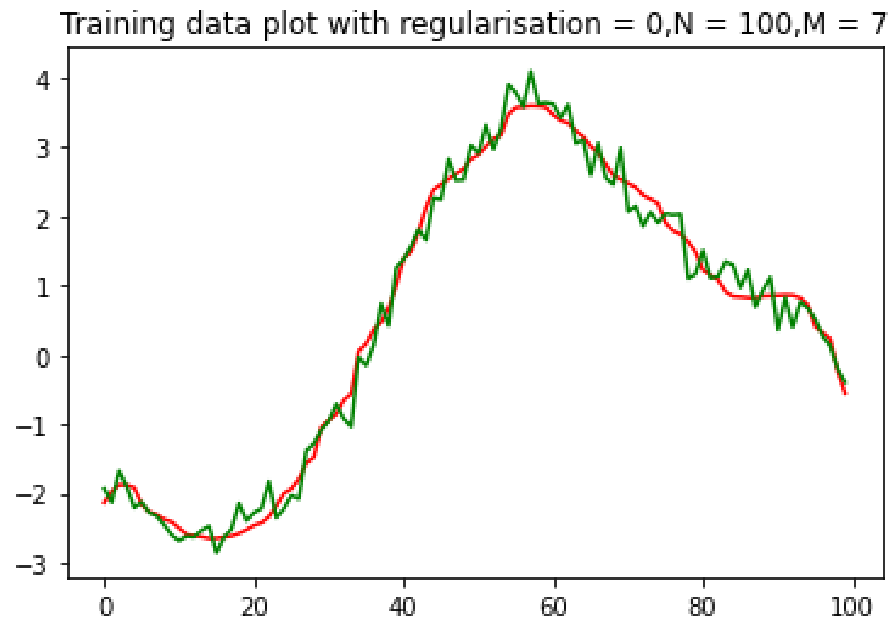
1D data:-

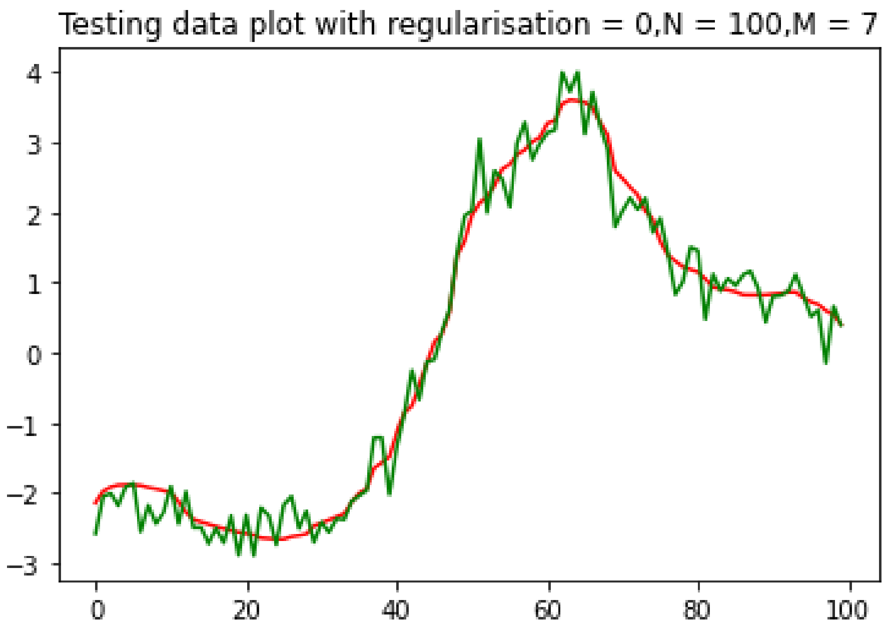




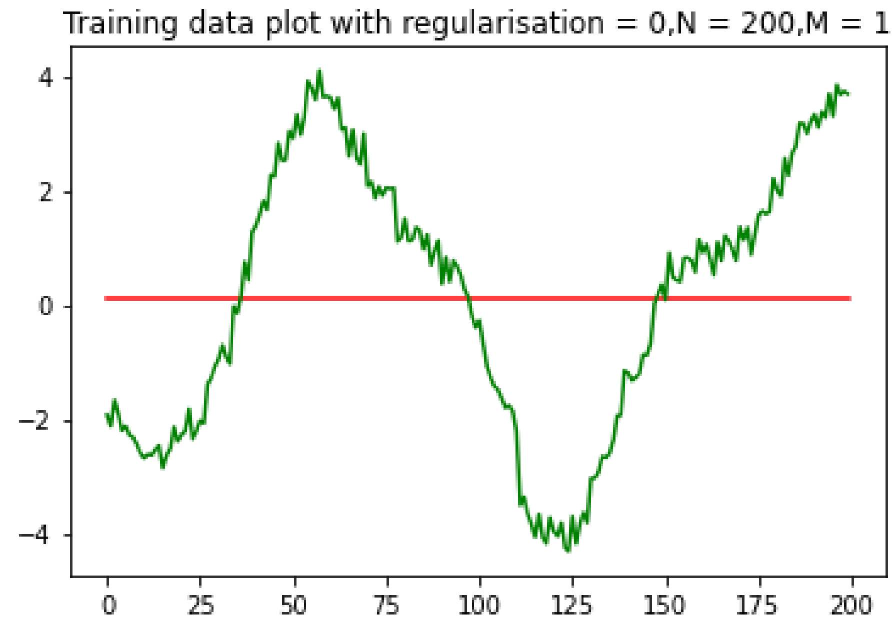


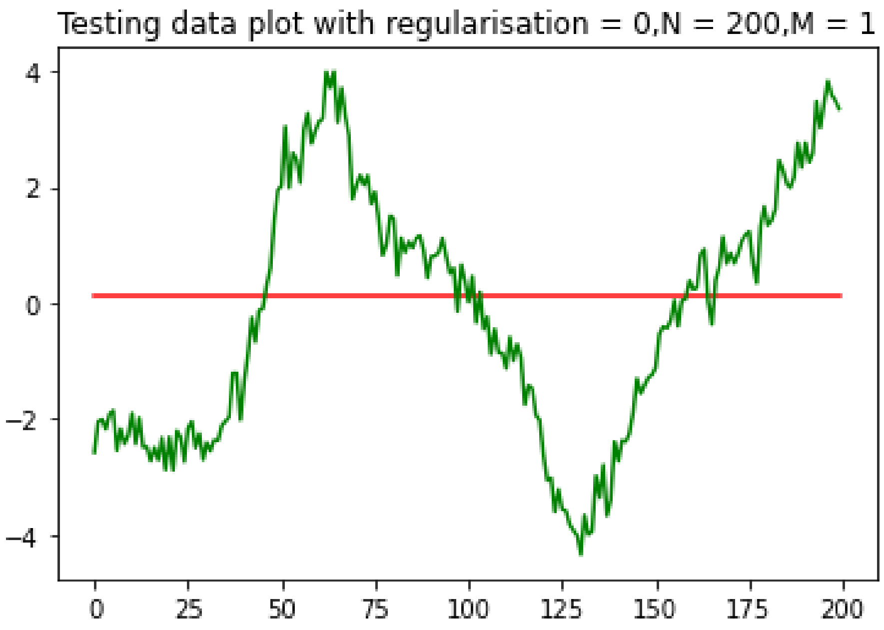


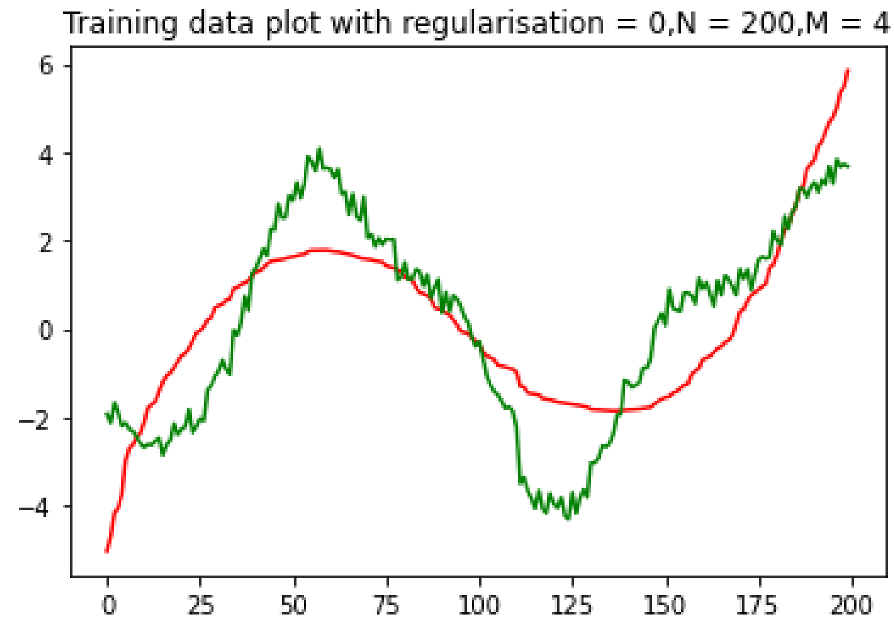


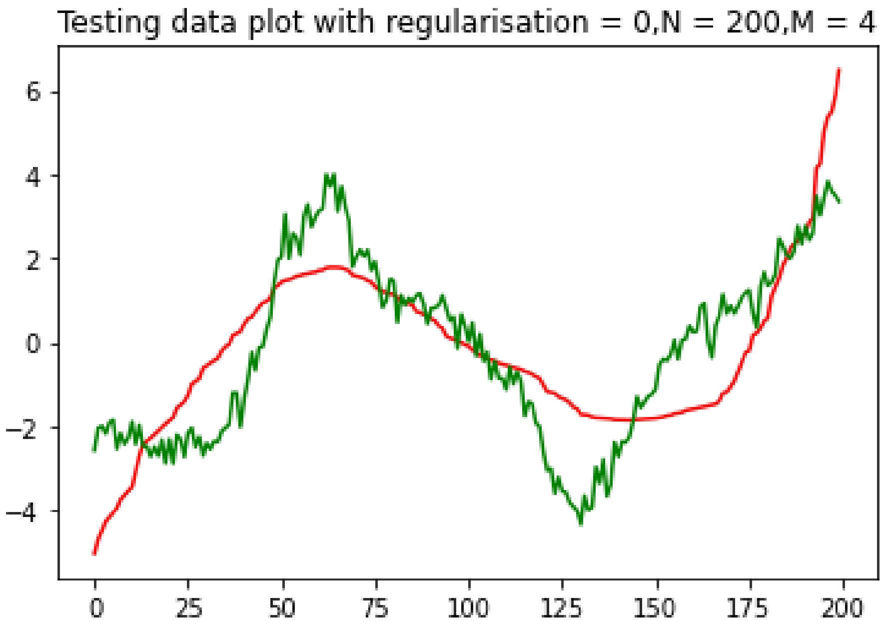


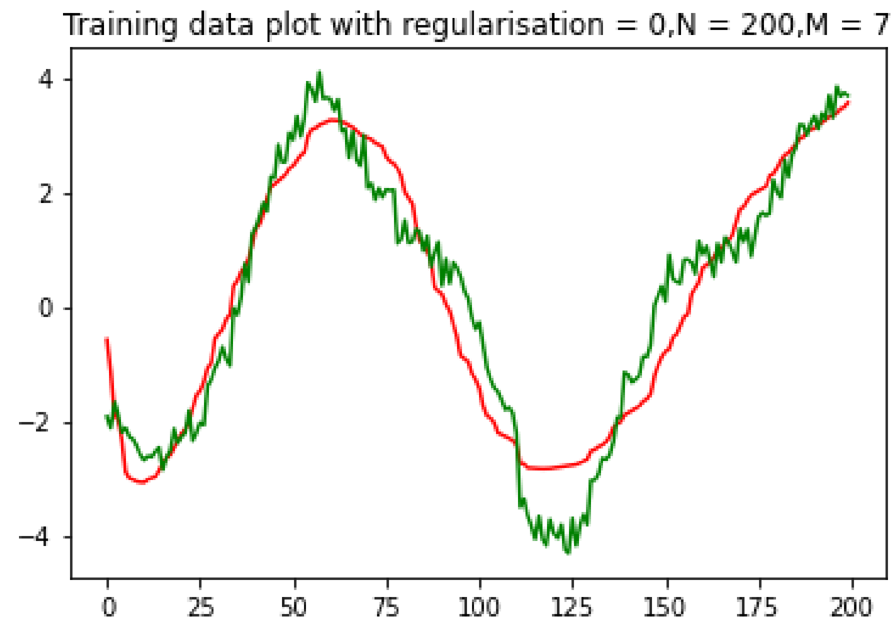
From these graphs we can observe that when M increases the fitting becomes much more better. It is valid only when M is less than certain point. Here that point is 13
For N = 100 we get best model for M = 12
From M = 13 it leads to overfitting .

