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VASAD
B. E. Second Semester (All Branch)
Subject: Vector Calculus and Linear Algebra (2110015)
Year 2015-2016

# Tutorial: 03

**1 Solve by Cramer's rule.**

$3x_1 - x_2 + x_3 = 4$
$-x_1 + 7x_2 - 2x_3 = 1$
$2x_1 + 6x_2 - x_3 = 5$

$x - 4y + z = 6$
$4x - y + 2z = -1$
$2x + 2y - 3z = -20$

$x_1 + 2x_3 = 6$
$-3x_1 + 4x_2 + 6x_3 = 30$
$-x_1 - 2x_2 + 3x_3 = 8$

**2 Use Cramer's rule to solve for y without solving for *x*, *z* and *w*.**

$4x + y + z + w = 6, 3x + 7y - z + w = 1, 7x + 3y - 5z + 8w = -3, x + y + z + 2w = 3$

**3 Check whether the following matrix is skew symmetric or not?**

$$\begin{bmatrix} 0 & 1 & -3 \\ -1 & 0 & 5 \\ 3 & -5 & 0 \end{bmatrix}$$

**4** Show that every square matrix A can be expressed as the sum of **a symmetric matrix** and **a skew-symmetric matrix.**

**5 Find all values of a, b, and c for which A is symmetric**.

$$A = \begin{bmatrix} 2 & a-2b+2c & 2a+b+c \\ 3 & 5 & a+c \\ 0 & -2 & 7 \end{bmatrix}$$

**6** Is $A = \begin{bmatrix} 0 & -3+2i & -2+i \\ 3+2i & 3i & 3+5i \\ 2+i & -3+5i & 2i \end{bmatrix}$ a skew–Hermitian matrix?

**7** Express $\begin{bmatrix} 4+2i & 7 & 3-i \\ 0 & 3i & -2 \\ 5+3i & -7+i & 9+6i \end{bmatrix}$ as the sum of a Hermitian and a skew-Hermitian matrix.

**8** Show that A = $\begin{bmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is orthogonal.