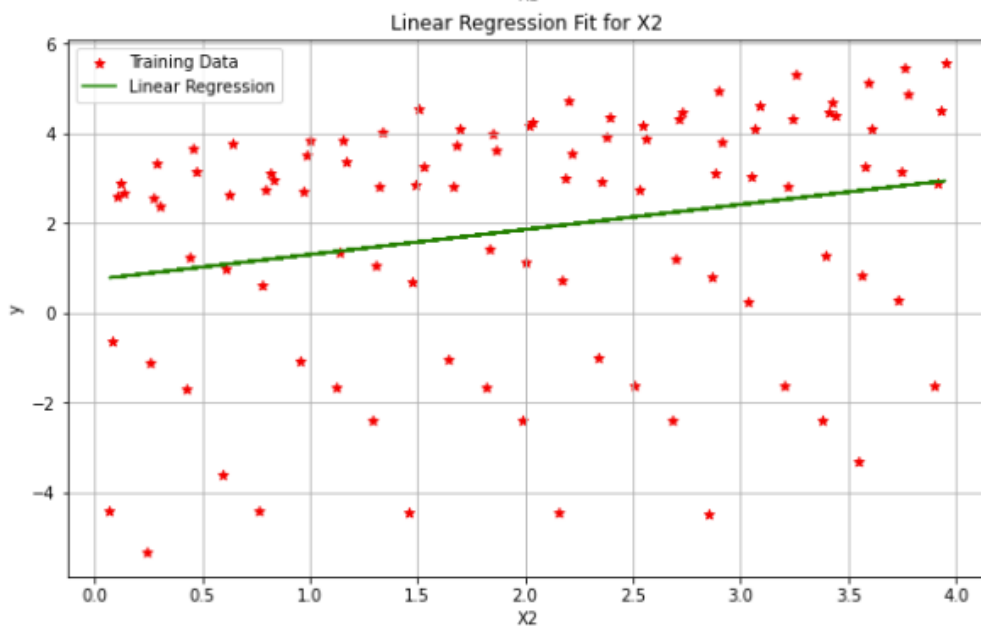
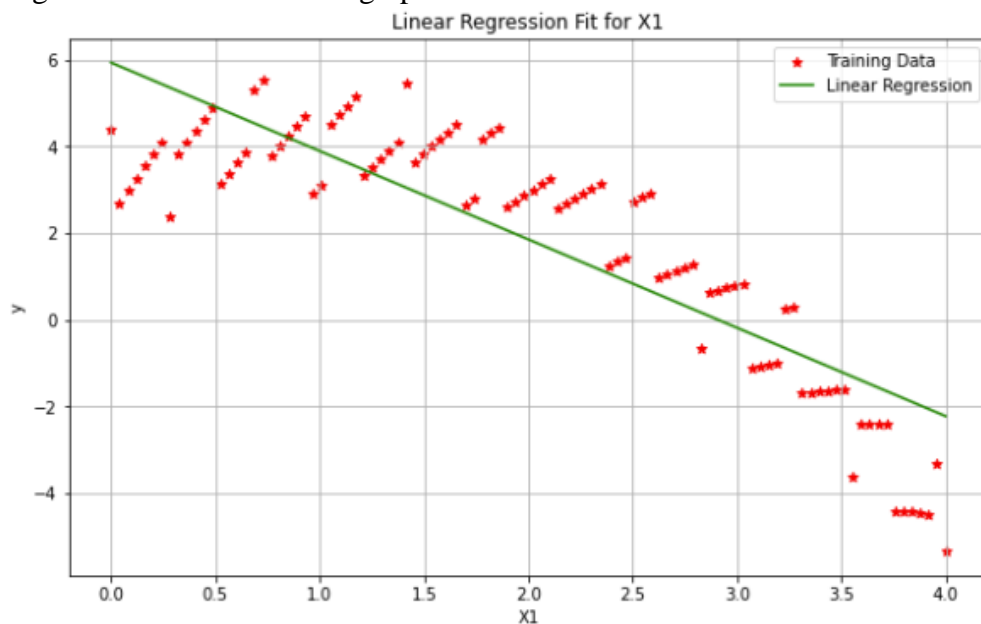


