**Student: Seif Kungulio**

**Date: 04/06/2025**

**Subject: Project 4**

**Class: DSCI 512**

**Section: 01W**

**Instructor: Dr. Nengbing Tao**

**File Name: Project4\_Kungulio\_Seif.docx**

1. Read the dataset in Boston.csv into R. Call the loaded data Boston. Make sure that you have the directory set to the correct location for the data.
2. The response is nox and the predictor is dis. Use the poly() function to fit a cubic polynomial regression to predict nox using dis. Report the regression output.
3. Your assistant data scientist, Tom Johnson, is considering predicting nox using dis as a predictor. He proposes models from degree 5, degree 4, and degree 3, and degree 2 polynomial regression. Please perform cross-validation using caret package to select the optimal degree for the polynomial and justify your answer.
4. Tom just took the DSCI 512. You recommend that he perform the following GAM analysis.
   1. Predict nox using a smoothing spline of degree 3 in dis and a smoothing spline of degree 2 in medv.
   2. Predict nox using a smoothing spline of degree 2 in dis and a smoothing spline of degree 1 in medv.
   3. Perform anova analysis. Recommend the best model and justify your answer.