
PROBLEM #1

Calculate $C_{21} = A_{2j}B_{j1}$.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 0 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

Einstein Conv \rightarrow sum over repeated indices

$$C_{21} = a_{21}b_{11} + a_{22}b_{21} + a_{23}b_{31}$$

$$= (4)(1) + (0)(0) + (1)(1)$$

$$= 5$$

PROBLEM #2

What is $C = AB$?

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 0 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

$$= AB$$

$$= \begin{bmatrix} 4 & 3 & 5 \\ 5 & 4 & 1 \end{bmatrix}$$

PROBLEM #3

$$\text{Calc } \begin{bmatrix} 2 & 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 2 \\ 1 \end{bmatrix} = (2)(1) + (4)(3) + (5)(2) + (6)(1)$$
$$= 2 + 12 + 10 + 6$$
$$= 30$$

PROBLEM #4

$$\text{Calc } \begin{bmatrix} 1 \\ 3 \\ 2 \\ 1 \end{bmatrix} \begin{bmatrix} 2 & 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} 2 & 4 & 5 & 6 \\ 6 & 12 & 15 & 18 \\ 4 & 8 & 10 & 12 \\ 2 & 4 & 5 & 6 \end{bmatrix}$$

PROBLEM #5

Calc $\begin{bmatrix} 2 & -1 \\ 0 & 3 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 & 4 & -1 \\ -2 & 0 & 0 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 2 & 8 & -4 \\ -6 & 0 & 0 & 6 \\ 0 & 1 & 4 & -1 \end{bmatrix}$

PROBLEM #6.

What is $\dim(D)$?

$$D = A_{3 \times 3} B_{3 \times 7} C_{7 \times 4}$$

$$\dim(D) = (3, 4)$$

PROBLEM #7

Calc Prod. $= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$
 $= \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

PROBLEM #8

What is the dot of u and v . vectors?

☒ $\sum_{i=1}^n u_i v_i$

☒ $u \cdot v$

☒ $[u_1 \ u_2 \ \dots \ u_n] \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{bmatrix}$

☐ $u_i v_j$

☒ $u_i v_i$

☐ $\begin{bmatrix} u_1 \\ u_2 \\ \vdots \end{bmatrix} [v_1 \ v_2 \ \dots \ v_n]$