# Linear Algebra 1E2
# Tutorial 3

## Problem 1

Find conditions that the $b$ 's must satisfy for the system to be consistent.

$$x_1 - 4x_2 + 6x_3 = b_1$$
$$13x_1 - 16x_2 + 18x_3 = b_2$$
$$-4x_1 + 4x_2 - 4x_3 = b_3$$

## Problem 2

Solve the following matrix equation for $X$ .

$$\begin{bmatrix} 1 & -1 & 1 \\ 2 & 3 & 0 \\ 0 & 2 & -1 \end{bmatrix} X = \begin{bmatrix} 2 & -1 & 5 & 7 & 8 \\ 4 & 0 & -3 & 0 & 1 \\ 3 & 5 & -7 & 2 & 1 \end{bmatrix}$$

## Problem 3

Solve the system by inverting the coefficient matrix and using the following theorem:

If $A$ is an invertible $n \times n$ matrix, then for each $n \times 1$ matrix $\mathbf{b}$ , the system of equations $A\mathbf{x} = \mathbf{b}$ has exactly one solution, namely, $\mathbf{x} = A^{-1}\mathbf{b}$ .

$$x + y + z = 9$$
$$x + y - 8z = 18$$
$$-8x + y + z = 0$$

# ANSWERS
# Tutorial 3

## Problem 1

$$b_1 = 1\ b_2 + 3\ b_3$$

## Problem 2

| | | | | |
|---|---|---|---|---|
| 11 | 12 | -3 | 27 | 26 |
| -6 | -8 | 1 | -18 | -17 |
| -15 | -21 | 9 | -38 | -35 |

## Problem 3

$x = 1$

$y = 9$

$z = -1$