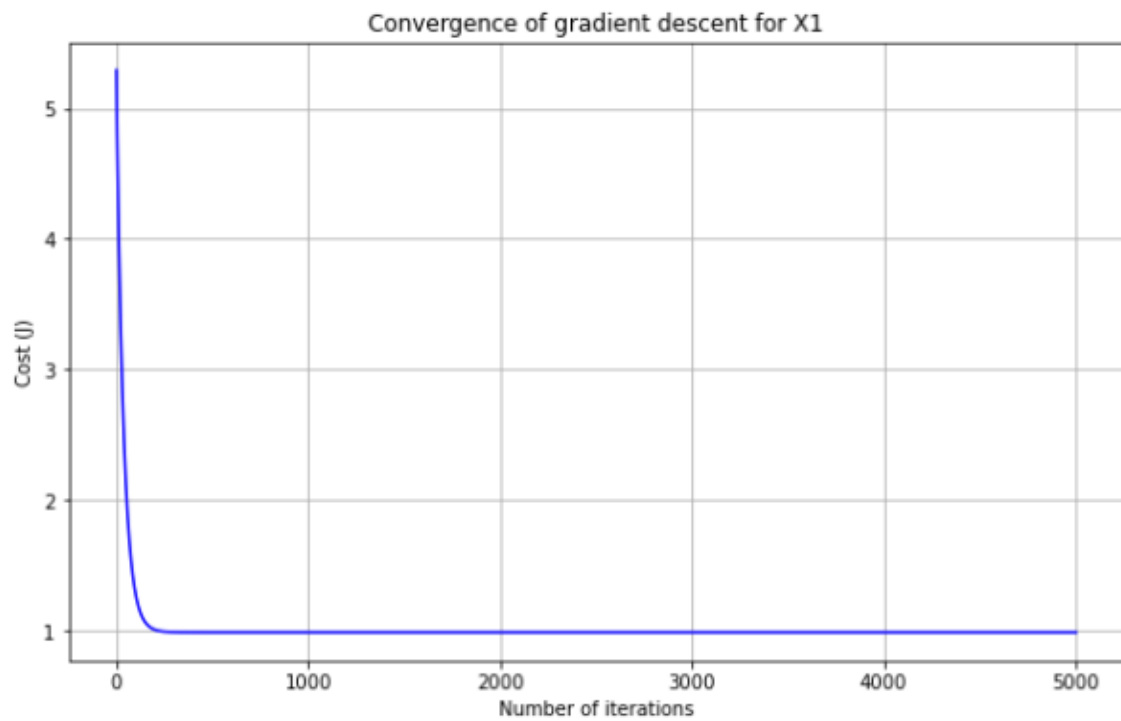
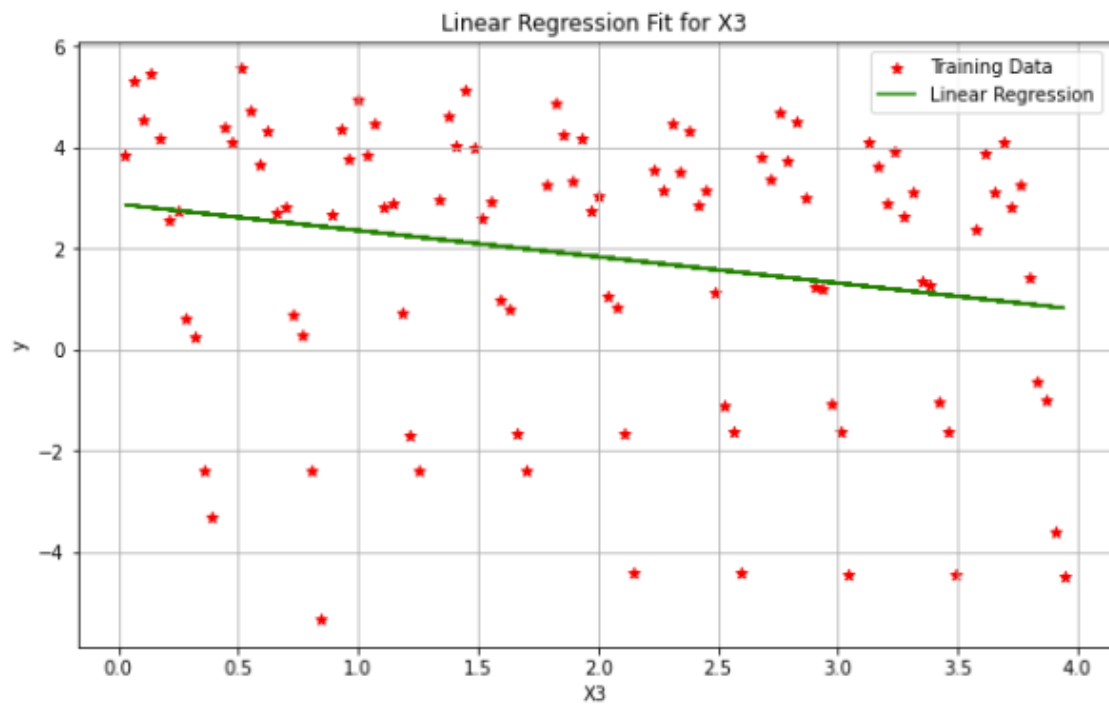
# Homework 0

