

# Homework 5: working with Stan

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Stan is a probabilistic programming language that can be used to estimate the parameters that generated observed data. To show this, you will use Stan to estimate the parameters you chose in generating the data for Homework 4 using the Stochastic Simulation Algorithm (SSA).

## 1 Required

1. Write a Stan script that will estimate the model parameters from the SSA section of homework 4.
2. Write an API (R, Python, MATLAB, etc.) script that will run the Stan script.

Hint 1: check out <https://github.com/kgourgou/set-phasers-to-stan> and look at `8schools` and `regression-example` for examples of how to write Stan and R scripts.

Hint 2: in the `homework` folder of the github page, you will find skeleton scripts for Stan, R, and Python.

Hint 3: if you were unable to generate the data for homework 4, email “slauer” at “schoolph.umass.edu” and we will send you the script to do so.

## 2 Optional/Extra credit/Just for fun

1. Write a Stan and API script that will estimate the model parameters from the Chemical Langevin Equation section of homework 4.
2. Write a Stan and API script that will estimate the model parameters from the ODE section of homework 4.

Note: we have not done these yet - you’re on your own! ODEs are formulated differently than the models in our examples and for the other parts of this homework.

Hint: read the Solving Differential Equations section of the Stan manual (p.191, this can also be found on the github page).