

Answers to selected questions, 2008 Exam

MATH1014: Introduction to Linear Algebra

Semester 2, 2009

1. (a) (i) -2
(ii) $5\sqrt{2}$
(iii) $-\frac{1}{5}$

(iv) $\frac{1}{5\sqrt{2}} \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}$

(b) (i) $\overrightarrow{PQ} = \begin{bmatrix} -1 \\ 3 \\ -1 \end{bmatrix}, \overrightarrow{PR} = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$.

(ii) $\begin{bmatrix} 4 \\ 1 \\ -1 \end{bmatrix}$

(iii) $4x + y - z = 3$

2. (a) (i) $x = 1, y = 2, z = 4$.

(ii) No solution.

(b) 27

3. (a) Eigenvalues: $-1, 7$.

Corresponding eigenvectors (respectively): $\begin{bmatrix} -t \\ t \end{bmatrix}, \begin{bmatrix} 3t/5 \\ t \end{bmatrix}, t \in \mathbb{R}, t \neq 0$.

(b) (i) 0.0195

(ii) $\begin{bmatrix} 1/5 \\ 4/5 \end{bmatrix}$

(iii) 80%

4. (a) (i)

$$25x + 10y + 40z = 80$$

$$50x + 10y + 20z = 60$$

$$30y + 90z = 300$$

(ii) Solution: $x = -0.8, y = 10, z = 0$. Hence the answer is no, since Dudley cannot eat a negative amount of fried chicken.