COL774: Assignment 1 Report

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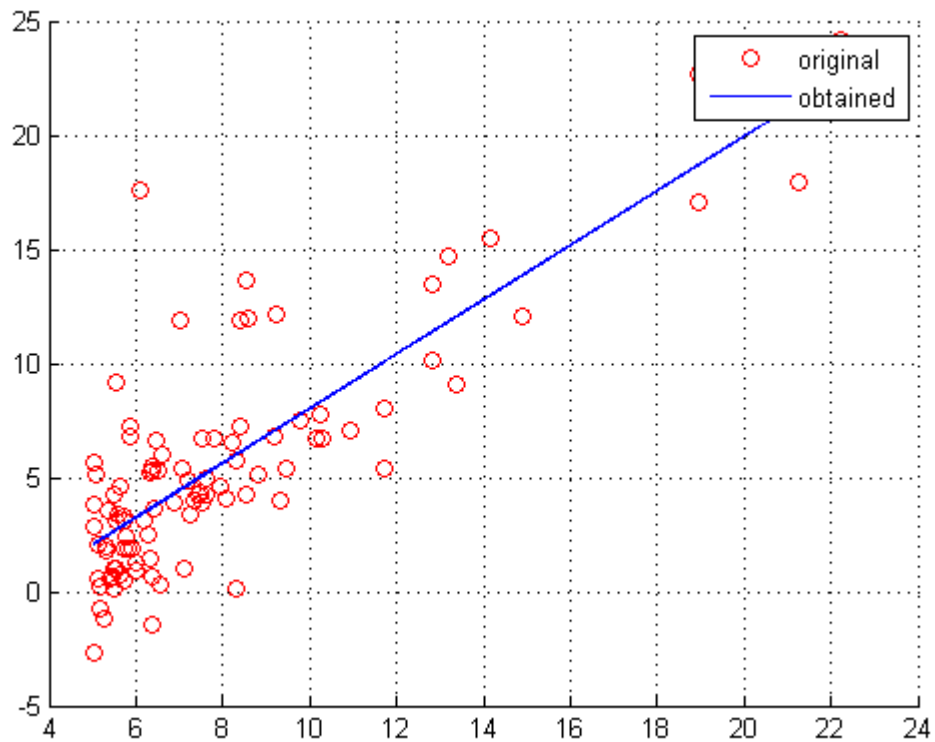
Question 1

