The limiting stationary distribution

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- Complete the following sentence: If all the elements in the transition matrix of a Markov chain are positive all the states in the chain are ...”

- Explain the meaning of the terms eigenvalue and eigenvector and write an equation involving a square matrix, one of its eigenvectors and one of its eigenvalues.

- How is the inverse of a matrix defined? Can a non-square matrix have an inverse?

- Explain what we mean when we state that a matrix is diagonalisable? Can non-square matrices be diagonalized?

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- Explain how you would go about calculating the fourth power of a diagonal matrix?

- The Perron-Frobeneius theorem tells us that square matrices with all positive real elements always have a unique largest eigenvalue, λ_1. What does this tell us about the following limit $\lim_{n\to\infty}\left(\frac{\lambda_2}{\lambda_1}\right)^n$ if λ_2 is the second largest eigenvalue?

- Consider a 2×2 diagonal matrix, $\mathbf{A}$, that has $A(1,1) = \lambda$ and calculate the following product of three matrices $\mathbf{VAB}$. Use v_{11}, v_{12}, v_{21} and v_{22} for the elements of $\mathbf{V}$ and similar names for the elements of $\mathbf{B}$. What do you notice about the rows of the final product matrix. Explain the significance of this result in the context of Markov chains.