Welcome to Recitation 10!

Case Background:
As part of a longer manufacturing process, a factory needs to cast a large number of rectangular metallic blocks. The blocks are manufactured by using a mold consisting of the main cavity, a cup through which the molten metal is poured, and two risers for cooling (see Figure 1). The size and shape of the pouring cup and risers affect how quickly the metal can be poured into the mold, how quickly it cools, and whether it sets correctly

FIGURE 1

Objective:
The factory needs to cast batches of 100 blocks of size 4.5 × 4.5 × 7 inches. The current casting approach is conservative — it takes a long time to pour, but the blocks always set correctly and are usable. Your goal is to achieve a significant reduction in average casting time while still ensuring that most blocks are feasible (usable). In this week's lab, you will focus on casting time, while next week the focus will be on feasibility. This week you should ignore the variable "`Feasible`" which indicates whether a casting is usable.

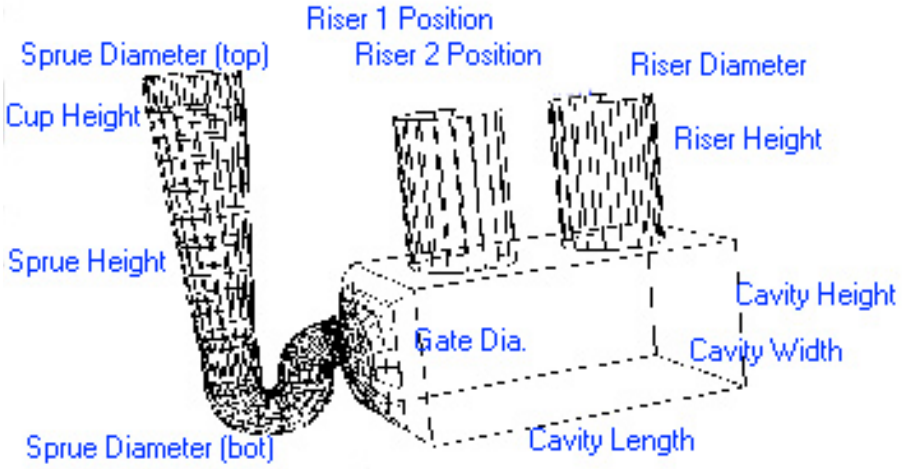

FIGURE 2

Variables:
The following variables can be varied: `Riser Height`, `Riser Diameter`, `Riser 1 Position`, `Riser 2 Position`, `Gate Diameter`, `Cup Height`, `Sprue Height`, `Sprue Diameter Bottom`, and `Sprue Diameter Top` (see Figure 2). The response variable is "`BatchTime`".

Data:
To obtain data on how various variable values affect pouring and cooling, a batch of 100 castings is poured with random variations in the mold variables about their baseline values. The data are available in the file `castdata.csv` on github. Each row contains parameter values (the inputs), and the cast batch time. The first line in the file contains the header with the names of the variables. The data start in the second row. The first row of data has the baseline values, that is, the values of the variables used in the current casting approach.

Download `Recitation_10_– Linear_Regression.ipynb` to complete the remainder of the lab.