Applying Spectral Graph Theory to Microbial Analysis

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April 29, 2021

The Importance of the Microbiome

Waimea Valley

The Data

(a) Abundance Table

(b) Metadata
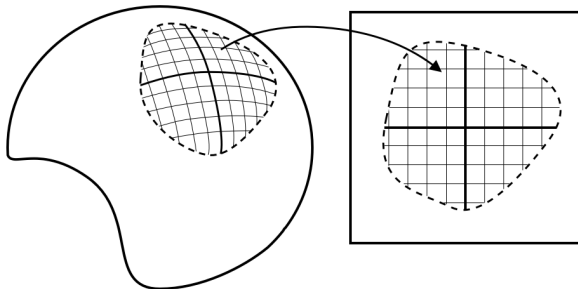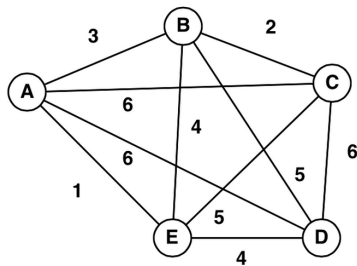
Problem Statement

Explore!

Previous Microbiology Work
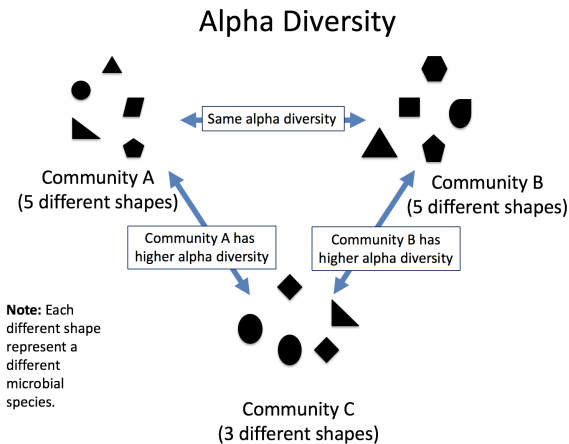
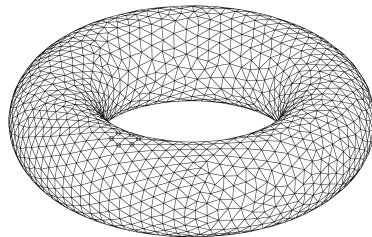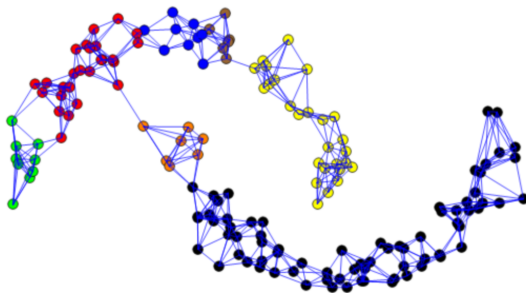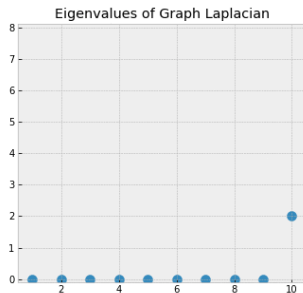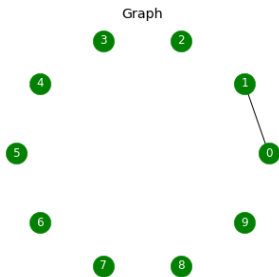## Manifolds
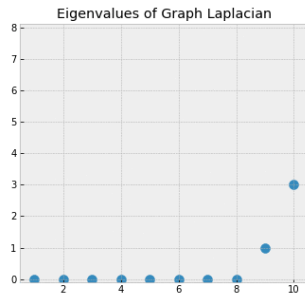
Graphs

(c) Graphs in General

(d) Graphs as Manifolds
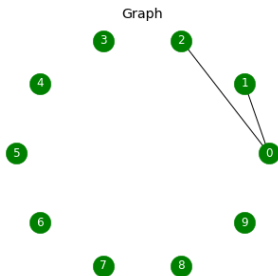
Compute Adjacency Matrix

