Solutions: Tutorial Exercise Week 4

Qs. 1. Inverse by Gaussian Approach

Using the Gaussian Approach for finding the inverse of a Matrix, find the inverses of the following matrices:

- $A = \begin{bmatrix} 6 & 1 \\ 2 & 8 \end{bmatrix}$
- $B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$

Qs. 1 Soln

$$A^{-1} = \frac{1}{46}\begin{bmatrix} 8 & -1 \\ -2 & 6 \end{bmatrix}$$

$$B^{-1} = \frac{1}{10}\begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$$

Qs. 2. Solving Simultaneous Equations via Matrix Inverse

For a Matrix M and vector, v, and constant vector, k, if

$$M * v = k$$

then

$$v = M^{-1} * k$$

provided, M^{-1} exists.
Solve the following Simultaneous Equations using the approach of Matrix Inverse.

- $2 * x + 3 * y = 13$
  $x - y = -1$

- $3 * x_1 + 2 * x_2 = 7$
  $-x_1 + x_2 = 6$

Qs. 2 Soln

$$A = \begin{bmatrix} 2 & 3 \\ 1 & -1 \end{bmatrix}; \quad A^{-1} = \frac{1}{5}\begin{bmatrix} 1 & 3 \\ 1 & -2 \end{bmatrix}$$

$$\frac{1}{5}\begin{bmatrix} 1 & 3 \\ 1 & -2 \end{bmatrix} * \begin{bmatrix} 13 \\ -1 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & 2 \\ -1 & 1 \end{bmatrix}; \quad B^{-1} = \frac{1}{5}\begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix}$$

$$\frac{1}{5}\begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix} * \begin{bmatrix} 7 \\ 6 \end{bmatrix} = \begin{bmatrix} -1 \\ 5 \end{bmatrix}$$