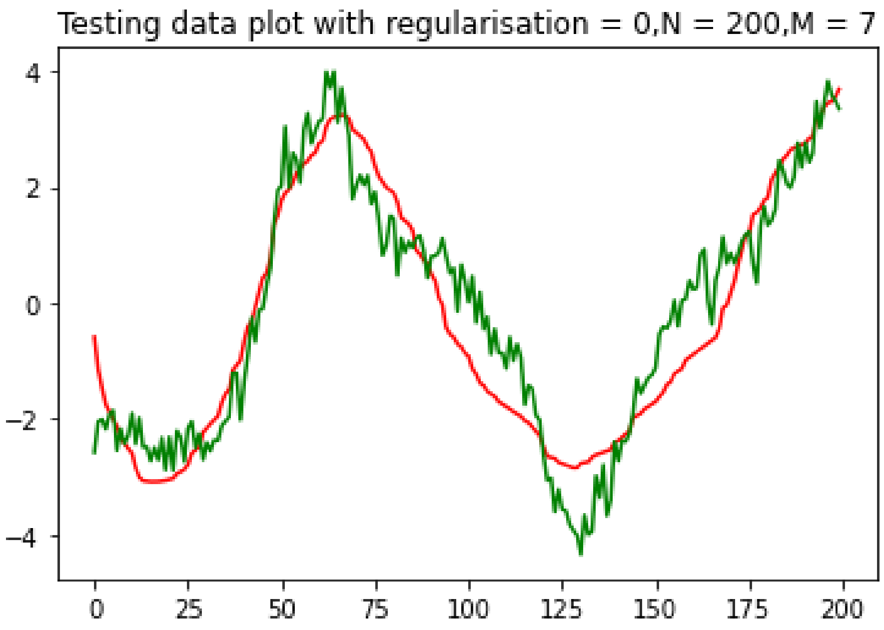




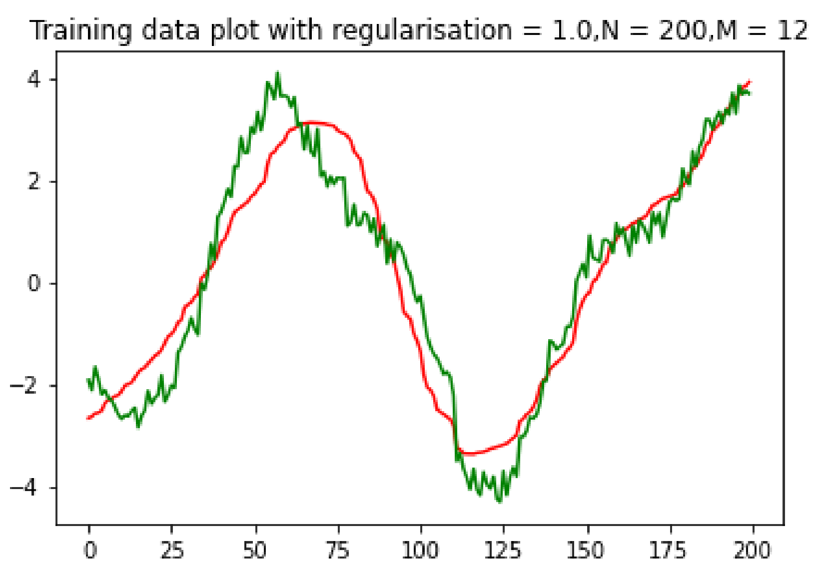


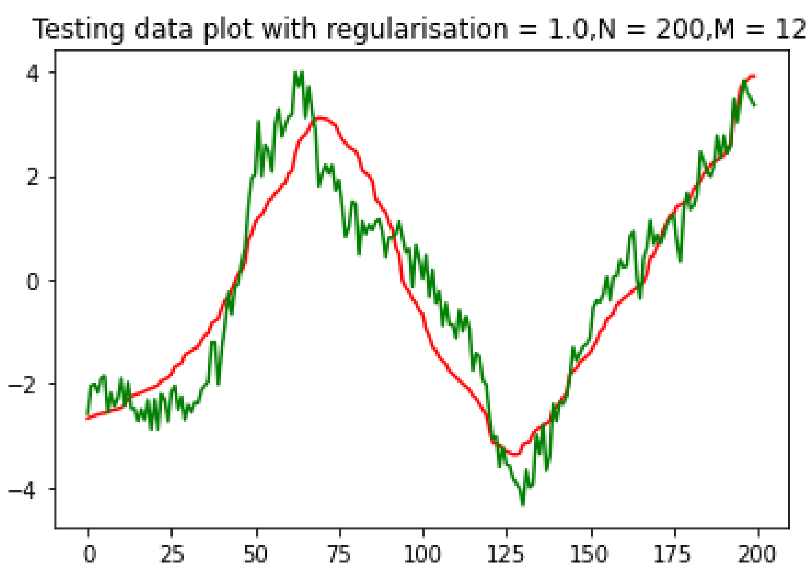


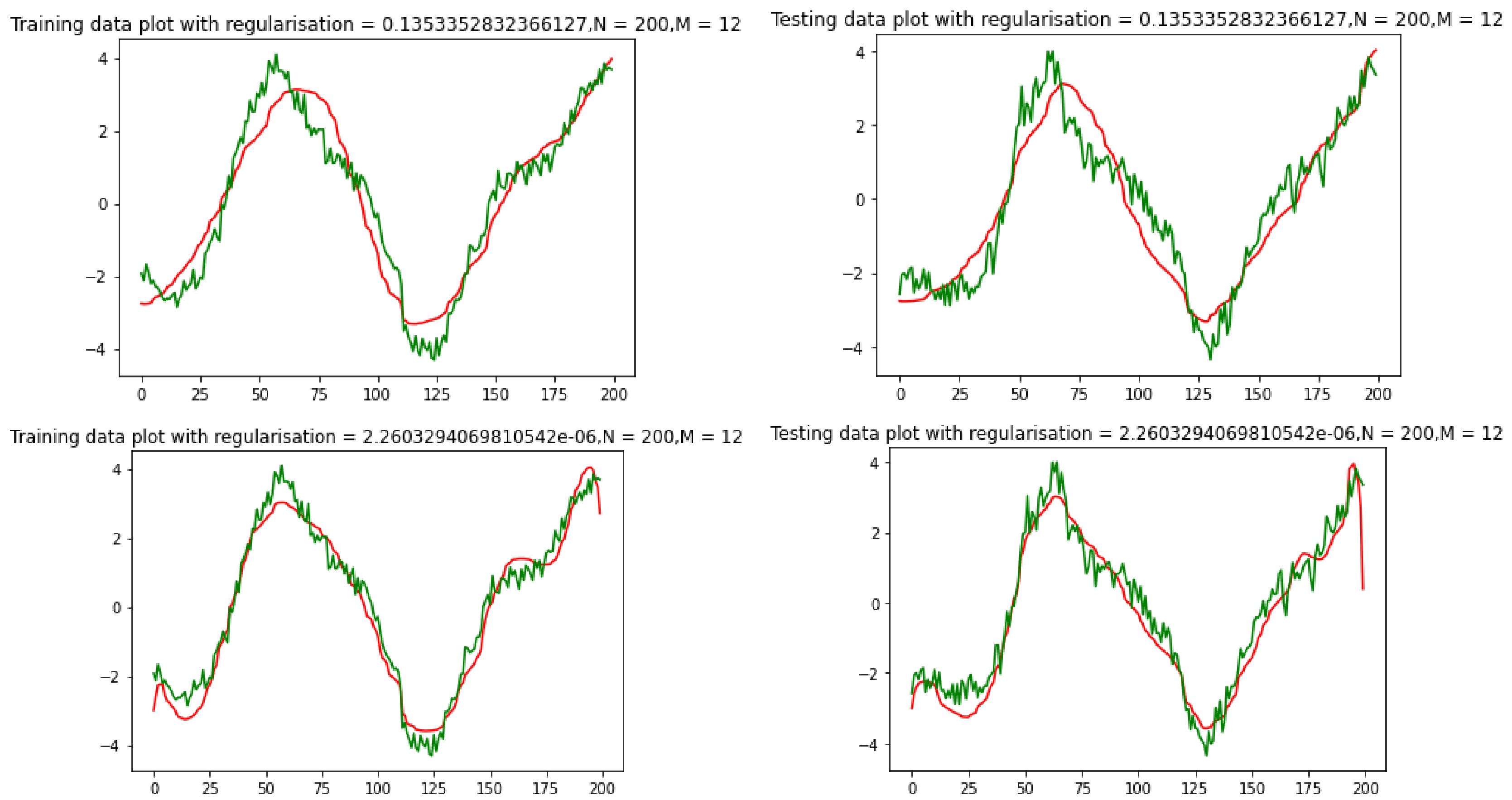




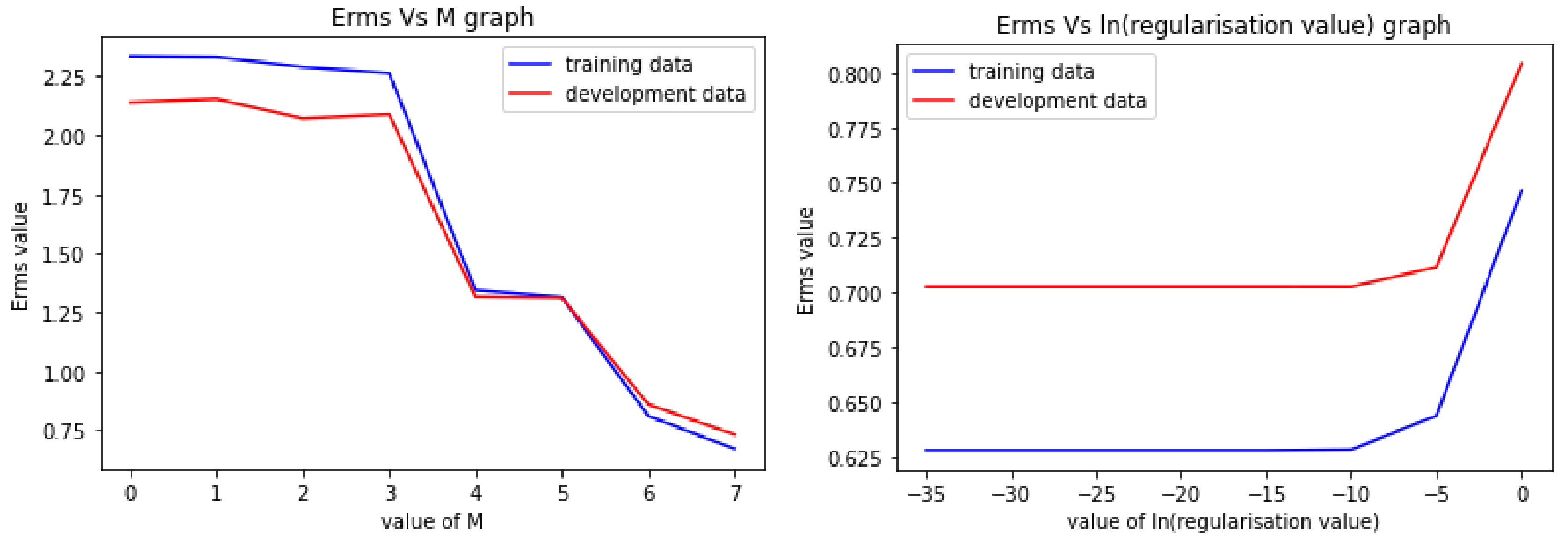
From these graphs we can observe that as N increases we get less accuracy for a given value of M.
For N = 200 also we get best model for M = 12



