**Maria Varga**

**Problem Set 3 AQM**

Regularization, Bootstrapping and Cross-Validation

**Problem 1 - Regularization and Condition Number**

Part a

ridge regression had a residual sum of squares (RSS)

After the L2 norms are expanded:

Using matrix notation, we have

The ordinary least squares solution is obtained by minimizing the sum of squared residual in respect to beta, that is minimizing the vertical distance between the observed and the predicted.

To find that minimizes the sum of squared residuals, we take the derivative and set it equal to zero

as long as X has full rank, this is a positive definite matrix and hence a minimum.

We then have

if the inverse of exists, we have

As , the identity matrix, the **estimator b** that minimize the sum of square error, is given by