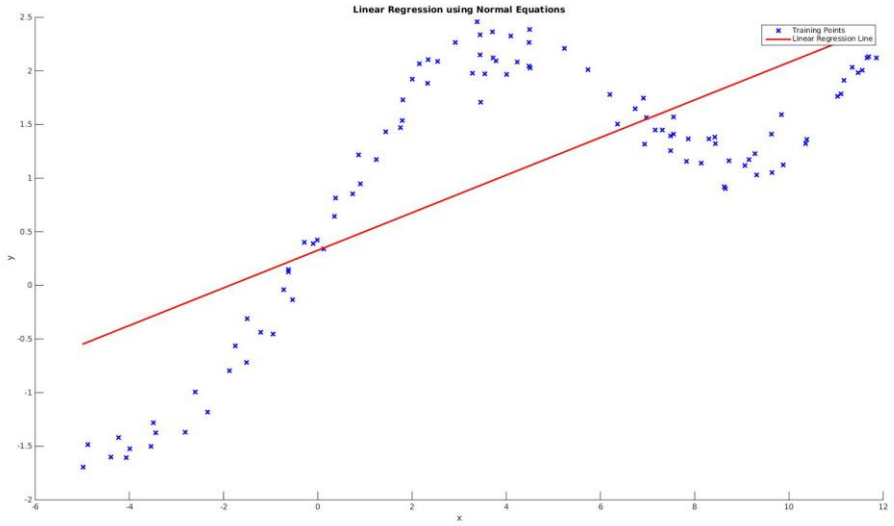
MACHINE LEARNING

ASSIGNMENT 1

QUESTION 2

(a)

Linear regression using normal equations.



(b)

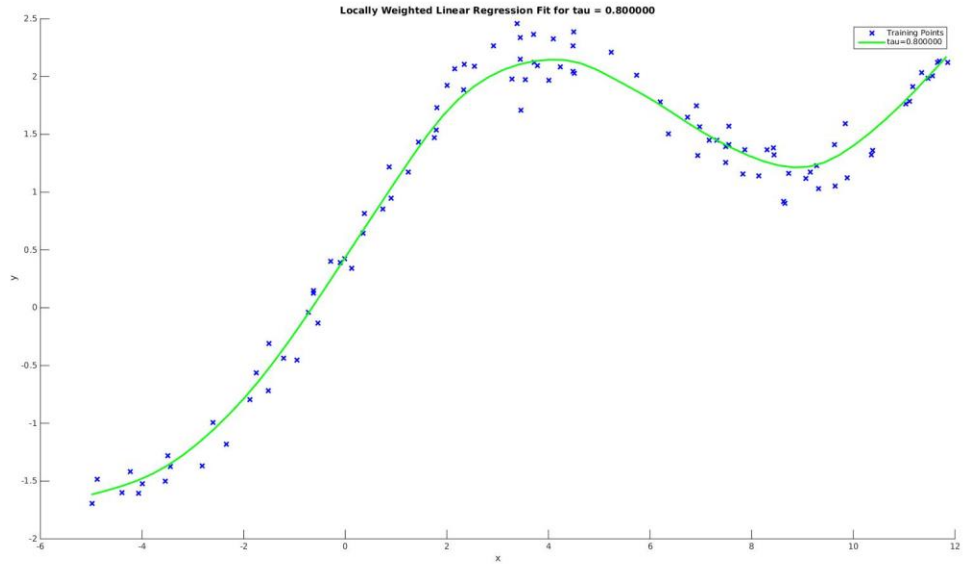
w is a diagonal matrix whose diagonal entries are obtained by –