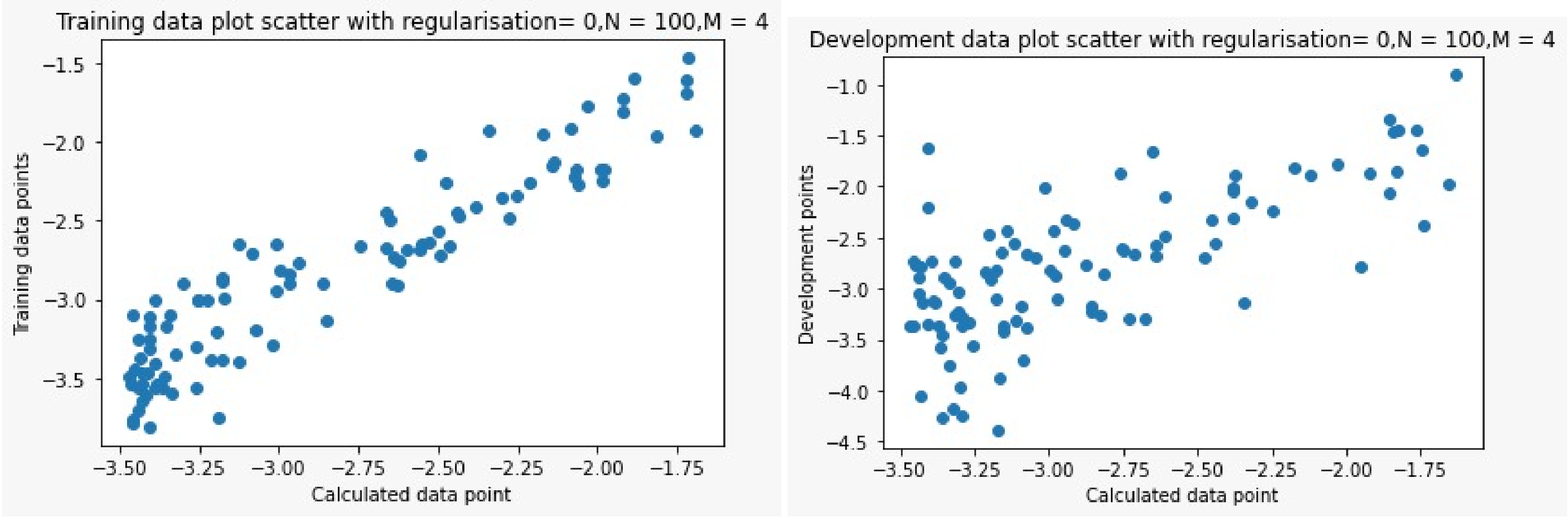


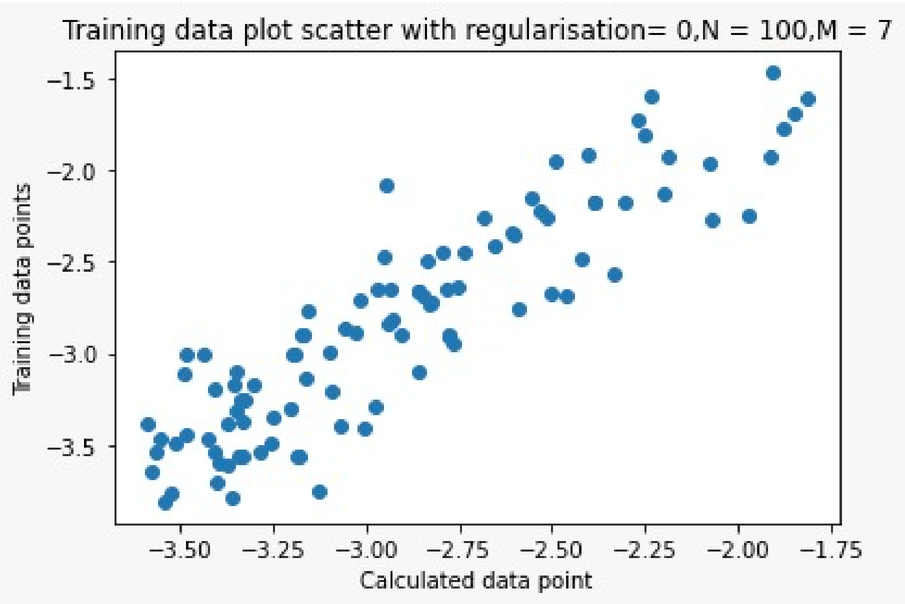


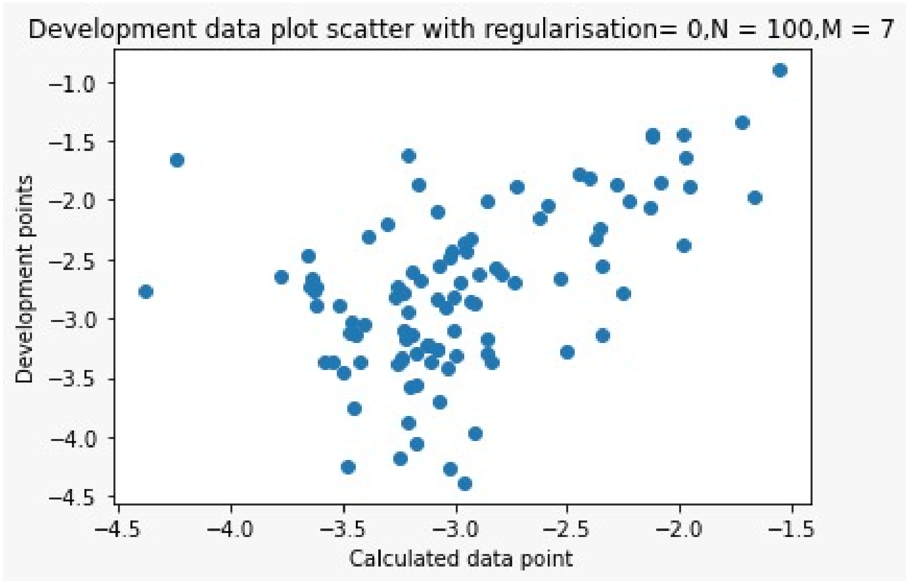
From these graphs we can observe that higher regularisation value leads to underfitting
Lower regularisation value leads to overfitting.