Compute Graph Laplacian and Eigenvalues

Compute Graph Laplacian and Eigenvalues

Compute Graph Laplacian and Eigenvalues

Compute Graph Laplacian and Eigenvalues

Compute Graph Laplacian and Eigenvalues

Graph
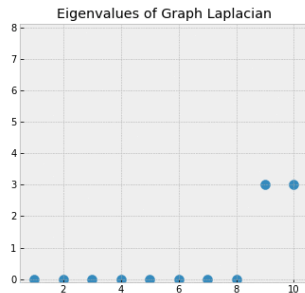
Eigenvalues of Graph Laplacian
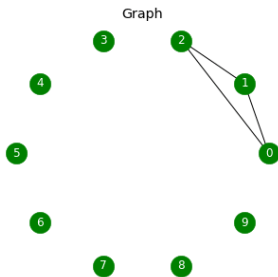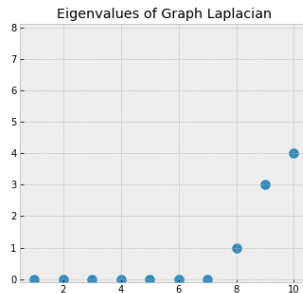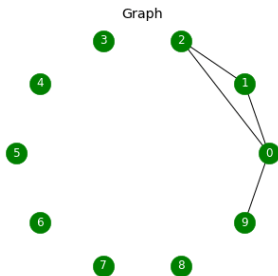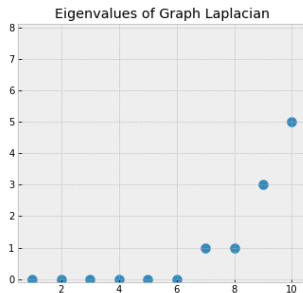
Compute Graph Laplacian and Eigenvalues

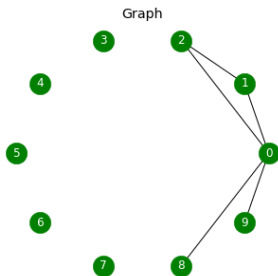# Compute Graph Laplacian and Eigenvalues

Graph

Eigenvalues of Graph Laplacian

Compute Graph Laplacian and Eigenvalues

Graph

Eigenvalues of Graph Laplacian

Compute Graph Laplacian and Eigenvalues
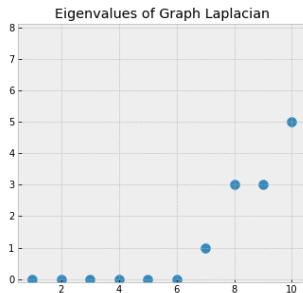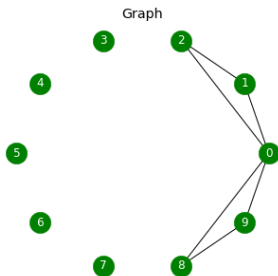

Graph

Eigenvalues of Graph Laplacian

Compute Graph Laplacian and Eigenvalues

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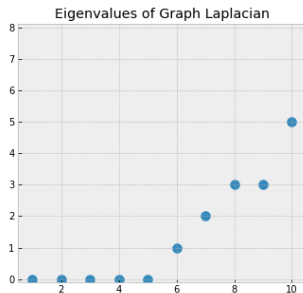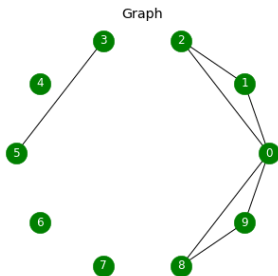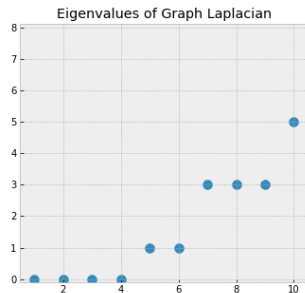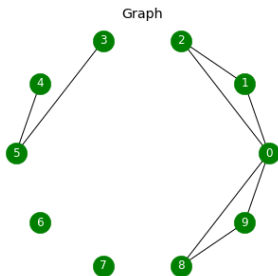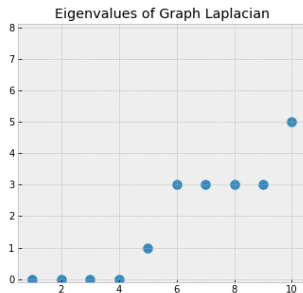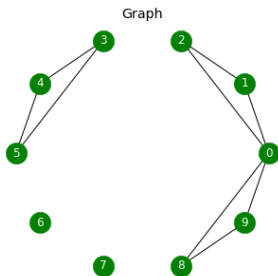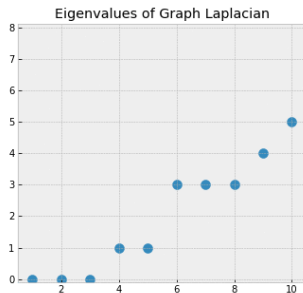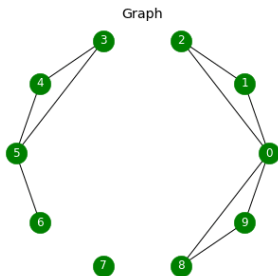# Compute Graph Laplacian and Eigenvalues