$$\boldsymbol{w^i = e^{\frac{-(x-x^i)^2}{2\,\tau^2}}}$$

At each query point 'θ' is obtained by –

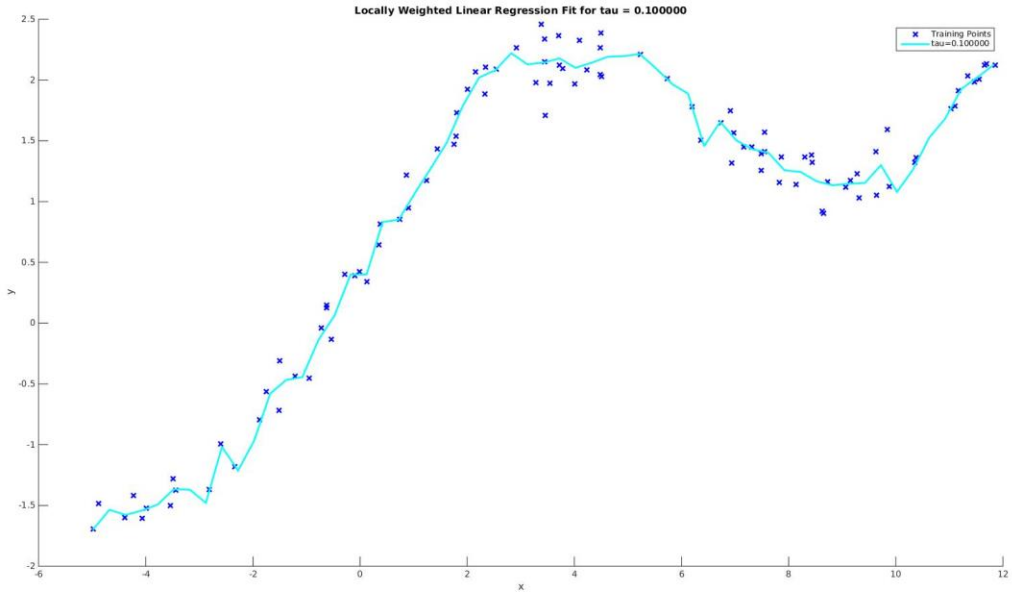
$$\boldsymbol{\theta_x = (X^T W X)^{-1} X^T \mathrm{WY}}$$