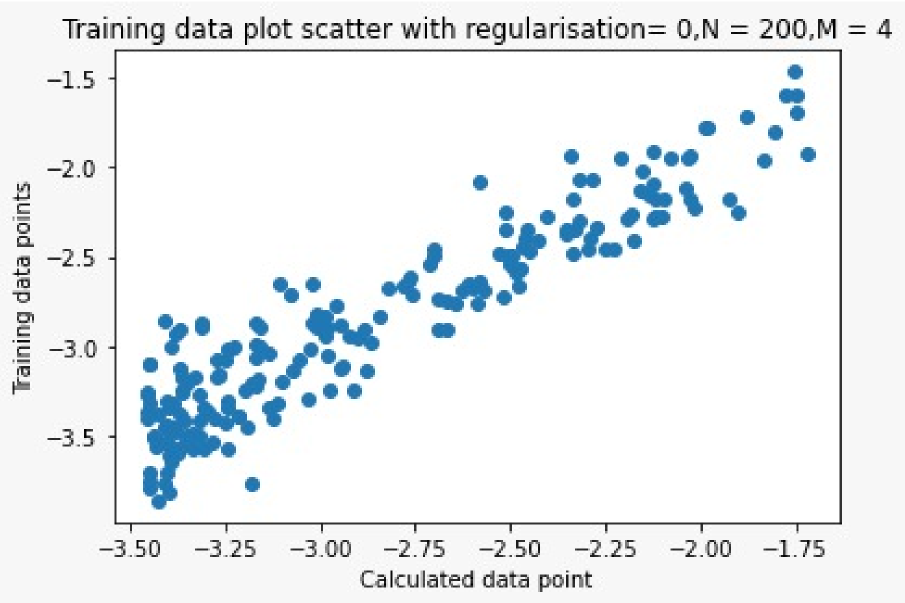


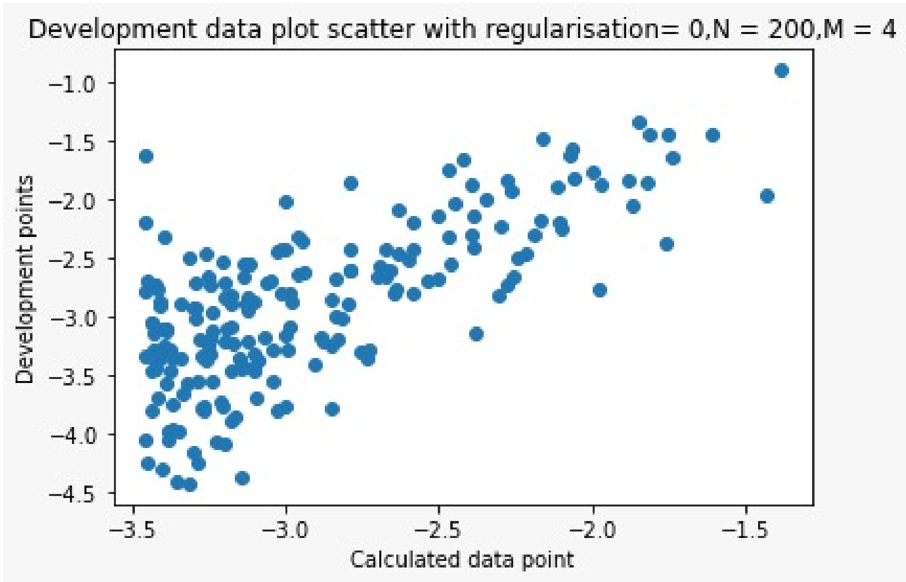
2D data:-

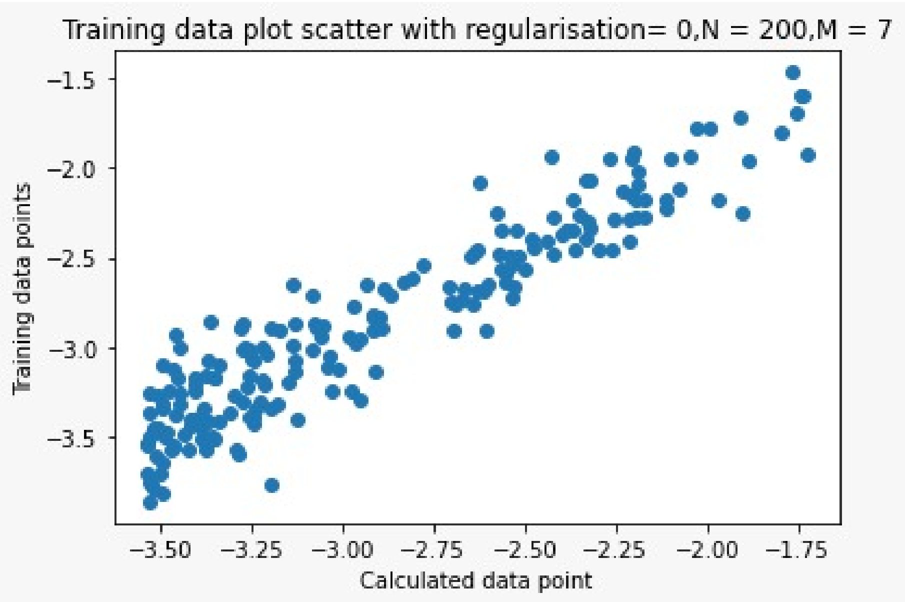


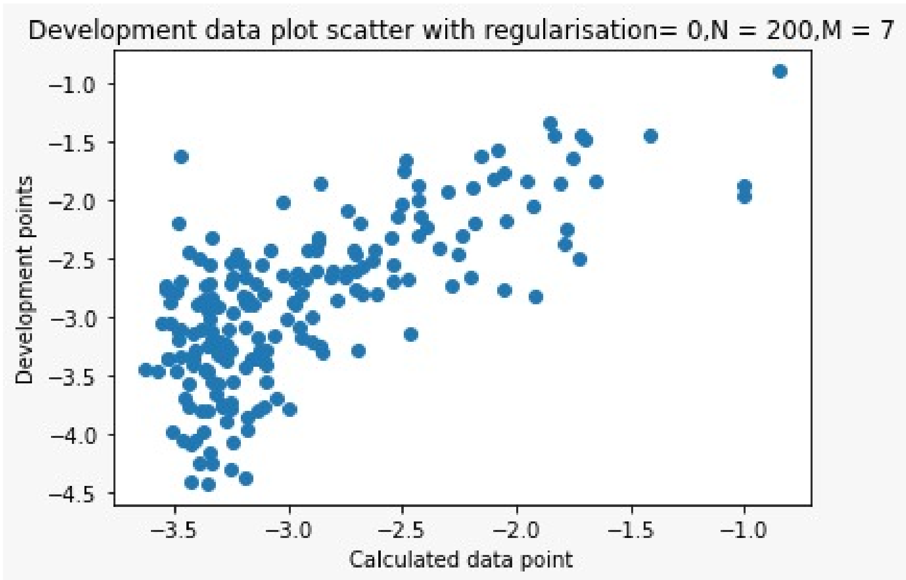

Training data plot scatter with regularisation= 0,N = 100,M = 7
Training data points
Calculated data point

