STAT 380 Lecture 34
Spring 2019
29 March 2019

- Administrative news: Assignment 7 will be the last assignment but I expect to add 1 or at most 2 problems about Brownian motion to the assignment. It will be due next Friday, April 5. I will monitor the extra problems to see if they are feasible by that deadline.
- I defined $e^{\mathbf{A}}$ when $\mathbf{A}$ is a matrix by

$$e^{\mathbf{A}} = \mathbf{I} + \mathbf{A} + \mathbf{A}^2/2! + \cdots .$$

- I showed that if $\mathbf{A}$ can be *diagonalized*, that is, written in the form

$$\mathbf{M}\boldsymbol{\Lambda}\mathbf{M}^{-1}$$

where $\boldsymbol{\Lambda}$ is diagonal then

$$e^{\mathbf{A}} = \mathbf{M}e^{\boldsymbol{\Lambda}}\mathbf{M}^{-1}$$

and if $\boldsymbol{\Lambda} = \text{diag}(\lambda_1, \ldots, \lambda_k)$ then

$$e^{\boldsymbol{\Lambda}} = \text{diag}(e^{\lambda_1}, \ldots, e^{\lambda_k}).$$

- I then solved the backward (and forward) equations for a 2 state chain by getting explict forms for $\mathbf{M}$ and $\boldsymbol{\Lambda}$.
- I used the solution to find the stationary initial distribution of the chain.
- I introduced the *infinitesimal generator* of the chain.
- I emphasized the fact that a researcher creating a probability model and wanting to use a continuous time Markov Chain ends up specifying the state space and the particular generator. This is science, not mathematics; that is, you have to try to understand the system you are modelling.
- We are working on the 'Continuous Time Markov Chain Slides'.
- I have done slides 1 to 22.
- Handwritten slides are here.