Homework 3

Please turn in your work through blackboard.
Only correctly formatted PDFs will be accepted.

This assignment will be submitted in a report format. While no specific format of the report is provided, please ensure your report has the following:

- Objective (what are you trying to convey to the reader)
- Introduction and background
- Clear figures that express the objective you are trying to solve
- Conclusion
- Appendix (This will include your code.)

This assignment is graded on its ability to clearly express the ideas at hand. Consider this to be a professional report where you are trying to convey to a client the challenges associated with their "system". Keep it short (less than 3 pages) and use quality figures.

1 Ridge Regression

Using the data provided with this assignment, and presented in figure 1, train a 20^{th} degree polynomial model to the data using the ridge regression technique. The ridge regression technique can be solved using either a closed-form or iterative solution but you must provide reasoning on the method you selected and insight into how the algorithm functions. You may use the appropriate SK-learn modules for building and training the models if you like, for example, use *sk.preprocessing.PolynomialFeatures(20)* to develop the combinations for a 20^{th} degree polynomial. Justify your choices for all hyper-parameters used. Lastly, develop and report the learning curves for your selection of hyperparameters and comment as to whether your selected hyperparameters result in an under, correctly, or over-fit model. Provide a short discussion on how the learning curves provide this information.

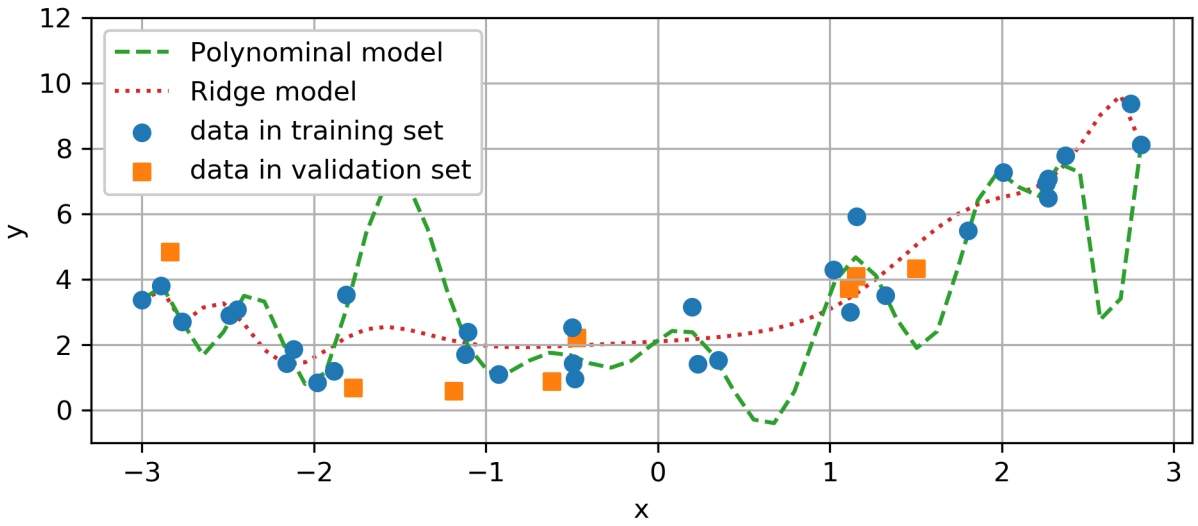

Figure 1: The provided data split into training and validation data sets, showing model results obtained using the polynomial and ridge regression methods.

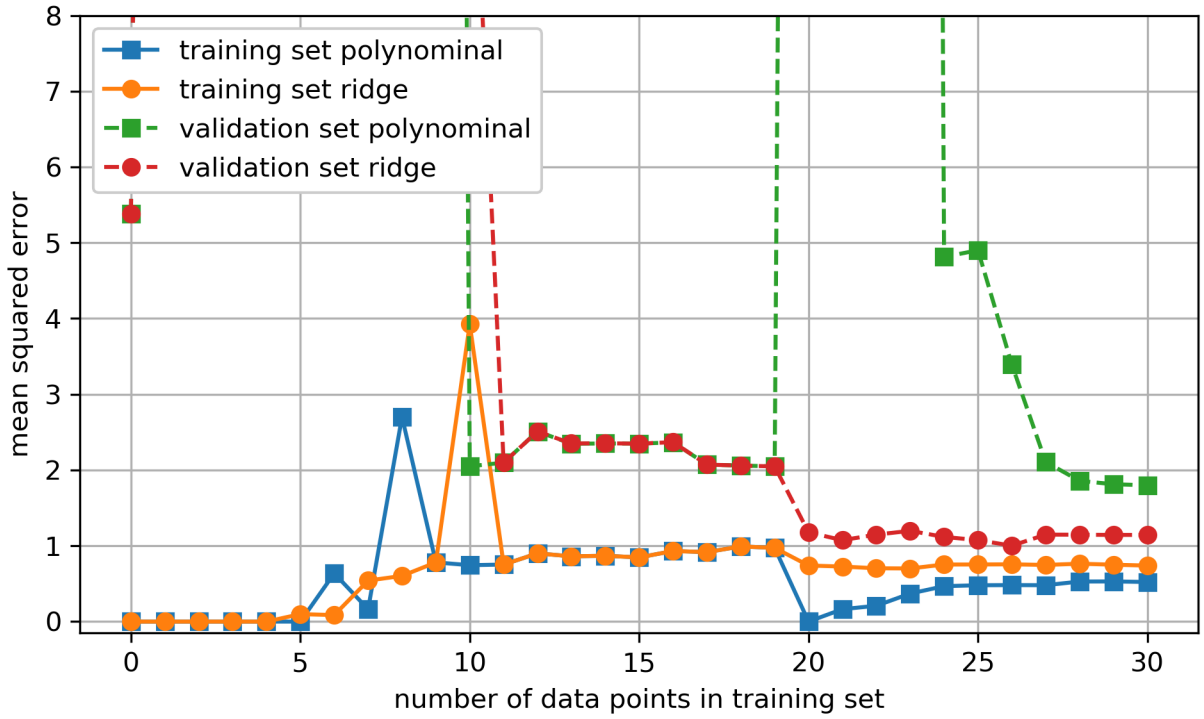

Figure 2: Learning curves for the polynomial and ridge regression methods presented in figure 1.

Figure 1 reports the results for a polynomial regression and a ridge regression model. Furthermore, figure 2 reports the learning curves for the polynomial and ridge regression approaches. These plots are meant to assist you by demonstrating potential solutions and learning curves for the considered data, however, your results may vary depending on your selected hyperparameters, solvers, and randomness in initial conditions.