Graph

Eigenvalues of Graph Laplacian
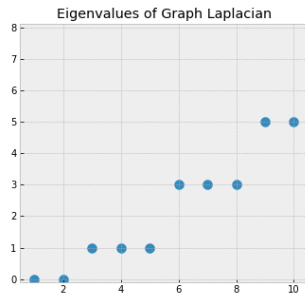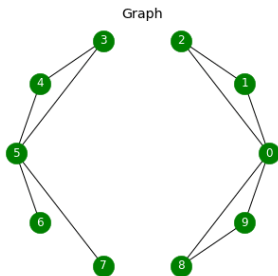
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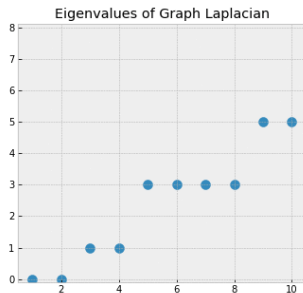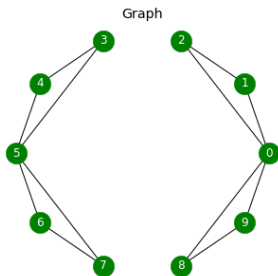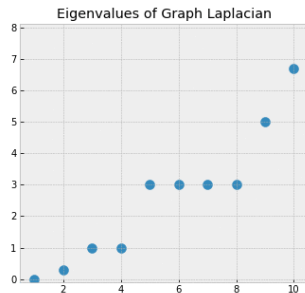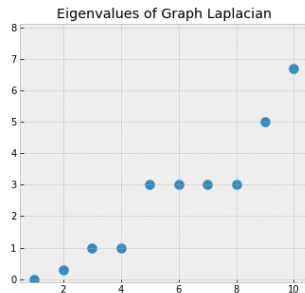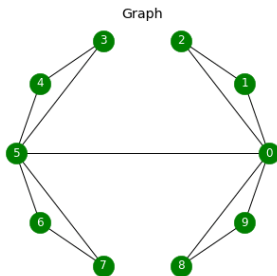# Compute Graph Laplacian and Eigenvalues
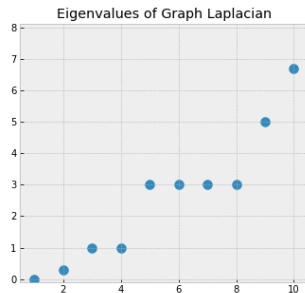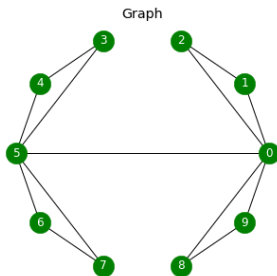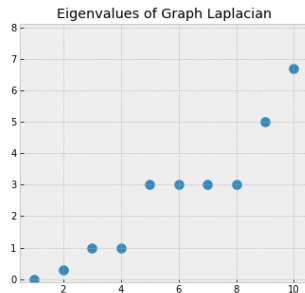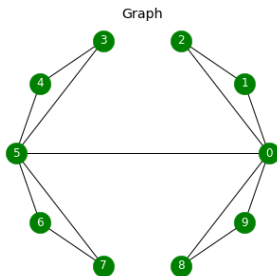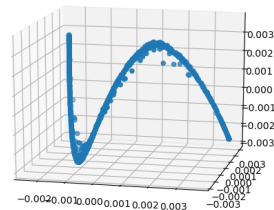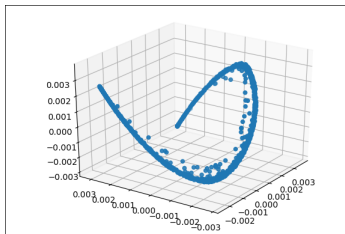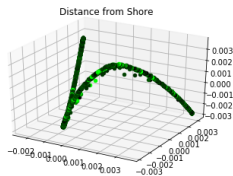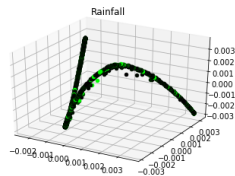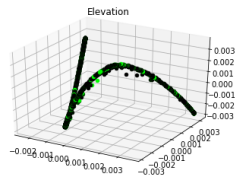
Compute Graph Laplacian and Eigenvalues

Figure: The plots are a representation of the dimensionality reduction procedure and display a one dimensional submanifold in $\mathbb{R}^3$.

Elevation

Rainfall

Distance from Shore

Thank you for listening!