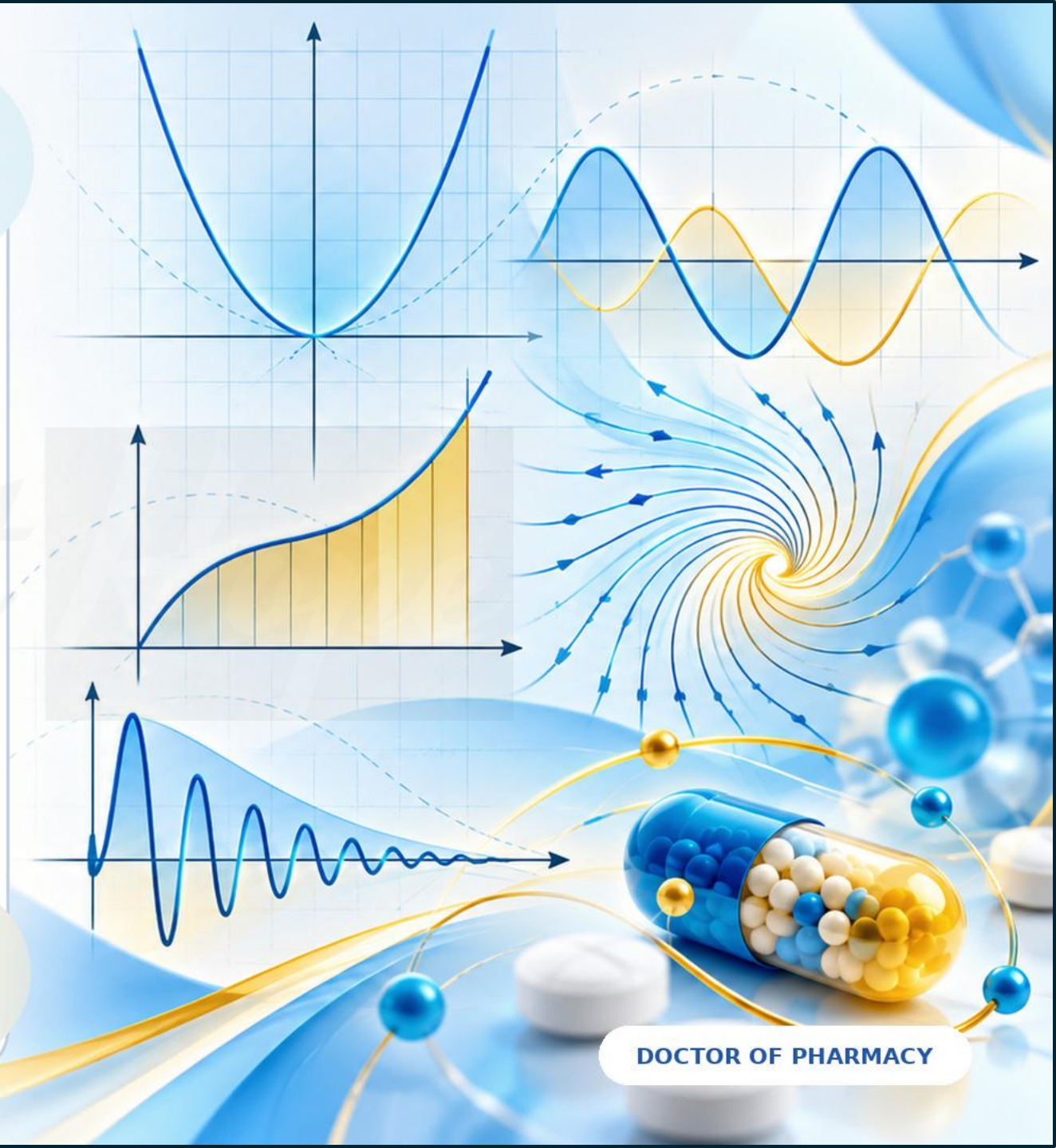
PHARM.D • YEAR 1

Remedial Mathematics

CHAPTER 1

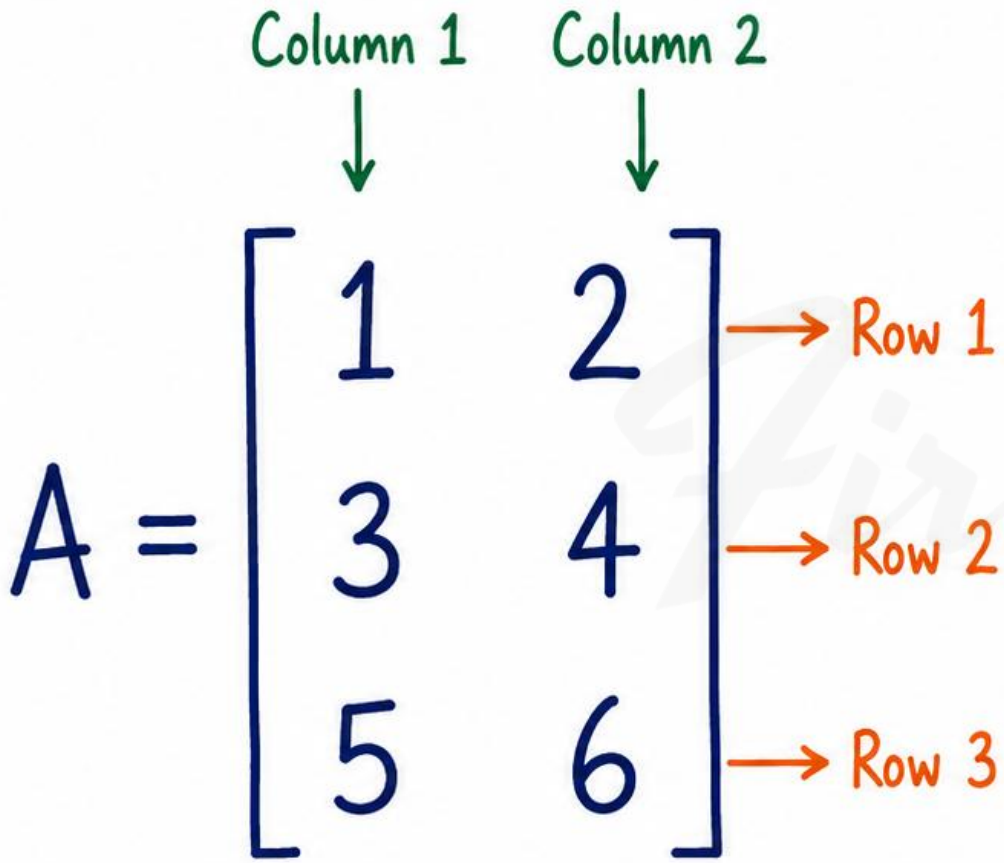
Algebra

PPT CHAPTER COVER



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Matrices: reading rows and columns



- A matrix is a rectangular array of numbers or symbols.
- Order = number of rows × number of columns.
- A = [1 2; 3 4; 5 6] has order 3 × 2.
- The entry a_{ij} lies in row i, column j.
- For this matrix, $a_{21} = 3$ and $a_{32} = 6$.
- Rows run horizontally; columns run vertically.
- Matrices organise data and represent systems of linear equations.

Row, column and square matrices

Row Matrix

One row:

$$\begin{bmatrix} 2 & -3 & 5 \end{bmatrix}$$

has order 1×3.

Column Matrix

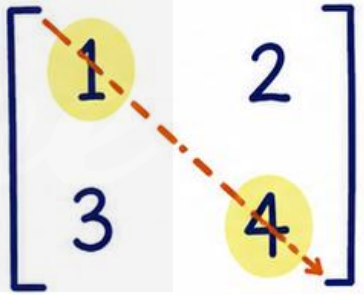
One column:

$$\begin{bmatrix} 4 \\ -1 \\ 7 \end{bmatrix}$$

has order 3×1.

Square Matrix

Equal numbers of rows and columns.



has order 2×2.

The main diagonal runs from top left to bottom right.

Only square matrices have a determinant and an ordinary two-sided inverse.

Diagonal, scalar, identity and zero

Diagonal: all off-diagonal entries are zero.

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

Scalar: a diagonal matrix with equal diagonal entries.

$$2I = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

Identity: diagonal entries are 1; other entries are 0.

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad AI = IA = A$$

Zero: every entry is zero.

$$O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

The zero matrix can have any order.

Symmetry and triangular matrices

Symmetric: $A^T = A$

$$\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$$

Entries mirror across the main diagonal.

Skew-symmetric: $A^T = -A$

$$\begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix}$$

Diagonal entries are zero; opposite entries change sign.

Upper triangular: zeros below the main diagonal.

$$\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$$

Lower triangular: zeros above the main diagonal.

$$\begin{bmatrix} 4 & 0 \\ 2 & 1 \end{bmatrix}$$

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