

Exam 1 - Part II

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Getting ready:

Open up a `R`markdown file. Change the YAML: Your YAML should look similar to:

```
---
title: "Exam 1 - Part II"
author: "Your name"
date: "03/30/2021"
output: pdf_document
---
```

1. **Extending the life of an aluminum smelter pot.** An investigation of the properties of bricks used to line aluminum smelter pot was published *American Ceramic Society Bulletin* - Feb. 2015. Six different commercial bricks were evaluated. The life length of a smelter pot depends on the porosity of the brick lining (less porosity, the longer the life); consequently, the researchers measured the apparent porosity of each brick specimen, as well as the mean pore diameter of each brick. The data are given in the following url.

- a. Use the following code to load and name your dataset.

```
site <- "https://lasanthi-asu.github.io/STT3851ClassRepo/Assignments/SMELTPOT.txt"
SP <- read.table(file = site, header = TRUE)
attach(SP)
head(SP)
```

- b. Find the mean and the median for both variables in SP.
- c. Fit a simple linear regression model for this data.
- d. Plot the response vs. the predictor. Use the `abline()` function or `geom_smooth()` function to display the least squares regression line.
- e. Predict the apparent porosity percentage for a brick with a mean pore diameter of 10 micrometers.
- f. What are the associated 95% confidence and prediction intervals?
- g. Make the residual plot.
- h. Would you trust the predictions from this model? Explain.

2. **Earnings of Mexican street vendors.** This question tries to investigate a relationship between the vendors' mean annual earnings with Age (x_1) and Hours (x_2).

a. Load the second data set using the following code:

```
site <- "https://lasanthi-asu.github.io/STT3851ClassRepo/Assignments/STREETVN.txt"
SV <- read.table(file = site, header = TRUE)
attach(SV)
head(SV)
```

- b. Fit a multiple linear regression model to model mean Earnings using Age (x_1) and Hours (x_2). Write your model.
- c. Which predictors appear to have a statistically significant relationship to the response. Justify your answer.
- d. Fit a second order non-linear model using Age and Age² as the only predictors. Write your model.
- e. Which predictors appear to have a statistically significant relationship to the response. Justify your answer.