

Exercise 15-1

$$(a) \det([4-\lambda]) = 4-\lambda = 0$$
$$\lambda = 4$$

$$(b) A = \begin{bmatrix} 0 & 3 \\ 5 & 0 \end{bmatrix}$$

$$\det(A-\lambda I) = \begin{vmatrix} -\lambda & 3 \\ 5 & -\lambda \end{vmatrix} = \lambda^2 - 15 = 0$$

$$\lambda = \pm\sqrt{15}$$

$$(c) A = \begin{bmatrix} 3 & 0 \\ 0 & 5 \end{bmatrix}$$

$$\det(A-\lambda I) = \begin{vmatrix} 3-\lambda & 0 \\ 0 & 5-\lambda \end{vmatrix} = (3-\lambda)(5-\lambda) = 0$$

$$\lambda = 3 \text{ or } 5$$

$$(d) A = \begin{bmatrix} 2 & 5 \\ 6 & 3 \end{bmatrix}$$

$$\det(A-\lambda I) = \begin{vmatrix} 2-\lambda & 5 \\ 6 & 3-\lambda \end{vmatrix} = \lambda^2 - 5\lambda - 24 = 0$$
$$\begin{matrix} \lambda & \times & -8 \\ \lambda & & 3 \end{matrix}$$

$$\lambda = 8 \text{ or } (-3)$$

$$(e) A = \begin{bmatrix} -4 & 1 \\ 1 & 3 \end{bmatrix}$$

$$\det(A-\lambda I) = \begin{vmatrix} -4-\lambda & 1 \\ 1 & 3-\lambda \end{vmatrix} = \lambda^2 + \lambda - 13 = 0$$

$$\lambda = \frac{-1 \pm \sqrt{53}}{\underline{4} \quad \underline{2}}$$

$$(f) A = \begin{bmatrix} -2 & 2 \\ -3 & 2 \end{bmatrix}$$

$$\det(A-\lambda I) = \begin{vmatrix} -2-\lambda & 2 \\ -3 & 2-\lambda \end{vmatrix} = \lambda^2 + 2 = 0$$