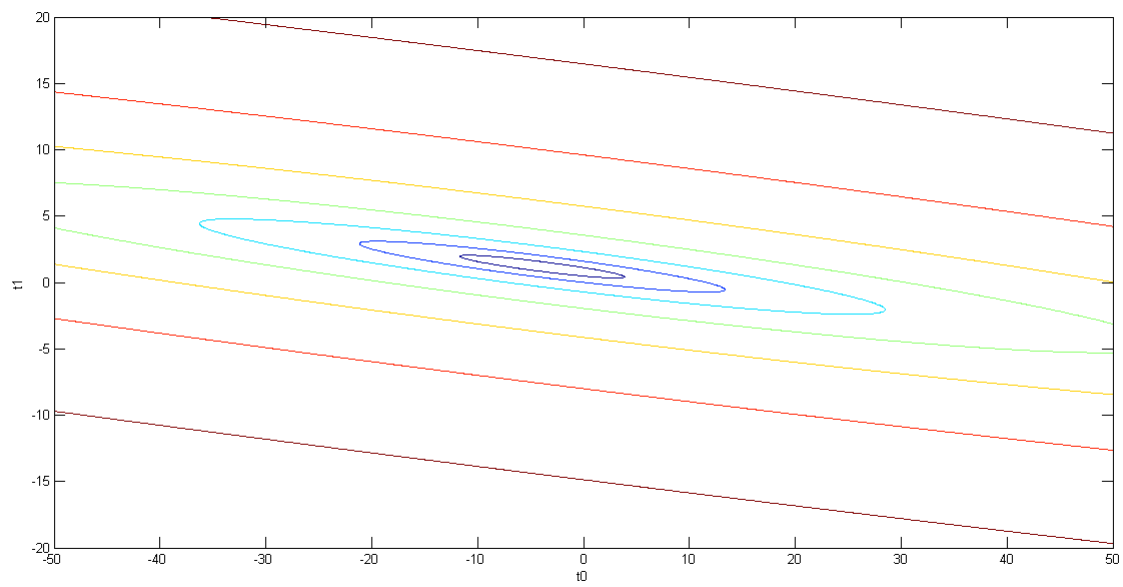## Part a

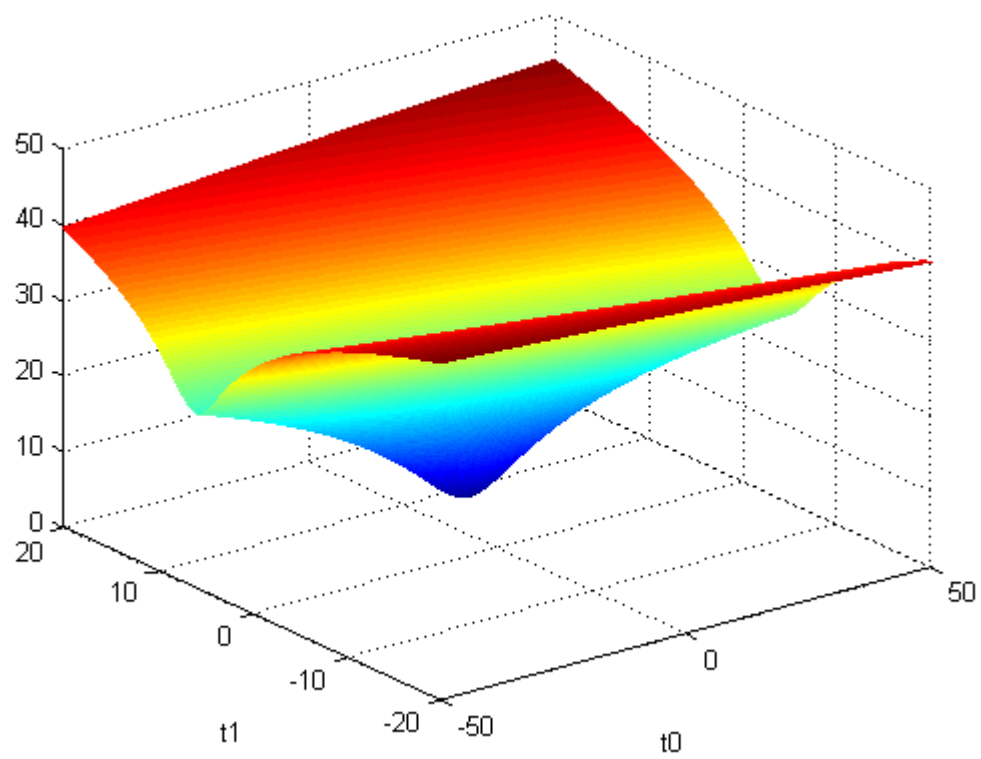| Learning Rate (α)	Stopping Criteria	Theta Obtained
0.001	error*error' >= 1.0e-12	[-3.8958 ; 1.1930]