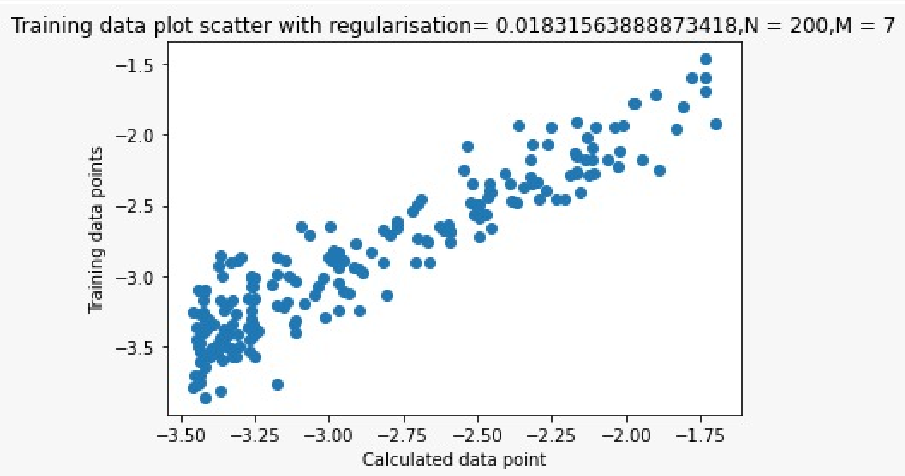

Development data plot scatter with regularisation= 0,N = 100,M = 7
Development points
Calculated data point

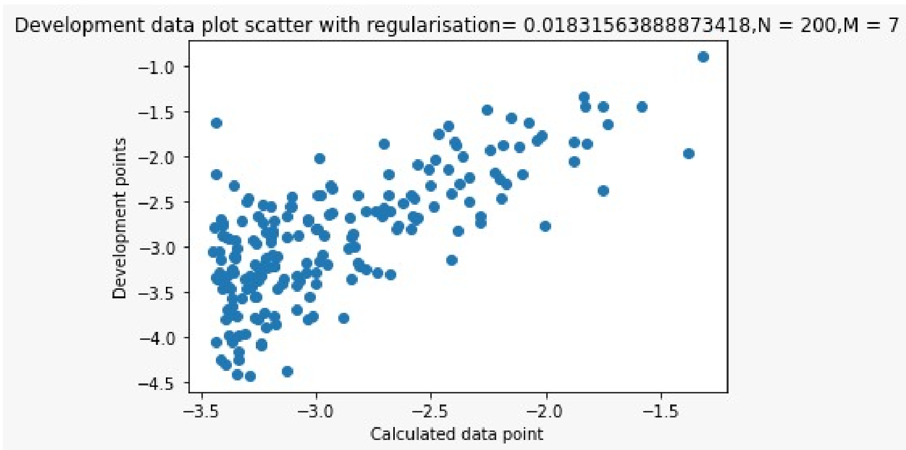

Training data plot scatter with regularisation= 0,N = 200,M = 4
Training data points
Calculated data point

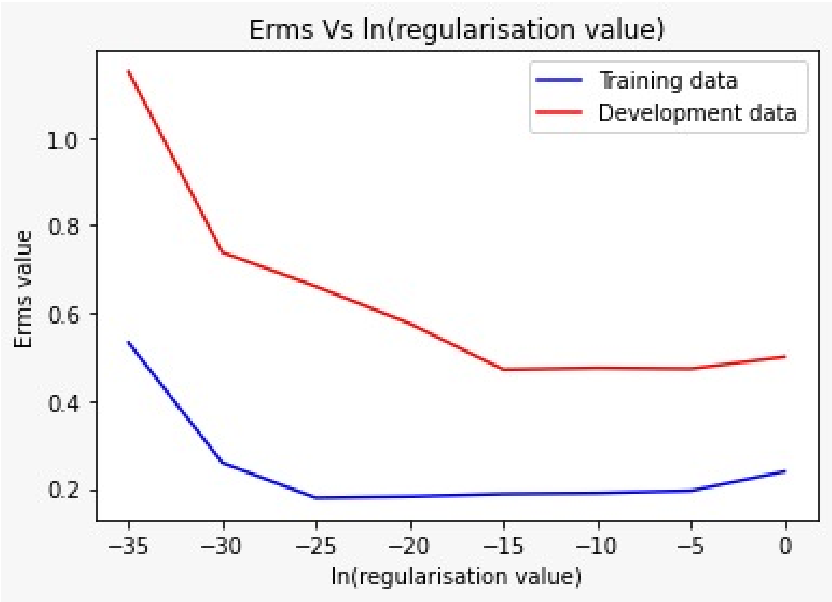

Development data plot scatter with regularisation= 0,N = 200,M = 4
Development points
Calculated data point

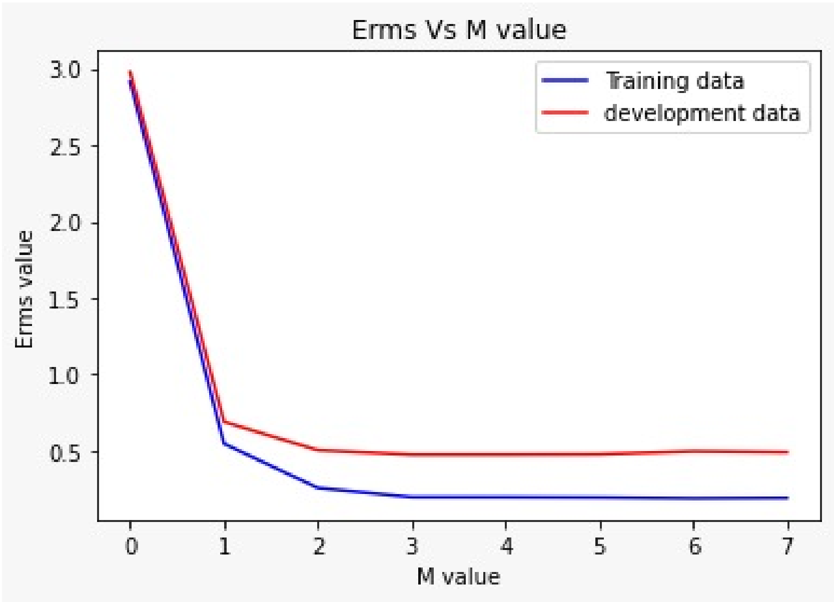

Training data plot scatter with regularisation= 0,N = 200,M = 7
Training data points
Calculated data point


Development data plot scatter with regularisation= 0,N = 200,M = 7
Development points
Calculated data point


Training data plot scatter with regularisation= 0.01831563888873418,N = 200,M = 7
Training data points
Calculated data point


Development data plot scatter with regularisation= 0.01831563888873418,N = 200,M = 7
Development points
Calculated data point

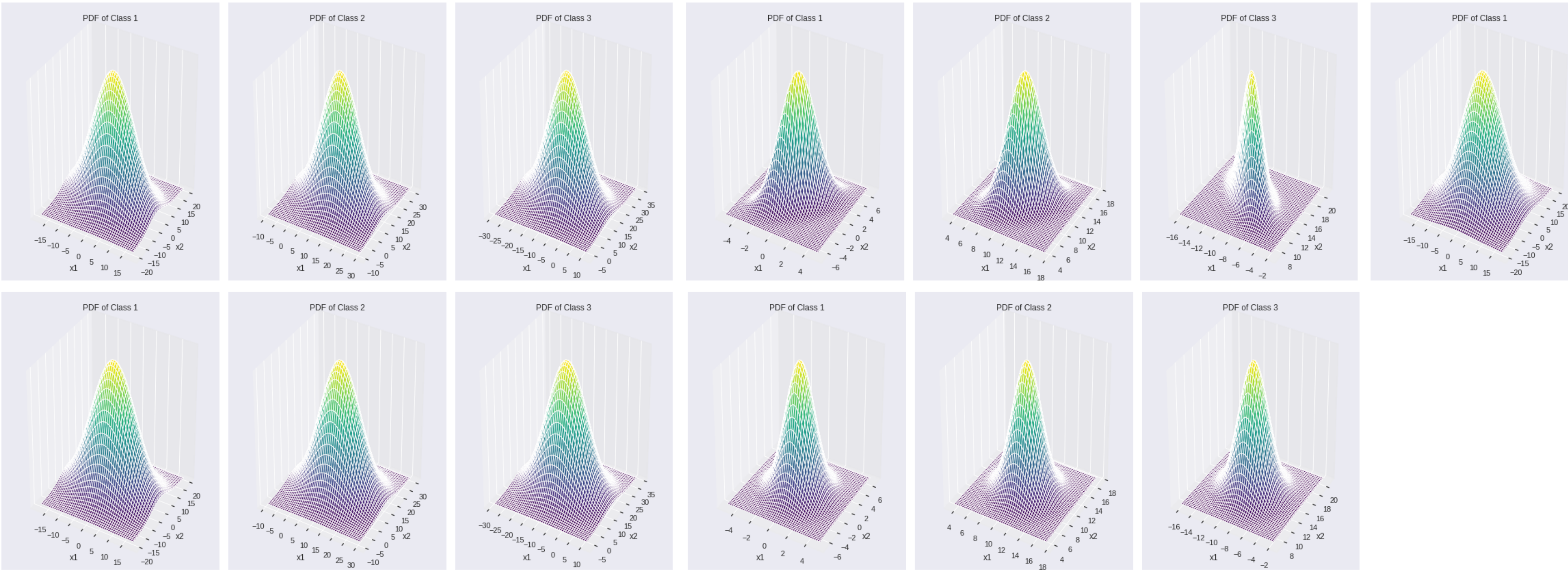

Erms Vs ln(regularisation value)
Training data
Development data
Erms value
ln(regularisation value)
1.0
0.8
0.6
0.4
0.2
−35
−30
−25
−20
−15
−10
−5
0


