Q1

$$P(y_i \mid \vec{x}_i, \vec{w}) = \frac{1}{2b} e^{-\frac{|y_i - \vec{w}^T x_i|}{b}}$$

$$L(\vec{w}) = \prod_i \frac{1}{2b} e^{-\frac{|y_i - \vec{w}^T x_i|}{b}}$$

$$2l(\vec{w}) = \ln\left(L(\vec{w})\right)$$

$$= \ln\left(\pi \frac{1}{2b} e^{-\frac{|y_i - \vec{w}^T x_i|}{b}}\right)$$

$$= \sum_i \ln\left(\frac{1}{2b}\right) - \frac{|y_i - \vec{w}^T x_i|}{b}$$

$$= N \ln \frac{1}{2b} - \sum_i \frac{1}{b} |y_i - \vec{w}^T x|$$

$$\underset{\vec{w}}{\arg\max}\ 2l(\vec{w}) = \underset{\vec{w}}{\arg\max}\ N\ln\frac{1}{2b} - \sum_i \frac{1}{b} |y_i - \vec{w}^T x|$$

$$= \underset{\vec{w}}{\arg\max}\ - \sum_i |y_i - \vec{w}^T x|$$

$$= \underset{\vec{w}}{\arg\min}\ \sum_i |y_i - \vec{w}^T x|$$

Q2

t	0	.2	.4	.6	.8	1
TP	8	8	6	6	4	0
FP	8	6	3	1	1	0
FN	0	0	2	2	4	8
Recall	100%	100%	75%	75%	50%	0%
Pre	50%	57%	66.6%	86%	80%	0%

Question 6 plots:

Step size .0001, Max iters = 1000
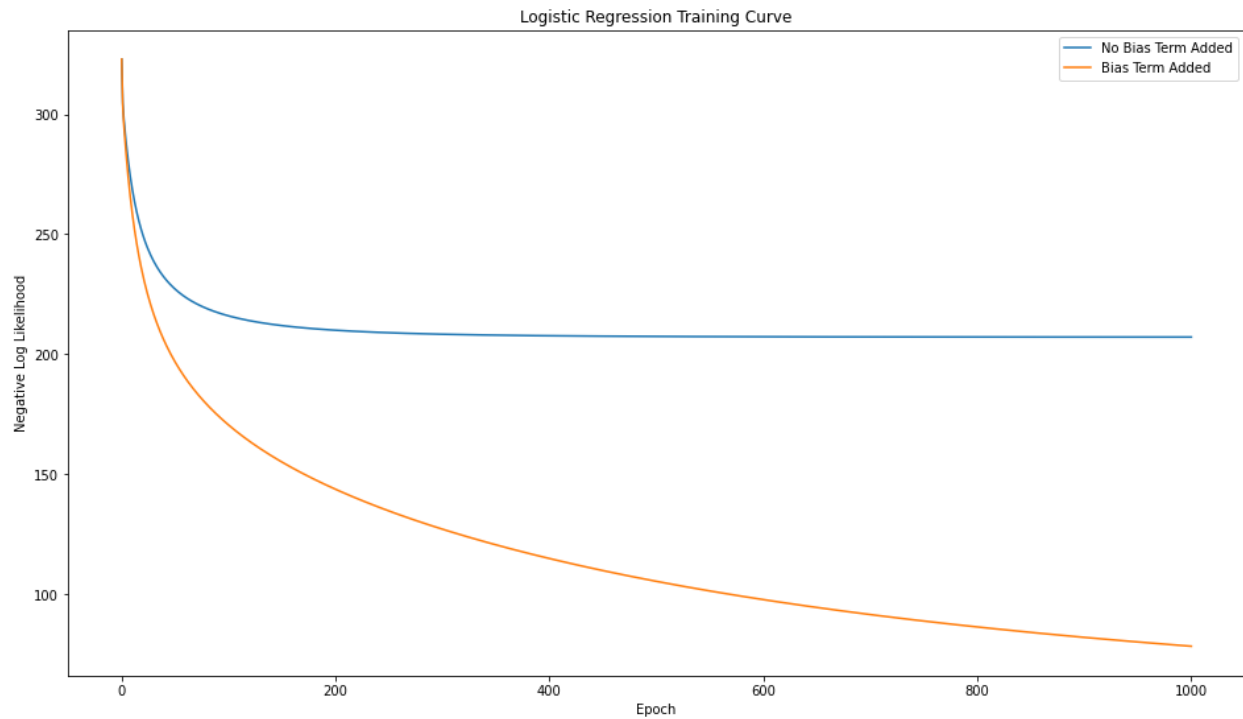
Step size .0001, Max iters = 10000
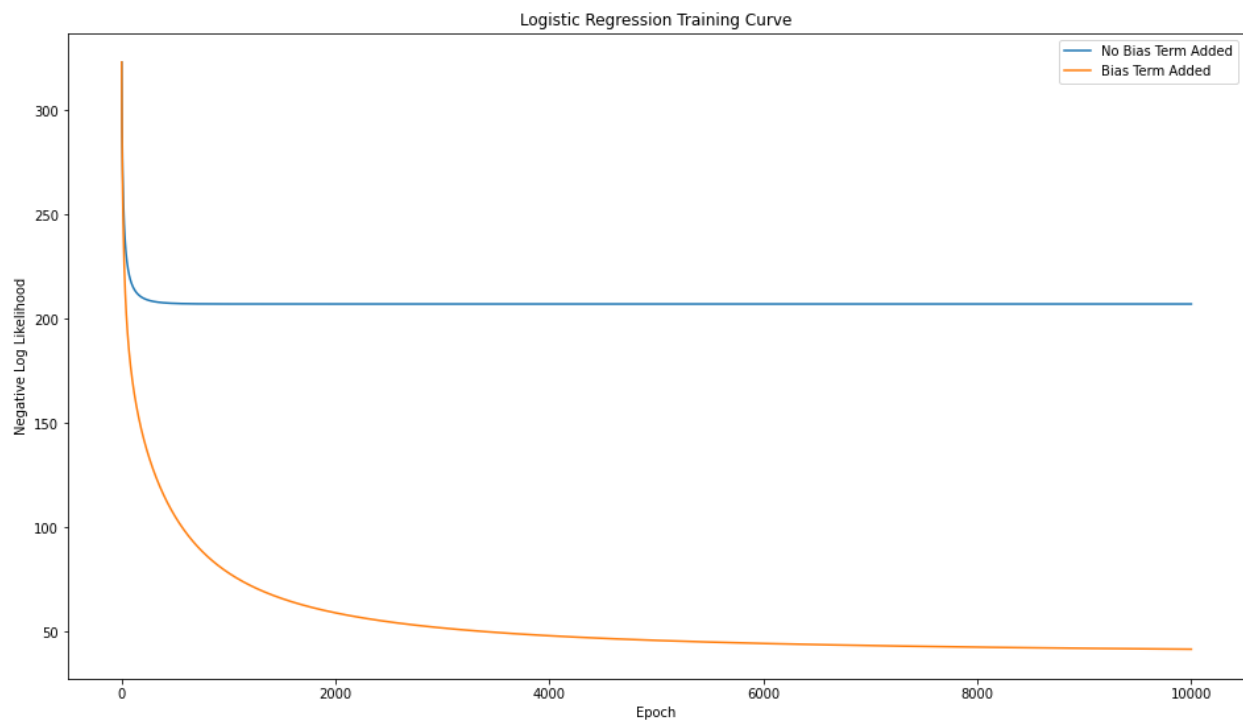
Step size .00001, max iters= 10000

