In-class exercise: Covariance analysis: two levels, one covariate

Names: (signatures only please, printed names will not be counted)

1.) 4.)

2.) 5.)

3.) 6.)

Overview

In this exercise we suppose we examine the difference in highway gas mileage between cars and trucks in models with and without weight as a covariate.

Instructions

As usual, start by bringing your copy of the `MTH225_Fall2016` archive up to date.

Open a command prompt or terminal window, and use the `cd` command to change to the `MTH225_Fall2016` subdirectory. Then type the command:

```
git pull origin master
```

The pull operation should download the following files:

- The R-knitr code: `week9_IC1_covariance_example.Rnw`
- The data in Rdata format: `EPA_mileage.Rdata`
- The STAN model file 1 `week9_IC1_covariance_example.stan`
- The STAN model file 2 `week9_IC1_no_covariate_example.stan`

In this exercise, the data file is in Rdata format, which you read with a `load` command. The .Rnw file is set up to do this, you should not have to modify it or the .stan files.

Questions

Use the *Compile PDF* button to run the model, and use the output to answer the following questions:

1) In the model with weight as a covariate, what is the estimated mean difference between the highway mileage of cars and trucks, and what is the 95% confidence interval for the difference?

2) What is the point estimate of the error standard deviation sigma for this model?

3) For the model with no covariate, what is the point estimate of the difference in highway mileage between cars and trucks? What is the 95% confidence interval for the difference?

4) What is the point estimate of the error standard deviation sigma for this model?

5) How would you explain the difference in the results for the two models, one with weight as a covariate and one with no covariate?