Erms Vs M value
Training data
development data
Erms value
M value
3.0
2.5
2.0
1.5
1.0
0.5
0
1
2
3
4
5
6
7

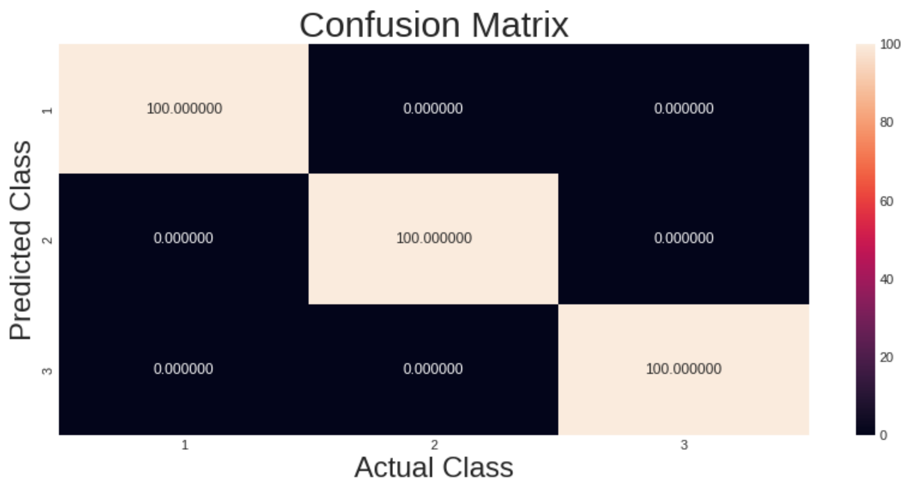
PART-2 :-

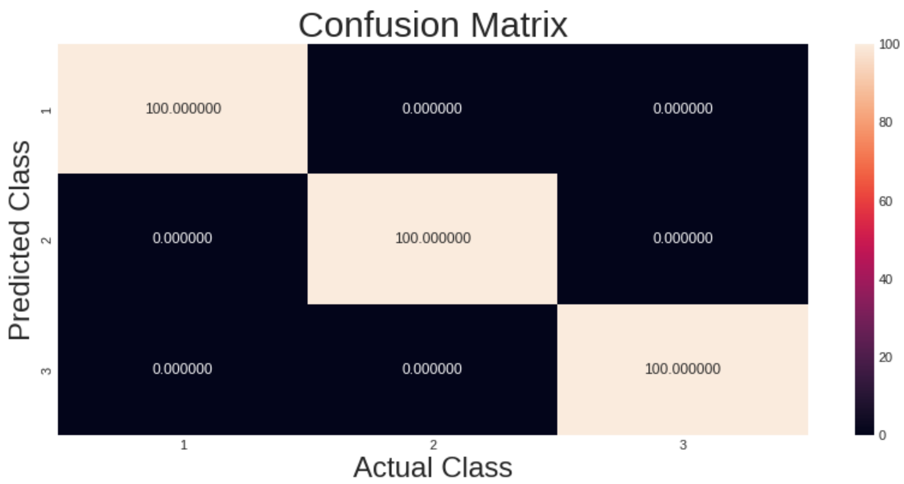
LINEAR SEPERABLE DATA:-

Pdfs of linear seperable data for cases 1,2,3,4,5:-

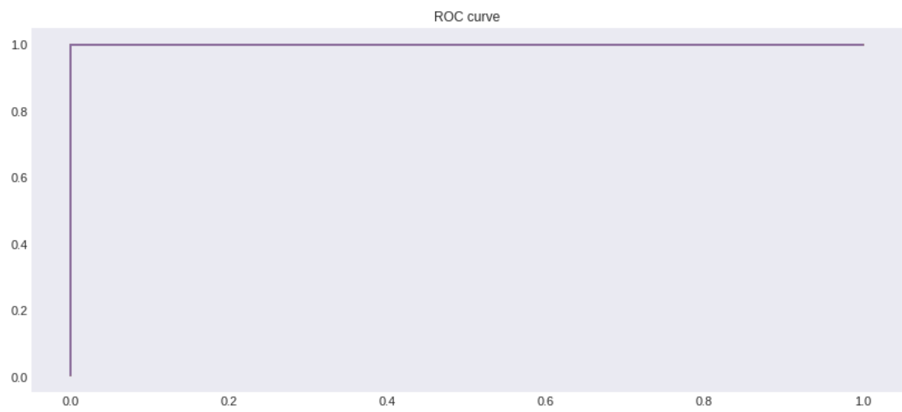


Confusion matrices of cases 2,3:-

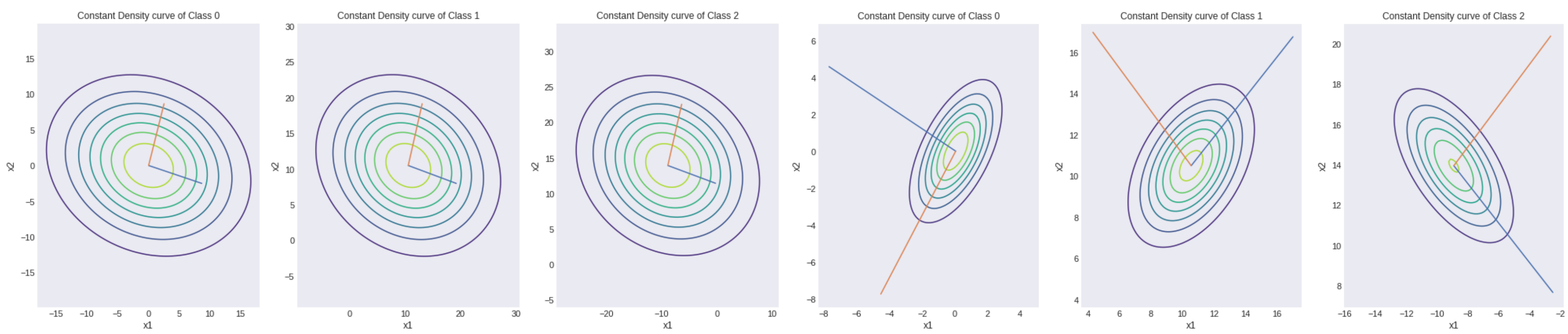




