Markov Chains in Continuous time

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- BEFORE WATCHING THE VIDEO: Write out the definition of the derivative as a limit

- BEFORE WATCHING THE VIDEO: Write out the McLaurin expansion for the exponential function

- Explain in your own words how continuous time Markov chains differ from the Markov chains that we have been studying thus far in this course.

- How do we take a limit of a matrix of functions and how then do we differentiate a matrix of functions

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- Explain why the following matrix of limits cannot be calculated using the method you have just described $\lim_{\delta t \to 0} \frac{P(t+\delta t)-P(t)}{\delta t}$

- How is the Jump rate matrix for a continuous time Markov chain, $\mathbf{Q}$, defined?

- Explain how the exponential of a matrix is calculated. Hint: You do not take the exponential of each of the elements in turn.

- Show by substitution that $\mathbf{P}(t) = \exp(\mathbf{Q}t)$ is a solution of the Kolmogorov equation.

- How do you determine whether or not a continuous time Markov chain has a limiting stationary distribution and how do you determine the elements of this distribution