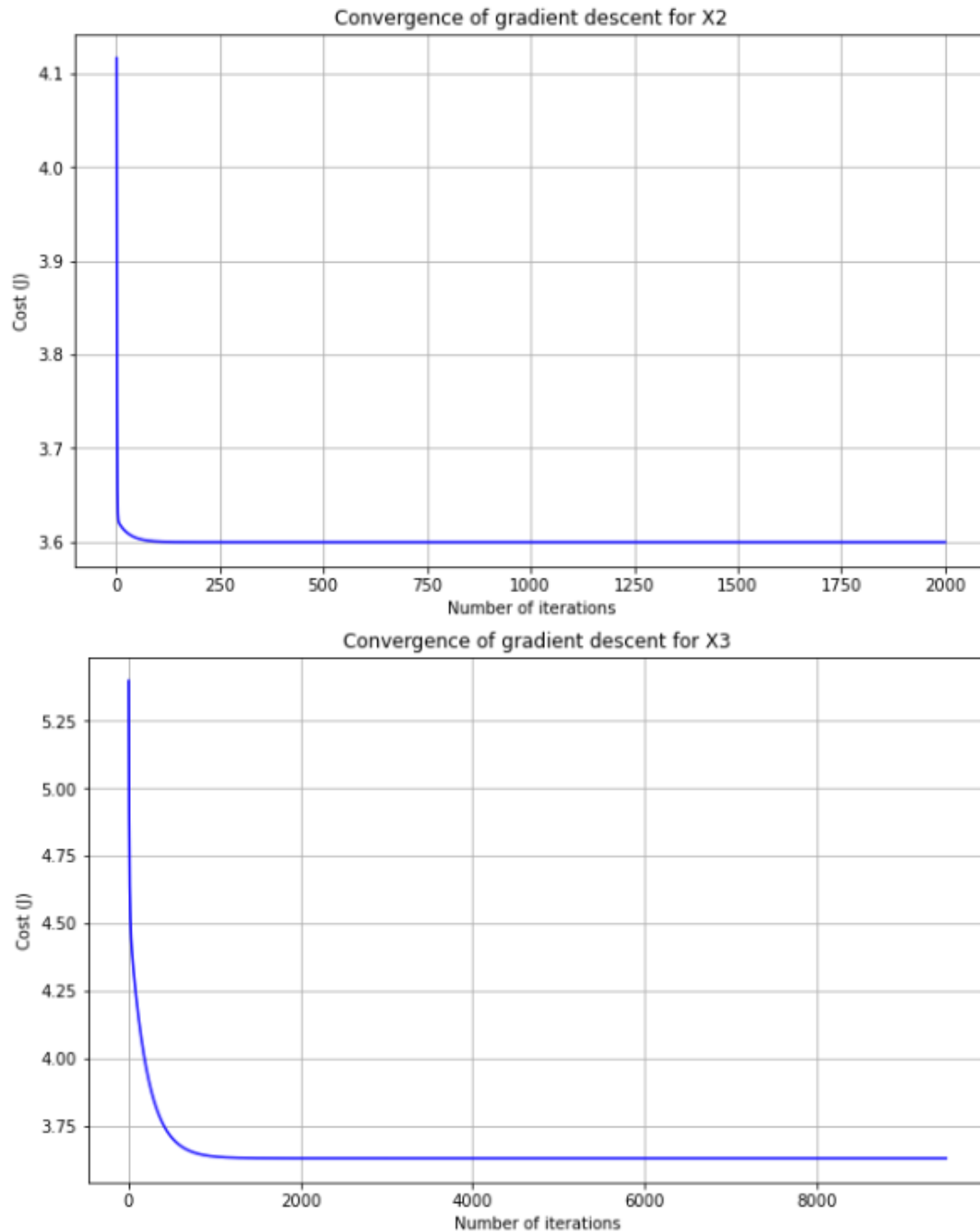
GitHub: [https://github.com/pballou/ECGR\\_4105/tree/master/Homework/homework\\_0](https://github.com/pballou/ECGR_4105/tree/master/Homework/homework_0)

