

# Assignment 8

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**Abstract**—This document deals with matrix multiplication. therefore,

Download python codes from

<https://github.com/neharani289/MatrixTheory/tree/master/Assignment8/codes>

Download latex-tikz codes from

<https://github.com/neharani289/MatrixTheory/tree/master/Assignment8>

$$\mathbf{ABC} = \begin{pmatrix} 4 & -4 \\ 4 & -4 \end{pmatrix} \quad (2.0.8)$$

$$\mathbf{CAB} = \begin{pmatrix} 0 \end{pmatrix} \quad (2.0.9)$$

## 1 PROBLEM

Let

$$\mathbf{A} = \begin{pmatrix} 2 & -1 & 1 \\ 1 & 2 & 1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 3 \\ 1 \\ -1 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 1 & -1 \end{pmatrix} \quad (1.0.1)$$

Compute  $\mathbf{ABC}$  and  $\mathbf{CAB}$ .

## 2 SOLUTION

$$\mathbf{ABC} = (\mathbf{AB}) \mathbf{C}$$

$$\mathbf{AB} = \begin{pmatrix} 2 & -1 & 1 \\ 1 & 2 & 1 \end{pmatrix} \begin{pmatrix} 3 \\ 1 \\ -1 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{AB} = \begin{pmatrix} 6 - 1 - 1 \\ 3 + 2 - 1 \end{pmatrix} \quad (2.0.2)$$

$$\mathbf{AB} = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \quad (2.0.3)$$

Now,

$$\mathbf{ABC} = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \begin{pmatrix} 1 & -1 \end{pmatrix} \quad (2.0.4)$$

$$\mathbf{ABC} = \begin{pmatrix} 4 & -4 \\ 4 & -4 \end{pmatrix} \quad (2.0.5)$$

$$\mathbf{CAB} = \mathbf{C}(\mathbf{AB})$$

$$\mathbf{CAB} = \begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} 4 \\ 4 \end{pmatrix} \quad (2.0.6)$$

$$\Rightarrow \mathbf{CAB} = \begin{pmatrix} 0 \end{pmatrix} \quad (2.0.7)$$