

Section 3.8 Matrices

Know basic terminology: matrix, square matrix, row, column, entry, symmetric matrix, transpose of a matrix, identity matrix

Be able to perform algebraic operations: Add two matrices, subtract, multiply (if defined).

When is the product of two matrices AB defined and what is dimension of result; How many multiplication's are required to calculate the product.

For three matrices of appropriate dimension, compute which is more efficient $(AB)C$ or $A(BC)$.

For two 0-1 matrices, calculate join, meet, Boolean product.

Practice Test Questions

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 2 & 3 & 1 & 0 \\ 3 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{pmatrix} \quad C = \begin{pmatrix} 1 & -2 & 5 \\ -2 & 2 & 4 \\ 5 & 4 & 3 \end{pmatrix}$$

For the above matrices:

- Which of the following products are defined? (Circle)
AB BA BC CA CB
- Which if any are identity matrices? (Circle) A B C
- Which if any are symmetric matrices? (Circle) A B C
- Which if any are square matrices? (Circle) A B C

10. Let A be a matrix with dimensions 4×20 ; B be a matrix with dimensions 20×3 ; C be a matrix with dimensions 3×10 .

- What is the dimension of AB ?
- What is the dimension of BC ?
- In terms the number of operations required to compute ABC , which method is more efficient $A(BC)$ or $(AB)C$? (Justify by showing the number of multiplications for each order).

11. Let $A = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$. Let $B = \begin{pmatrix} 0 & 1 \\ 0 & 1 \end{pmatrix}$.

- Compute the join of A and B .
- Compute the meet of A and B .
- Compute the Boolean product of A and B .