**Homework 0**

GitHub: https://github.com/pballou/ECGR\_4105/tree/master/Homework/homework\_0

Problem 1:

1. Linear models
   1. X1: h(x) = 5.93\*x1 – 2.04
   2. X2: h(x) = .74\*x1 + .56
   3. X3: h(x) = 2.87\*x1 - .52
2. Regression models and loss graphs:

Chart, scatter chart

Description automatically generated

Chart, scatter chart

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Chart, scatter chart

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Chart

Description automatically generated with medium confidence

Chart, line chart

Description automatically generated Graphical user interface

Description automatically generated

1. X1 has the lowest loss.
2. 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\*x3 – 2.00\*x2 + .53\*x1 - .27

Chart

Description automatically generated

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