Part b

Obtained Linear equation
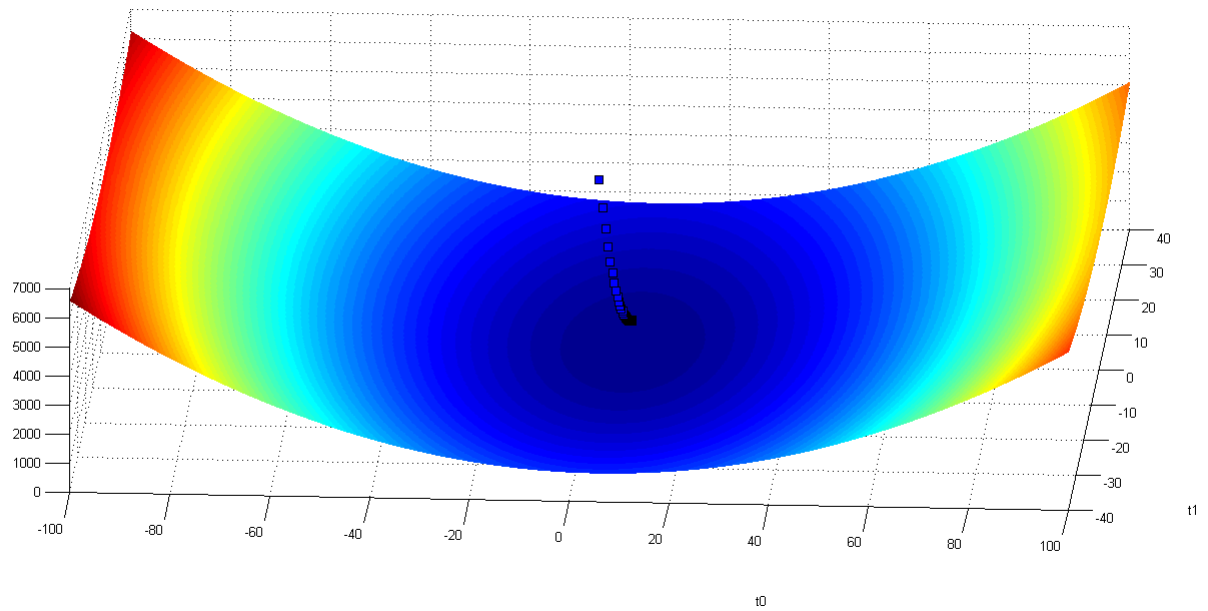
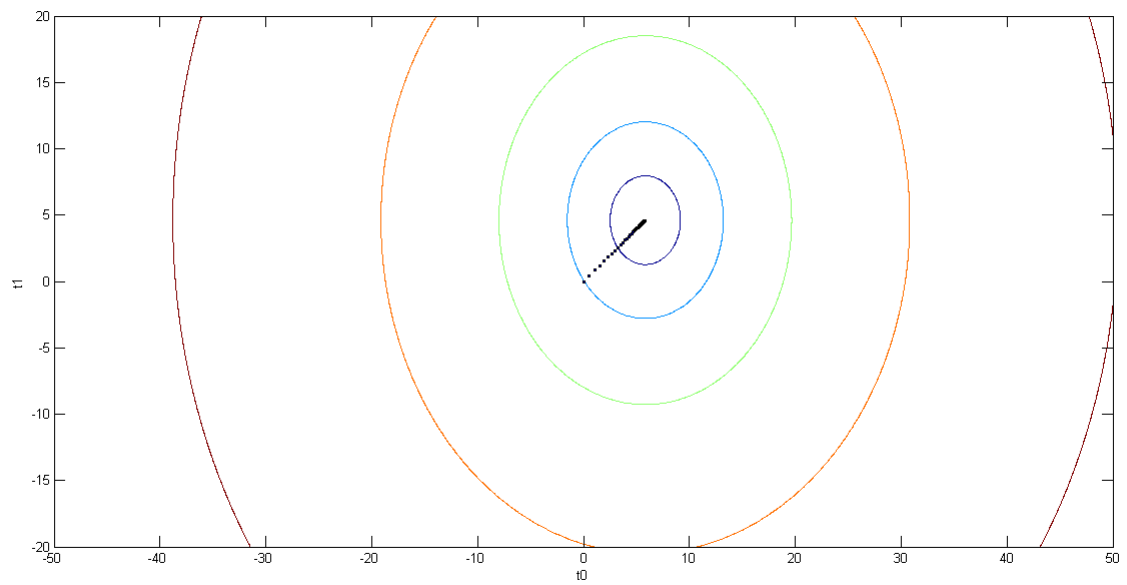**Error Mesh Plot (log)**

Error Contour Plot (log)