## Problem 1:

1. Linear models
  - a. X1:  $h(x) = 5.93 \cdot x_1 - 2.04$
  - b. X2:  $h(x) = .74 \cdot x_1 + .56$
  - c. X3:  $h(x) = 2.87 \cdot x_1 - .52$
2. Regression models and loss graphs:



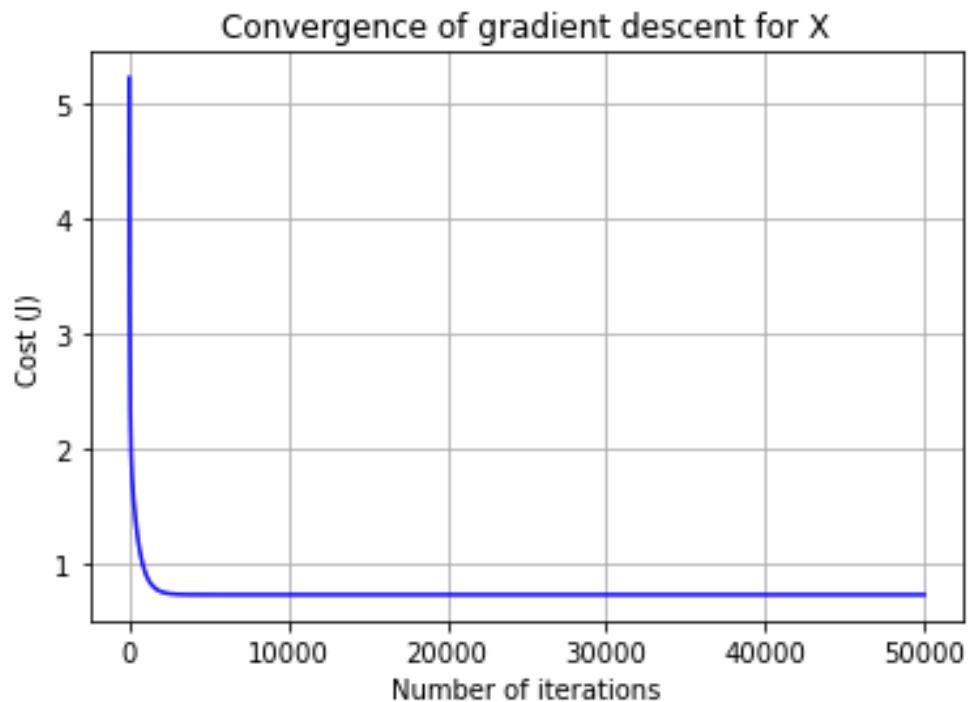




3. X1 has the lowest loss.
4. If I went too low, like  $\alpha = .01$  and less, the final loss would get worse. I basically just played around with the learning rate and found the one that resulted in the lowest final loss. The number of iterations didn't make a difference past a certain point, but it wouldn't quite converge if I went too low. This varied for each X input.

Problem 2:

1.  $h(X) = 5.31 \cdot x_3 - 2.00 \cdot x_2 + .53 \cdot x_1 - .27$
- 2.



3. The lowest loss I was able to achieve was  $\sim .738464$ . In general, even higher learning rates (.1) produced roughly the same final cost if the number of iterations was increased.
4. Predictions:
  - a.  $h(1,1,1) = 3.58$
  - b.  $h(2,0,4) = .24$
  - c.  $h(3,2,1) = .10$