Tao-0.8



For other values {0.1, 0.3, 2, 10}

Tao-0.1



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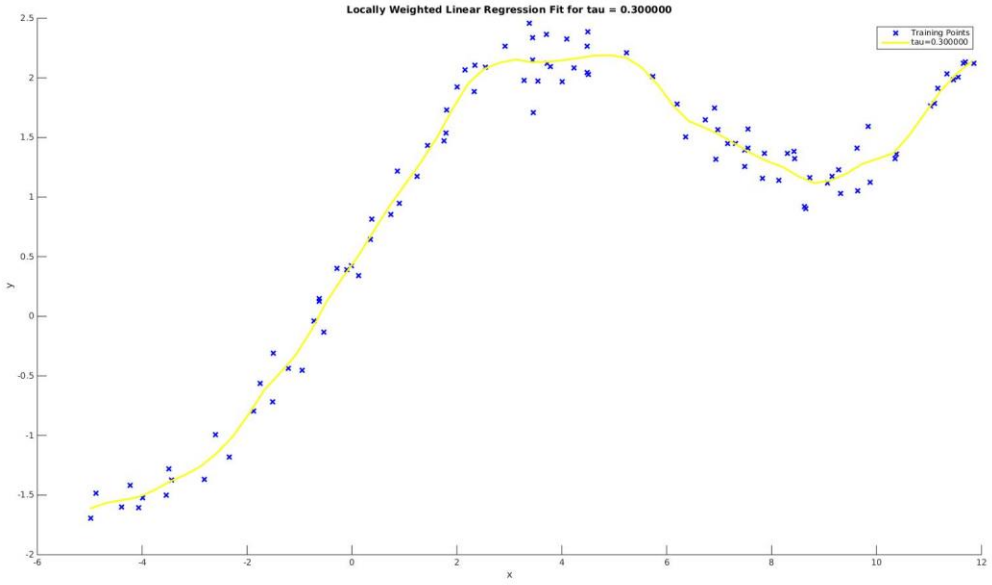
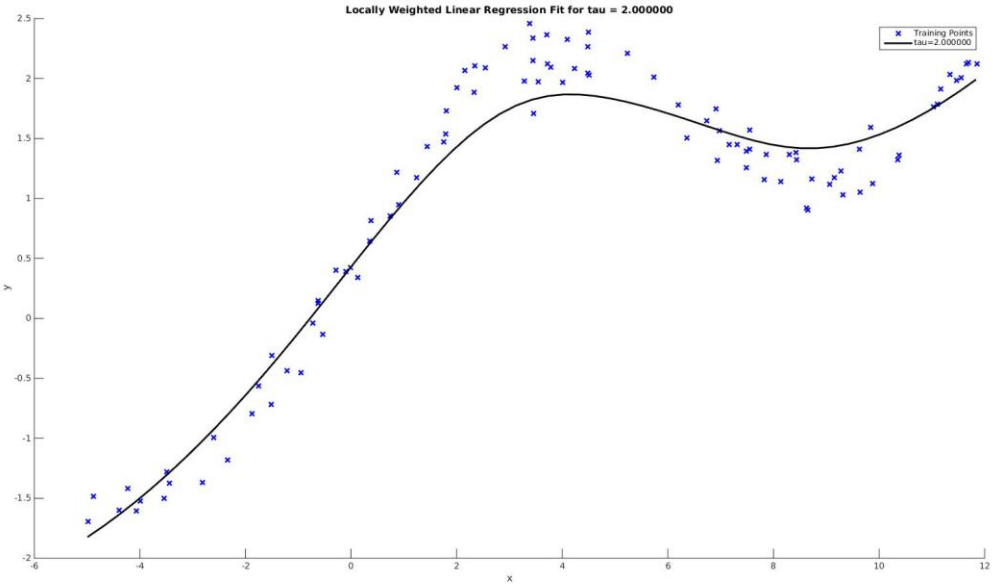
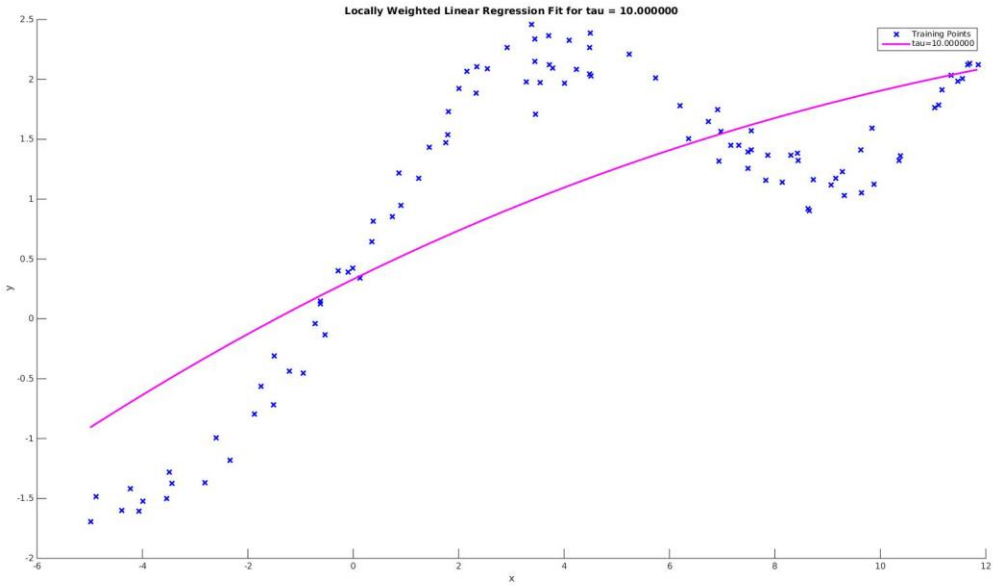
Tao-0.3


Locally Weighted Linear Regression Fit for tau = 0.300000
Training Points
tau=0.300000
x
y

Tao-2


Locally Weighted Linear Regression Fit for tau = 2.000000
Training Points
tau=2.000000
x
y

Tao-10



- Among the above plots, the initial ones are clearly overfit while last ones are underfit. The intermediate value of 0.3 seems to catch the data in the right fashion without fluctuating with the noise.