Part c

Mesh Plot and error values

Part d

Contour Plot and Error Values

Part e

Converges for η $\{0.1, 0.5, 0.9, 1.3\}$
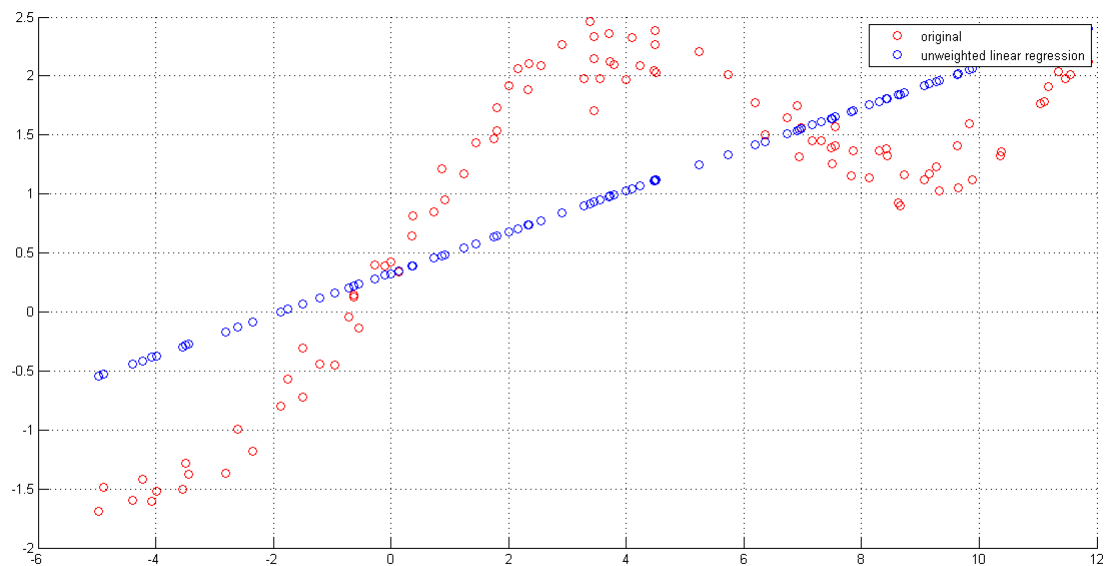Does not conerge for η $\{2.1, 2.5\}$
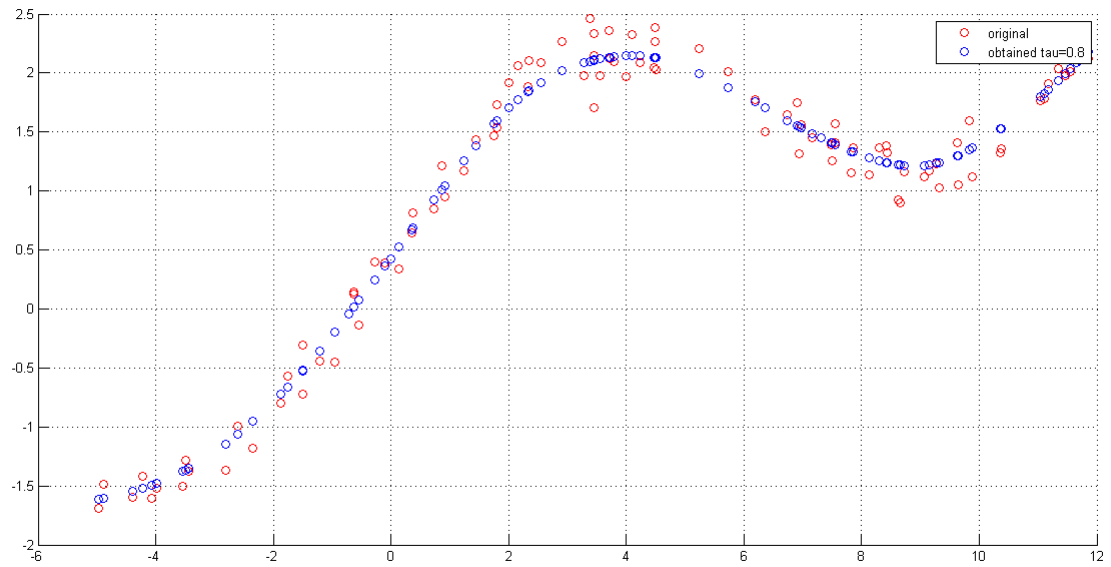
Question 2

