**Due Date: April 1, 2020**

**PART I Reading Assignment: Chapter VIII of “An Introduction of Statistical Learning”**

**Answer the following questions based on your reading.**

**Problem 1 (2 Points)** Suppose that the data for study is where is a p-dimensional prediction vector. In regression analysis, we assume that the model has the form . (Hint: Page 314)

**Problem 2 (2 Points)** Suppose that the data for study is where is a p-dimensional prediction vector. In regression tree analysis, we assume that the model has the form . (Hint: Page 314)

**Problem 3 (2 Points) (True/False)** Even if the true function form of the model is well approximately by a linear model, the model build using decision trees is still better than the model built using regression.

**Problem 4 (10 Points)** Based on the textbook, Decision Trees for either classification or regression have four advantages over the traditional regression and logistic regression methods:















However, it has one major disadvantage that is **.**

**Problem 5 (2 Points)** Suppose that be a random sample from a normal population with mean and variance . The variance of the mean is . This means that we can reduce the variance of almost all statistics through averaging.

**PART II Programming (12 Points)**

Data: The data set used is “ASS06\_DATA”.

**Problem 1 (6 Points)** Bagging for regression

DO K = 1 to 20;

STEP 01: Randomly select a sample of size 1,460 with replacement.

STEP 02: Build a **regression** model to predict the “HousePrice”

STEP 03: Use the model built in STEP 02 to score all 1,460 observation and keep all the predicted values for each observation

END DO;

STEP 04: Calculate the bagging estimator using the formula

STEP 05: Calculate the error estimator for the bagging estimator in “STEP 04” using the formula .

Produce a box plot for all 20 bagging predictions with “predicted” “HousePrice” as the Y-axis.

**Problem 2 (6 Points)** Bagging for decision trees

DO K = 1 to 20;

STEP 01: Randomly select a sample of size 1,460 with replacement.

STEP 02: Build a **decision trees** model to predict the “HousePrice”

STEP 03: Use the model built in STEP 02 to score all 1,460 observation and keep all the predicted values for each observation

END DO;

STEP 04: Calculate the bagging estimator using the formula

STEP 05: Calculate the error estimator for the bagging estimator in “STEP 04” using the formula .

Produce a box plot for all 20 bagging predictions with “predicted” “HousePrice” as the Y-axis.