[CMPUT 466/566] Machine learning

Coding Assignment 1

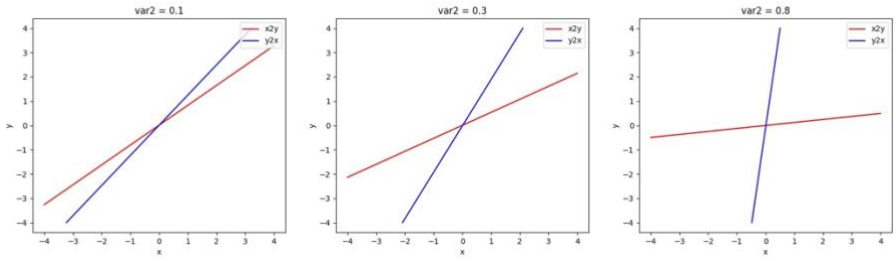
Problem 1 [50%]

1)

Predicting y from x (x2y): w_x2y= 0.5393370911476868 b_x2y = 0.0014756460529262638

Predicting x from y (y2x): w_y2x= 0.5251463117607872 b_y2x = -0.007923170504960239

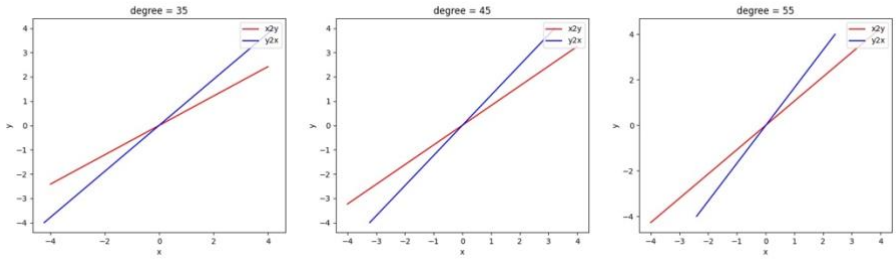
2)



3)

The change of var2 affects the output of the regression model. When var2 increases, the regressions of x2y and y2x deviate from each other more.

4)



When we try with different rotation degrees, the output of the regression model x2y and y2x are almost same. The deviation between two regression model remains the same as the rotation degree increases. Both lines have positive slope.

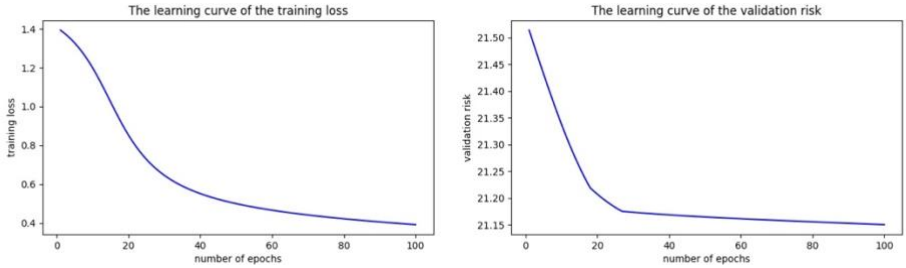
Problem 2 [50%]

1)

The number of epochs that yields the best validation performance: 100

The validation performance (risk) in that epoch: 21.15027084533993

The test performance (risk) in that epoch: 21.585162329099735



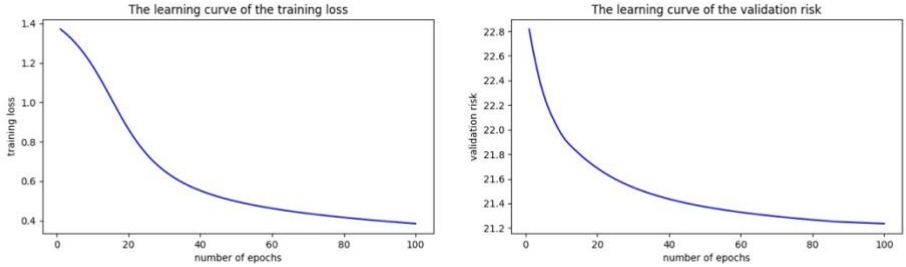
2)

The best hyperparameter of decay: 0.01

The number of epochs that yields the best validation performance: 100

The validation performance (risk) in that epoch: 21.235882001489603

The test performance (risk) in that epoch: 21.463675573856772



c)

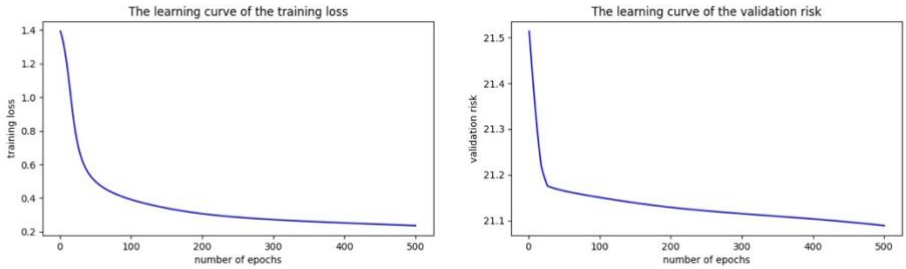
Meaningful scientific question: What happens to **the learning curve of the training loss** and **the learning curve of the validation risk** when MaxIter and batch_size change?

When I set MaxIter = 500:

The number of epochs that yields the best validation performance: 500

The validation performance (risk) in that epoch: 21.088644577756583

The test performance (risk) in that epoch: 21.625162780811504



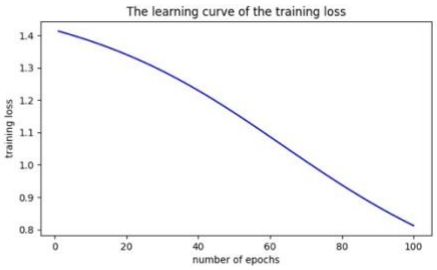
Comparing the new outputs with the outputs in 2a, we could conclude that when MaxIter becomes bigger (the number of epochs increase), the regression model performance is better.

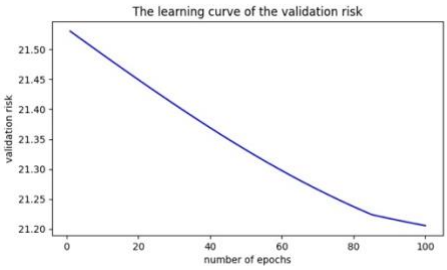
When I set batch_size = 50:

The number of epochs that yields the best validation performance: 100

The validation performance (risk) in that epoch: 21.20553345244632

The test performance (risk) in that epoch: 21.557594017151676





Comparing the new outputs with the outputs in 2a, we could conclude that when batch_size becomes bigger, the regression model performance is not good as before.