ROC curve:-

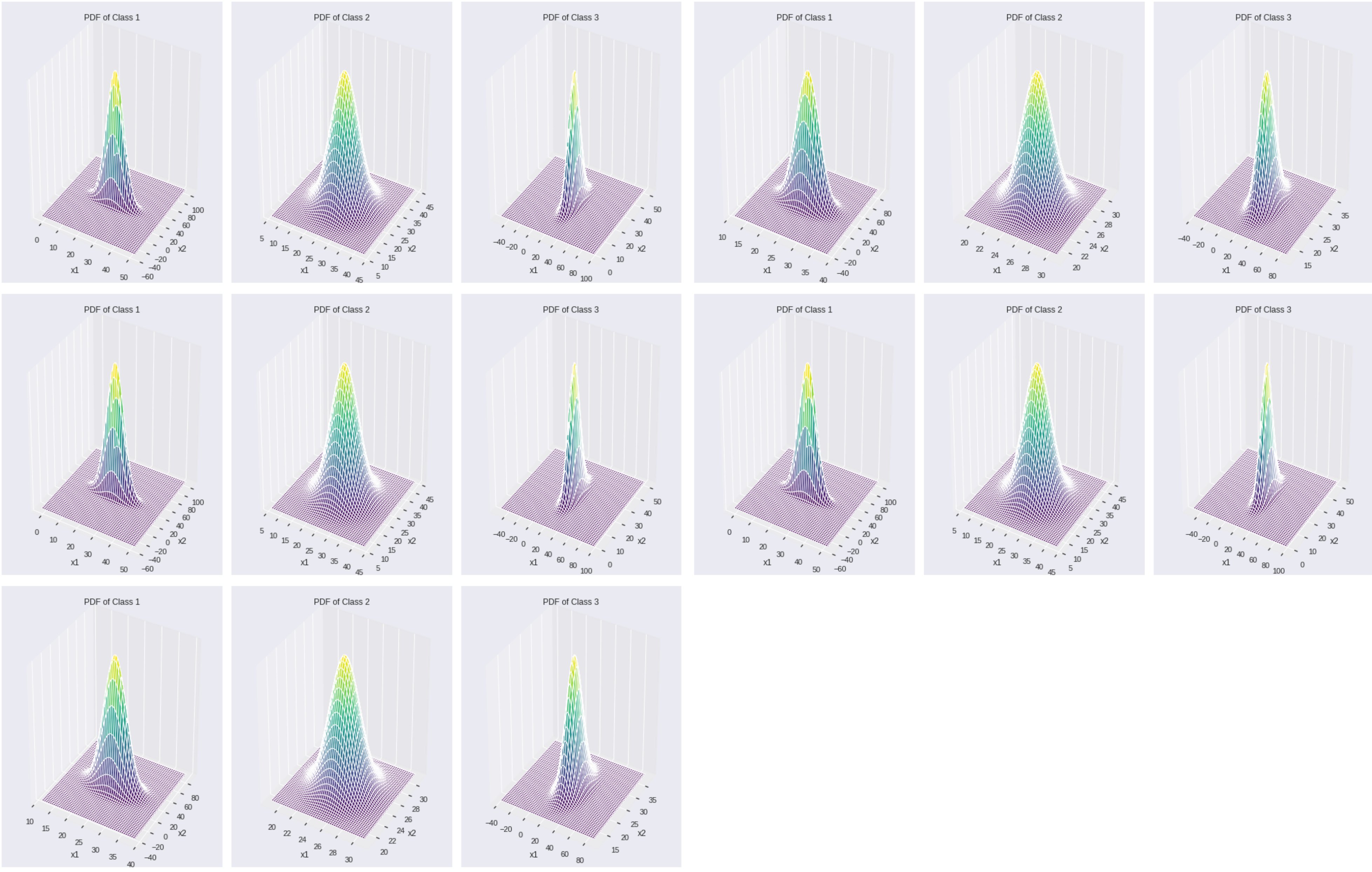


constant density curves for case1,2:-

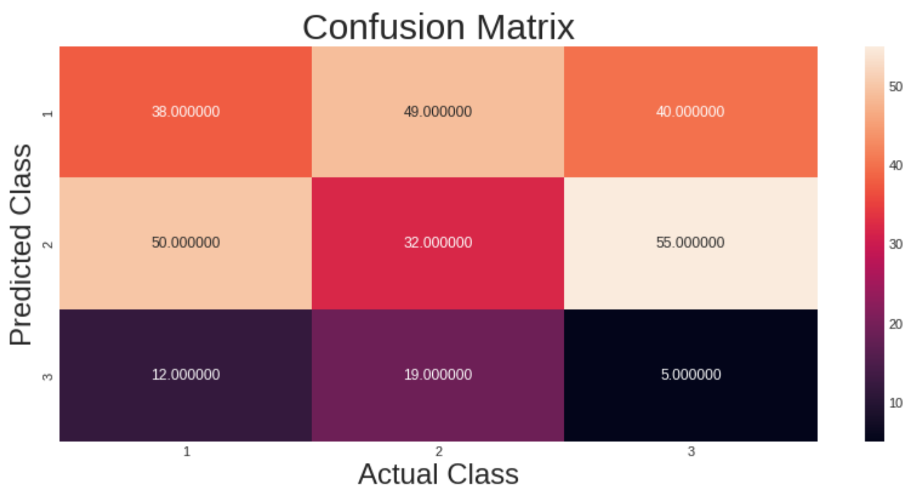


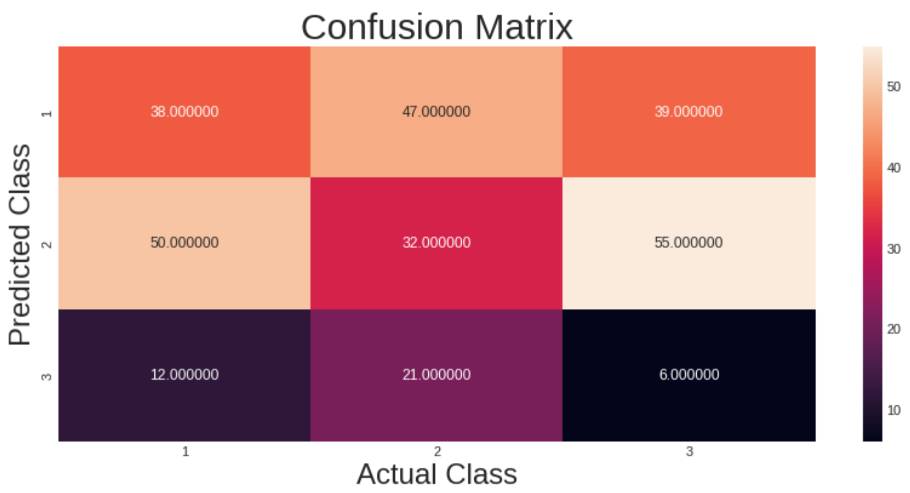
NON SEPERABLE DATA:-

PDFs for cases 1,2,3,4,5:-

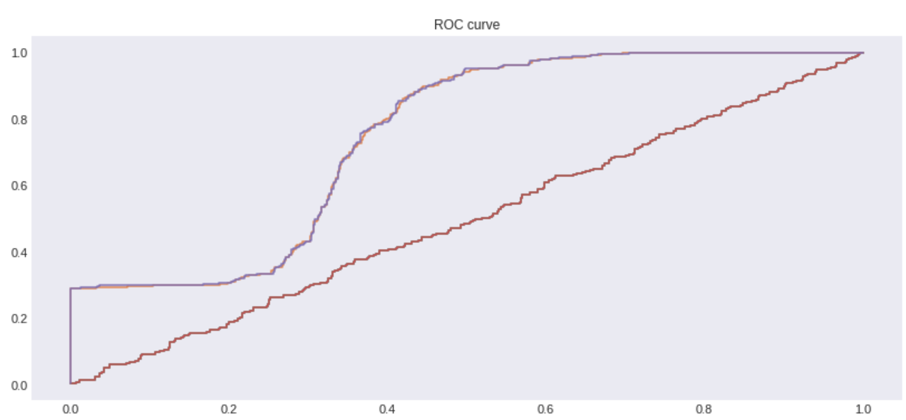


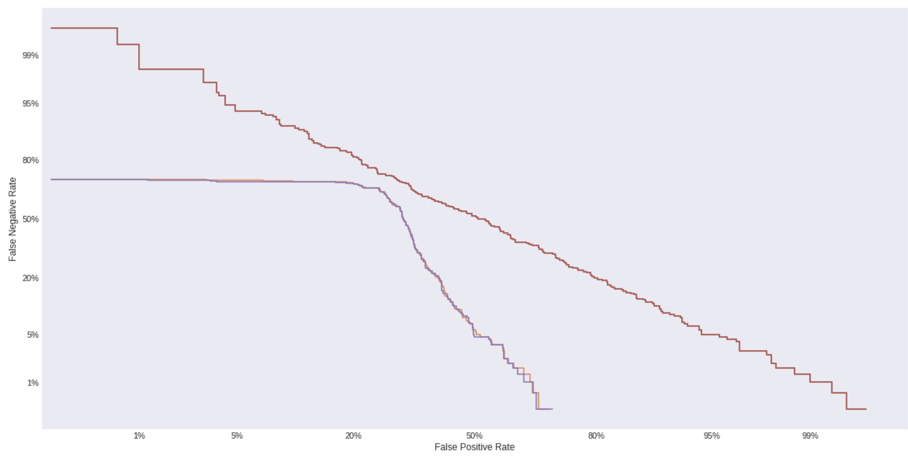
Confusion matrices of cases 1,4:-



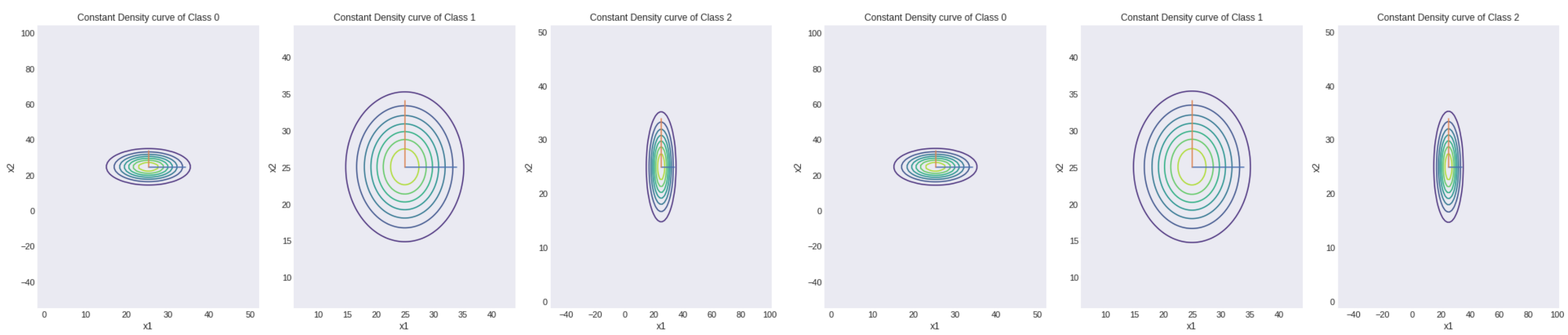