Part a

Theta Obtained

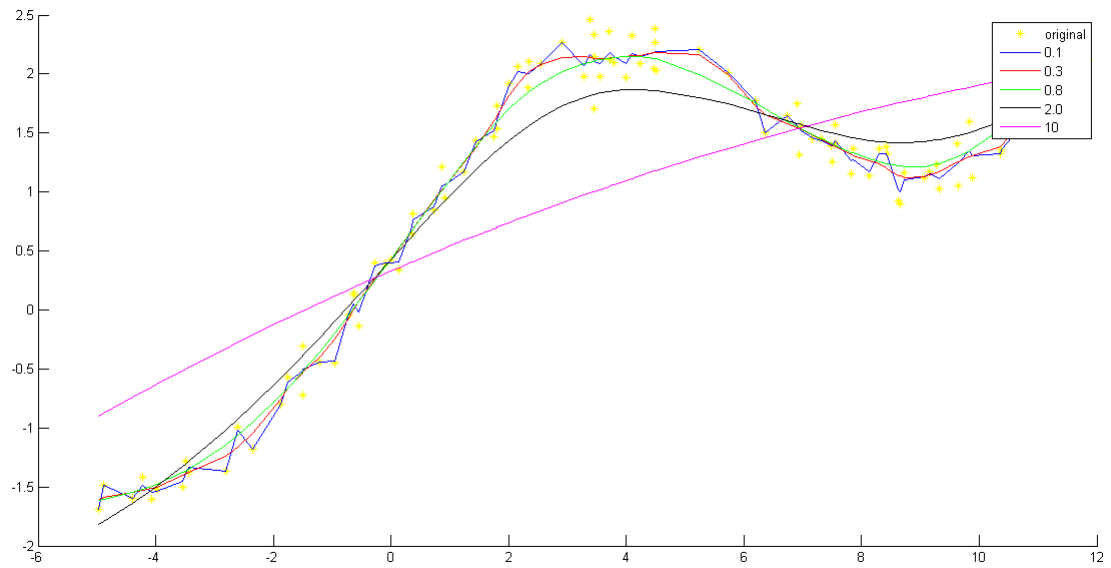| t0	t1
0.3277	0.1753

Unweighted Linear Regression

Part b

Weighted Linear Regression (tau = 0.8)

Weighted Linear Regression with varying tau

As clearly observed, lower tau leads to overfitting and higher values lead to underfitting. So, we have to find the perfect balance, which in this case happens to be 0.8
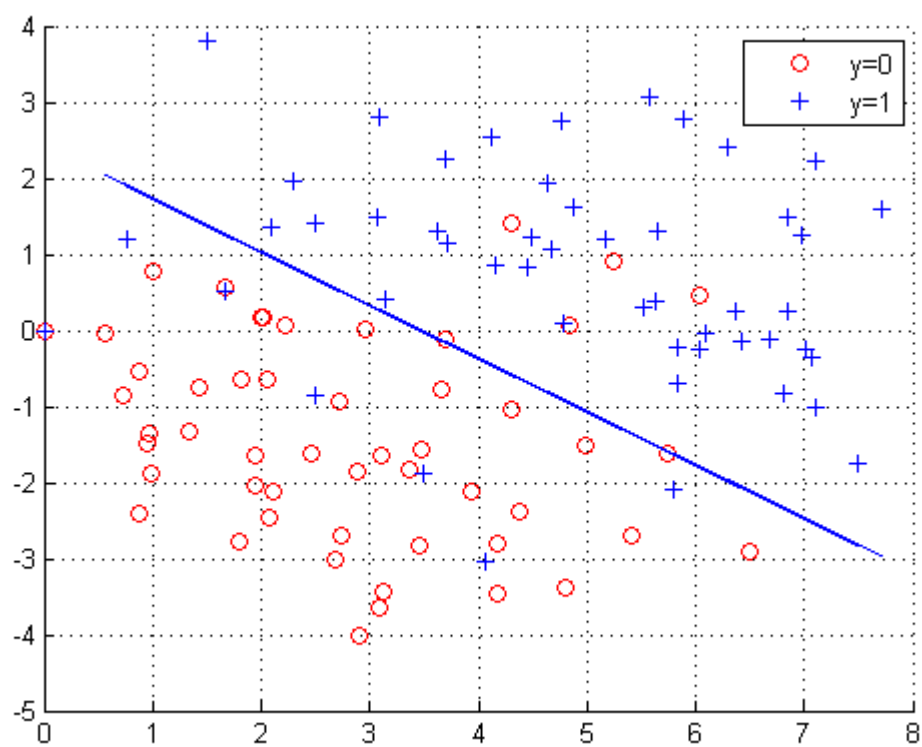
Question 3

