

Answers to selected questions, 2006 Exam

MATH1014: Introduction to Linear Algebra

Semester 2, 2008

1. (a) $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \end{bmatrix} + t \begin{bmatrix} -2 \\ 3 \end{bmatrix}, t \in \mathbb{R}.$
(b) $(\frac{3}{2}, \frac{5}{2}, \frac{1}{2})$
2. (a) (i) $x = 1 + t, y = -2t, z = t, t \in \mathbb{R}.$
(ii) $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} + t \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}, t \in \mathbb{R}.$
(b) $\begin{bmatrix} \frac{1}{3} & -\frac{1}{6} & -\frac{1}{6} \\ \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\ \frac{1}{9} & -\frac{2}{9} & \frac{1}{9} \end{bmatrix}$
4. (a) $\begin{bmatrix} 0.662 & 0.250 \\ 0.338 & 0.750 \end{bmatrix}$ (taking “wet” as state 1, “dry” as state 2.)
(b) 0.353
(c) 43% wet, 57% dry.
5. (a) $\begin{bmatrix} 0.5 & 1 \\ 0.5 & 0 \end{bmatrix}$
(b) Eigenvalues: $-\frac{1}{2}, 1$. Corresponding eigenvectors: $\begin{bmatrix} -t \\ t \end{bmatrix}, \begin{bmatrix} 2t \\ t \end{bmatrix} (t \in \mathbb{R}).$
(d) 2 : 1.