University of Technology Sydney
Department of Mathematical and Physical Sciences

37233 Linear Algebra
Tutorial Assignment 10

Question 1.

Find the least squares solution to the following (inconsistent) set of equations.

$$\begin{aligned} 3x + y &= 1 \\ x + \ y &= 1 \\ x + \ 2y &= 1 \end{aligned}$$

Question 2.

Find the equation $y = \beta_0 + \beta_1 x$ of the least squares line that best fit the data points $(2, 3)$, $(3, 2)$, $(5, 1)$ and $(6, 0)$.

Question 3.

Find the line of best fit through the following data points (x, y).

x	y
-0.31	3.15
0.71	9.12
2.11	12.11
2.65	14.01

Question 4.

Find eigenvalues and eigenvectors of the matrix $\mathbf{A}$ and construct matrices $\underline{\mathrm{P}}$ and $\mathbf{D}$ such that $\mathbf{A} = \mathbf{PDP}^{-1}$

$$\mathbf{A} = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}.$$

Question 5.

Orthogonally diagonalize the matrix $\mathbf{A}$ given below and construct its spectral decomposition

$$\mathbf{A} = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}.$$