

## MTH225 Spring2017 Final Problem 4

A pair of wire loops embedded in a highway surface record the speed of vehicles passing over them (in miles per hour). Use the sample to produce a 95% confidence interval for the standard deviation of the speeds.

The data is in `MTH225_Spring2017_Final_Problem4.csv`. The variables are:

- `mph` Speed in miles per hour.

Use STAN to model the data as a sample from a normal population, and use the posterior draw to produce a 95% confidence interval for the standard deviation.

You should be able to use the Stan model file `normal.stan` as is.

- 2 points: Write R code to read the data and convert it to an R data frame.
- 1 point: Write the data block of a STAN model file that extracts the data from the R workspace.
- 1 point: Write the parameters block of a STAN model file that declares the parameter(s) of your model.
- 2 points: Write the model block of a STAN model file that specifies the priors and likelihood for your model.
- 1 point: Write R code to apply the `extract` function to the data structure output from the `stan` function.
- 1 point: Use the `extract()` function of the RSTAN package to obtain the values for the parameters from the posterior draw.
- 1 point: Use the posterior draws to obtain a point estimate and 95% confidence interval for the standard deviation parameter.
- 1 point: A hypothesis of interest is that the standard deviation is between 7.5 and 9.5. Use the posterior draw for sigma to estimate the probability that this statement is true.

(10 points possible)