Part a

Theta Obtained

t0	t1	t2
-0.0014	0.0004	0.0006

Part b

Data Plot

Question 4

Part a

Mean : Alaska

98.380000	429.660000

Mean : Canada

137.460000	366.620000

Covariance

1.0e+03 * 0.2875	1.0e+03 *-0.0267
1.0e+03 *-0.0267	1.0e+03 * 1.1233

Part b & c
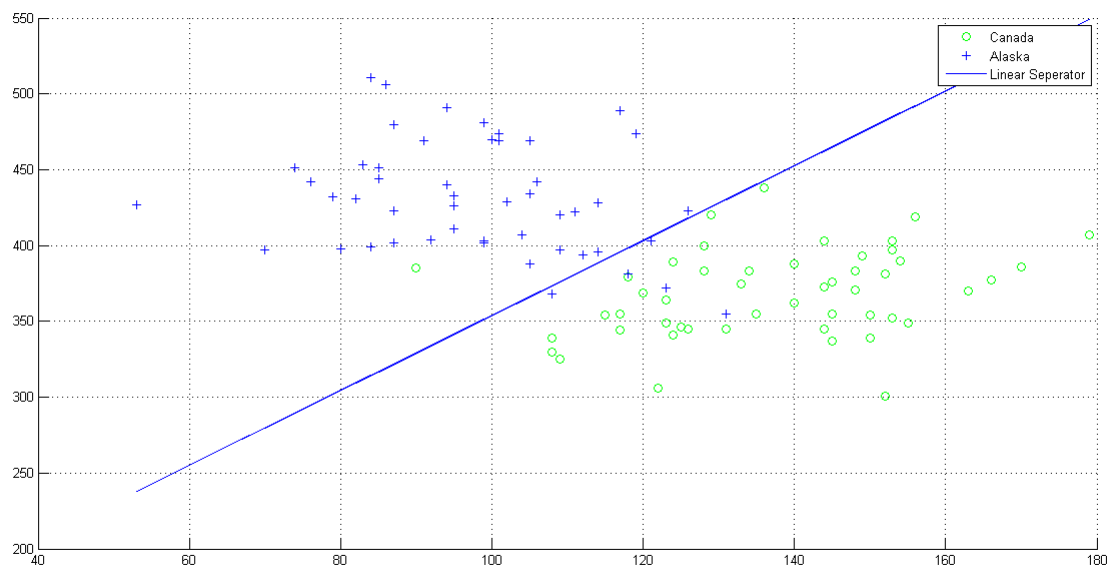
Part d

Covariance : Alaska

1.0e+03 * 0.2554	1.0e+03 *-0.1843
1.0e+03 *-0.1843	1.0e+03 * 1.3711

Covariance : Canada

319.5684	130.8348
130.8348	875.3956

Part e
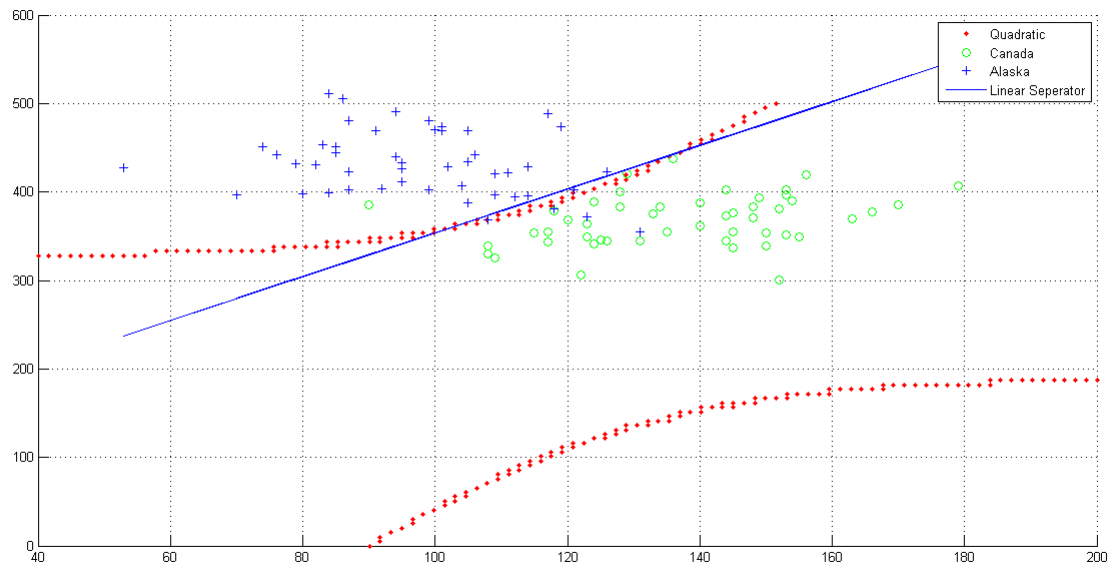
Part f

Quadratic Seperator is more flexible, the accuracy is comparable, with quadratic performing better on boundary cases.