Logistic Regression Training Curve
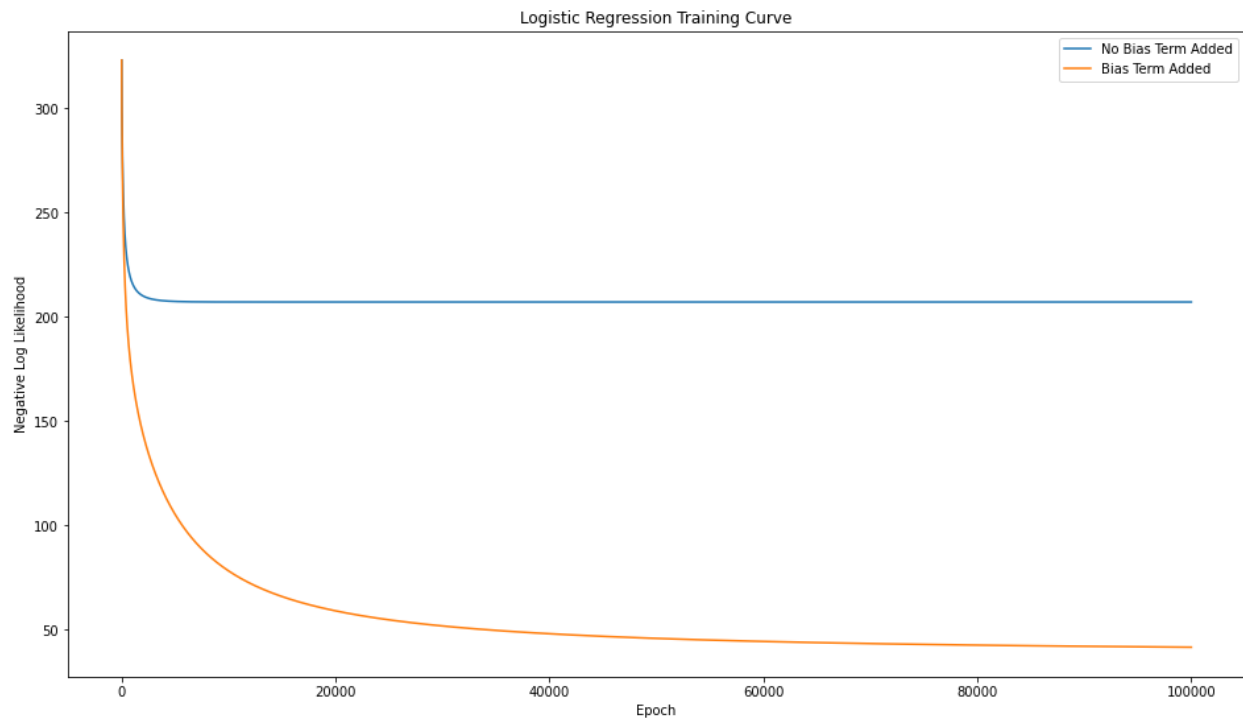
The first plot shows more iterations are needed but the second two show a horizontal asymptote.

1. Approximately how many hours did you spend on this assignment?

5 or 6

2. Would you rate it as easy, moderate, or difficult?

Easiest so far, but not easy.

3. Did you work on it mostly alone or did you discuss the problems with others? 5

Alone

4. How deeply do you feel you understand the material it covers (0%–100%)?

80-90% I wish I had a better idea of what the graphs were showing.

5. Any other comments