Assignment 4

This assignment has two parts.

Part A: Discriminant Analysis

1. The covariance matrix of a 3-dimensional multivariate normal distribution is given by:

\[ \Sigma = \begin{pmatrix} 1 & 0.5 & 0 \\ 0.5 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix} \]

(a) Find the discriminant analysis discriminant functions.
(b) Plot the discriminant functions on the original variable space.

2. The covariance matrix of a 2-dimensional multivariate normal distribution is given by:

\[ \Sigma = \begin{pmatrix} 1 & 0.5 \\ 0.5 & 2 \end{pmatrix} \]

(a) Find the discriminant analysis discriminant functions.
(b) Plot the discriminant functions on the original variable space.

Part B: Principal Component Analysis

3. The covariance matrix of a 3-dimensional multivariate normal distribution is given by:

\[ \Sigma = \begin{pmatrix} 1 & 0.5 & 0 \\ 0.5 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix} \]

(a) Find the principal component axes.
(b) Plot the principal component axes on the original variable space.

4. The covariance matrix of a 2-dimensional multivariate normal distribution is given by:

\[ \Sigma = \begin{pmatrix} 1 & 0.5 \\ 0.5 & 2 \end{pmatrix} \]

(a) Find the principal component axes.
(b) Plot the principal component axes on the original variable space.