

WU #18 - Bias-Var Tradeoff

Math 158 - Jo Hardin

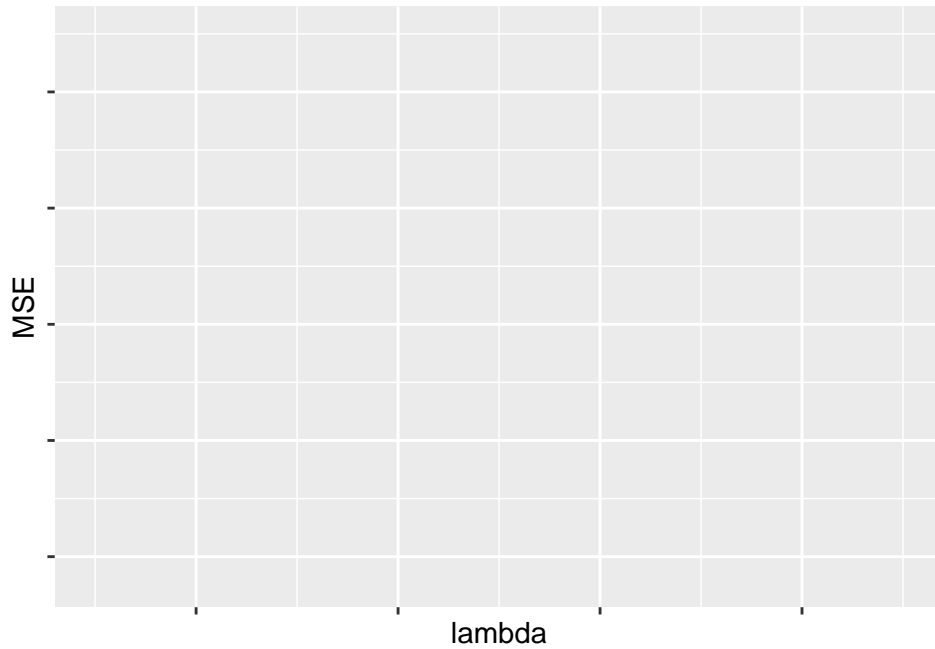
Tuesday 4/5/2022

Name: _____

Names of people you worked with: _____

Consider evaluating the ridge regression model using both cross validation as well as using the full dataset. On the graph below, sketch the relationship between MSE and λ for each of the two data evaluations (one line/curve for CV MSE one line/curve for MSE on the full dataset).

- Which line/curve is above the other (or do they cross)?
- Are the lines/curves monotonic?
- Do either of the lines/curves decrease all the way to zero?



Solution:

- Which line/curve is above the other (or do they cross)?
> For any given λ , CV should be above the full MSE line.
- Are the lines/curves monotonic?
> Full MSE will be monotonic, CV will be quadratic.
- Do either of the lines/curves decrease all the way to zero?
> No, neither line goes to zero MSE.

Note: as $\lambda \rightarrow \infty$, all the coefficients go to zero which means that the predictions are all \bar{Y} . Note that the full model will still have smaller MSE than the CV model (because the point being predicted will be included in the \bar{Y} calculation), but the MSE values will level off.

