LINEAR ALGEBRA

- Matrices → Regtangular array of quantities (usually enclosed by large parenthesis or brackets)

- Example: $A = \begin{pmatrix} 1 & 5 & -2 \\ -3 & 0 & 6 \end{pmatrix}$

- To indicate a particular number, use notation A_{ij}.

  i → row number
  j → column number

  $A_{12} = 5$
  $A_{23} = 6$

- A matrix with m rows and n columns is an $m \times n$ matrix.

- Transpose of a Matrix

$$A^T = \begin{pmatrix} 1 & -3 \\ 5 & 0 \\ -2 & 6 \end{pmatrix}$$

- Write the rows as the columns

- $(A^T)_{ij} = A_{ji}$

EXAMPLE → solve for x, y, z

$$
\begin{aligned}
2x - z &= 2 \\
6x + 5y + 3z &= 7 \\
2x - y &= 4
\end{aligned}
$$

– Matrix of the coefficients (M)

$$M = \begin{pmatrix} 2 & 0 & -1 \\ 6 & 5 & 3 \\ 2 & -1 & 0 \end{pmatrix}$$

$$r = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} \quad k = \begin{pmatrix} 2 \\ 7 \\ 4 \end{pmatrix}$$

– We can write the following:

$$\sum_{j=1}^{3} M_{ij} x_j = k_i \qquad i = 1, 2, 3$$

$$\sum_{j=1}^{3} M_{1j} x_j = k_1$$

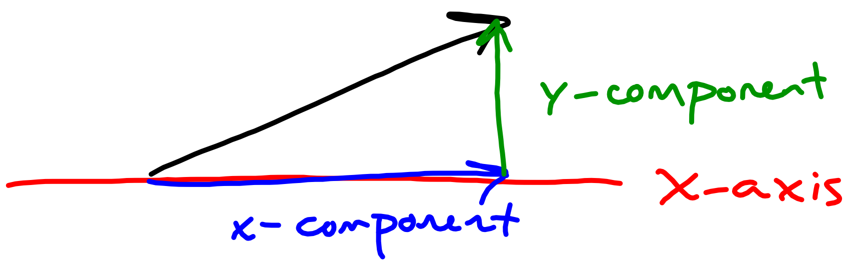
$$\sum_{j=1}^{3} M_{2j} x_j = k_2$$

$$\sum_{j=1}^{3} M_{3j} x_j = k_3$$

– Using the above steps, we can show that $Mr = k$.

$$\begin{array}{ccc} x & y & z \end{array}$$

$$\begin{pmatrix} 2 & 0 & -1 \\ 6 & 5 & 3 \\ 2 & -1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2 \\ 7 \\ 4 \end{pmatrix}$$


Y-component
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