# Homework 4

Dec. 3, 2020

**NOTE: Homework 4 is due next Thursday (Dec. 10, 2020). The questions started with * are for Exercise only, and you are not required to submit the answers.**

1. The attached data set "data.csv" is a subset of the Ames House data set. The first row of this data set is the name of the variables, where "SalePrice" is the dependent variable (column 1) and "Lot_Area" is the independent variable (predictor; column 2). There are $n = 1598$ observations in total (rows 2 - 1599). Suppose we use a linear regression model to approximate the relationship between SalePrice and Lot_Area:
$$\text{SalePrice} = \beta_0 + \beta_1 \text{ Lot\_Area} + \epsilon$$
   Suppose that the noise $\epsilon_i$ i.i.d. $\sim N(0, \sigma^2)$. Calculate the MLEs of $\beta_0, \ \beta_1, \ \sigma^2$ .

2. Let $\boldsymbol{X} = (X_1, \cdots, X_n)$ be a random sample of size $n = 15$ from a normal distribution $N(\mu, 0.25^2)$, and the observed values are:
$$2.9, 2.8, 3.0, 2.8, 3.1, 2.7, 2.3, 2.8, 2.4, 2.8, 2.6, 2.6, 3.1, 3.2, 2.9.$$
   Construct a 95% confidence interval for $\mu$.