

CSES-ALG-QUIZ 3

Module 4: Matrix Multiplication

Name: _____

Section: _____ Date: _____

I. Write:

- A. if only X is true,
- B. if only Y is true,
- C. if both X and Y are true, and
- D. if neither X nor Y is true.

1. The dot product (inner product) of n-vectors a and b
X. $a \cdot b = a_1b_1 + a_2b_2 + \dots + a_nb_n$
Y. $a \cdot b = (a_1 + b_1) + (a_2 + b_2) + \dots + (a_n + b_n)$
2. For the product AB of two matrices A and B to be defined,
X. the number of columns of A must equal the number of rows of B
Y. the number of rows of A must equal the number of columns of B
3. If A is a 3 x 2 matrix and B is a 2 x 4 matrix, then the product AB is
X. a 3 x 4 matrix
Y. a 2 x 2 matrix
4. In general, for matrices A and B whose product is defined,
X. $AB = BA$ (matrix multiplication is commutative)
Y. $AB \neq BA$ (matrix multiplication is not generally commutative)
5. If $C = AB$, the (i, j) entry of C, denoted c_{ij} , is obtained by
X. taking the dot product of row i of A and column j of B
Y. taking the dot product of column i of A and row j of B
6. Given $a = [2 \ -1 \ 3]$ and $b = [1 \ 0 \ -2]^T$ (column vector),
X. $a \cdot b = -4$
Y. $a \cdot b = 5$
7. If A is a 2 x 3 matrix and B is a 4 x 2 matrix,
X. AB is defined
Y. BA is defined

For nos. 8-10. Given:

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

$$B = \begin{bmatrix} 2 & -1 \\ 1 & 4 \end{bmatrix}$$

8. The (1, 2) entry of AB

X. -1

Y. 1

9. The (2, 1) entry of BA

X. -7

Y. 4

10. Since A and B above are both 2×2 matrices,

X. AB is also a 2×2 matrix

Y. AB is a 4×4 matrix

II.

A. Fill in the blank with the correct value (6 pts)

Given:

$$\mathbf{a} = [-1 \ 2 \ x] \quad \mathbf{b} = [3 \ -1 \ 2]$$

1. Find x if $\mathbf{a} \cdot \mathbf{b} = 5$

2. Find x if $\mathbf{a} \cdot \mathbf{b} = 3$

3. The (1, 1) entry of $\mathbf{ab}$

4. The (2, 2) entry of $\mathbf{ab}$

B. Compute. Show your solution. (13 pts)

Given:

$$\mathbf{A} = \begin{bmatrix} 2 & -1 & 0 \\ 1 & 3 & -2 \end{bmatrix}$$

$$\mathbf{B} = \begin{bmatrix} 1 & 0 \\ -2 & 4 \\ 3 & 1 \end{bmatrix}$$

4. AB

5. BA

Bonus Question:

If matrix A has a size of 3×2 and matrix B has a size of 2×5 , what are the dimensions of the resulting matrix product AB?