ROC and DET curves:-

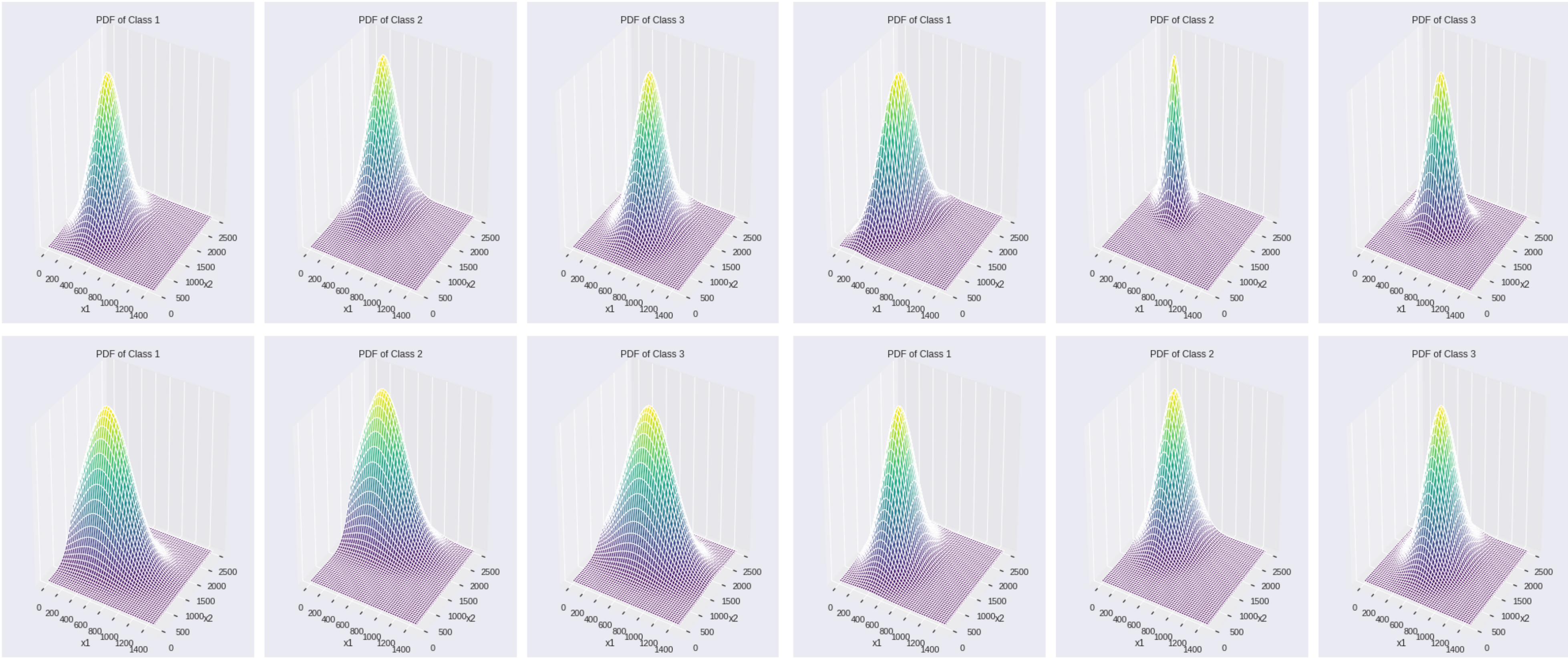




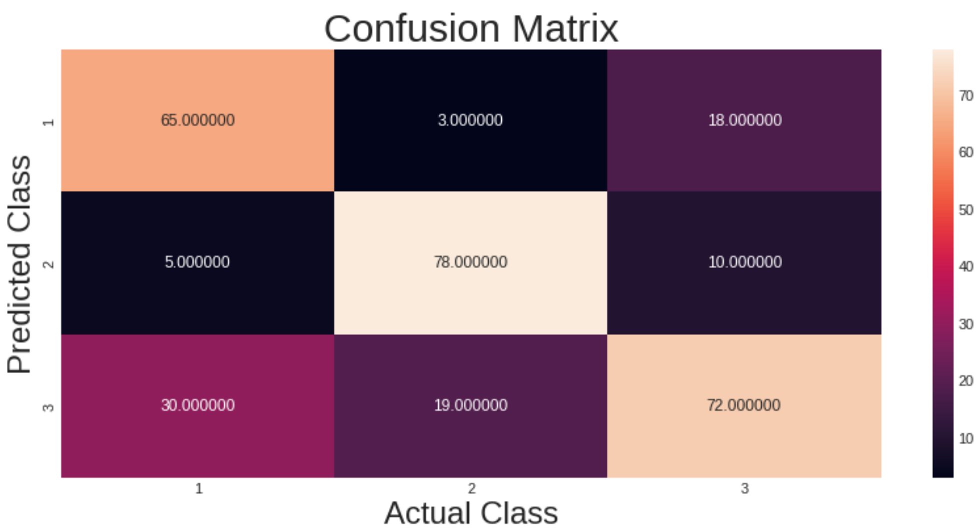
constant density curves of cases 3,4:-

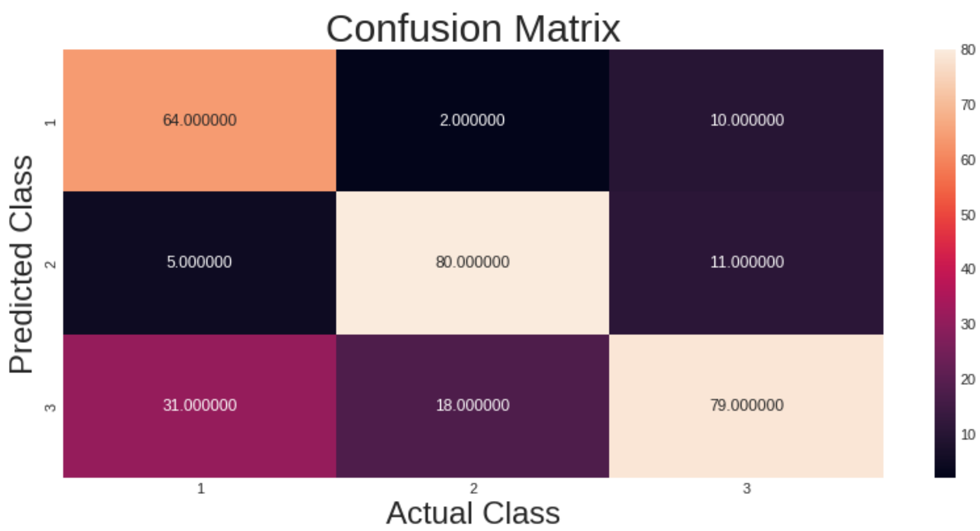


Real data:-

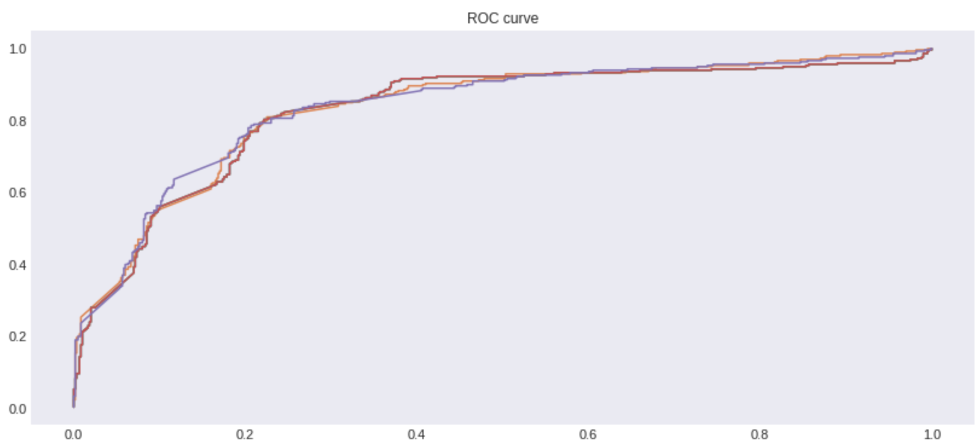


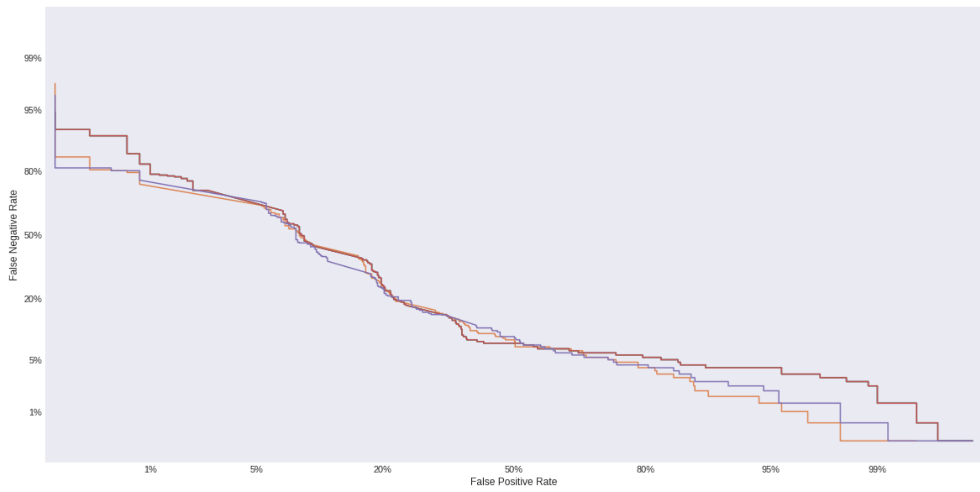
Confusion matrix of 1,5 cases:-





roc and det curves:-





constant density curves for 1,5