Solutions to Exercise 2

Q1 (a) $A = \begin{bmatrix} 2 & 2 \\ 5 & -1 \end{bmatrix}, \det(A) = -12 \text{ e} - \text{values } 4, -3$ (b) $A = \begin{bmatrix} 7 & 3 \\ 3 & -1 \end{bmatrix}, \det(A) = -16 \text{ e} - \text{values } 4, -2$

(c) $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}, \det(A) = -5, \text{e} - \text{values } 5, -1$ (d) $A = \begin{bmatrix} 2 & 1 \\ 0 & -1 \end{bmatrix}, \det(A) = -3 \text{ e} - \text{values} - 1, 2$

Q2 (a) $A = \begin{bmatrix} 2 & 2 \\ 5 & -1 \end{bmatrix}$, e-vectors $(1, 1), (-2, 5)$ (b) $A = \begin{bmatrix} 7 & 3 \\ 3 & -1 \end{bmatrix}$, e-vectors $(1, -1), (1, -3)$

(c) $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$, e-vectors $(1, 2), (-1, 1)$ (d) $A = \begin{bmatrix} 2 & 1 \\ 0 & -1 \end{bmatrix}$, e-vectors $(1, -3), (1, 0)$

The reason for the second eigenvector being what it is is somewhat unclear. One school of thought has it that (0,0) is a possible eigenvector. The argument the other was is that, by definition, and though an eigenvalue can be zero, an eigenvector cannot. So, the answer in 2(d) comes from similar working to that set out in http://mathforum.org/library/drmath/view/68332.html.