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Properties of the matrices multiplication

Associative property: $A(BC) = A(BC)$

Distributive property: $A(B+C) = AB+BC$

Identity property: $AI = A = IA$

Singular and non – singular matrices

Singular matrix is square matrix whose determinant is equal to Zero

Example

$A = \begin{pmatrix} 5 & 2 \\ 5 & 2 \end{pmatrix}$ is the singular matrix
 $|A| = 10 - 10 = 0$

Non - Singular matrix is also square matrix whose determinant is not equal to zero.

$A = \begin{pmatrix} 6 & 2 \\ 5 & 2 \end{pmatrix}$ is the non singular matrix
 $|A| = 12 - 10 = 2$

Determinant of 2 × 2 matrix

If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ be 2×2 then its determinant
 $|A| = ad - bc$

Inverse matrix

For a matrix A its inverse B exist when $AB = BA = I$ exists.

$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ $B = \begin{pmatrix} e & f \\ g & h \end{pmatrix}$

The components of the inverse matrix can be obtained by

$$e = \frac{d}{ad-bc}$$

$$g = \frac{-c}{ad-bc}$$

$$f = \frac{-b}{ad-bc}$$

$$h = \frac{a}{ad-bc}$$

We have matrix equation

$$AX = B$$

If A^{-1} exists if, $|A| \neq 0$

$$\Rightarrow A^{-1}(AX) = A^{-1}B$$

$$\Rightarrow I.X = A^{-1}B$$

$$\Rightarrow X = A^{-1}B$$

By using this equation we can solve simultaneous equations

Example 3

Find the value of x and y

$$(5yx7)(1-2) = (19-4)(5xy7)(1-2) = (19-4)$$

$$(5-2xy-14)(5-2xy-14) = (19-4s)(19-4s)$$

Now,

$$5-2x = 19$$

$$\therefore x = -7$$

And

$$y-14 = -4$$

$$\therefore y = 10$$