# Assignment-9

Satyam Singh
EE20MTECH14015

*Abstract*—This assignment deals with matrices multiplication.

Download tex file from

## 1 PROBLEM STATEMENT

Let

$$A = \begin{pmatrix} 1 & -1 & 1 \\ 2 & 0 & 1 \\ 3 & 0 & 1 \end{pmatrix}, B = \begin{pmatrix} 2 & -2 \\ 1 & 3 \\ 4 & 4 \end{pmatrix} \tag{1.0.1}$$

Verify directly that $A(AB) = A^2B$

## 2 SOLUTION

$$A^2 = \begin{pmatrix} 1 & -1 & 1 \\ 2 & 0 & 1 \\ 3 & 0 & 1 \end{pmatrix}\begin{pmatrix} 1 & -1 & 1 \\ 2 & 0 & 1 \\ 3 & 0 & 1 \end{pmatrix} \tag{2.0.1}$$

$$A^2 = \begin{pmatrix} 2 & -1 & 1 \\ 5 & -2 & 3 \\ 6 & -3 & 4 \end{pmatrix} \tag{2.0.2}$$

and

$$AB = \begin{pmatrix} 1 & -1 & 1 \\ 2 & 0 & 1 \\ 3 & 0 & 1 \end{pmatrix}\begin{pmatrix} 2 & -2 \\ 1 & 3 \\ 4 & 4 \end{pmatrix} \tag{2.0.3}$$

$$AB = \begin{pmatrix} 5 & -1 \\ 8 & 0 \\ 10 & -2 \end{pmatrix} \tag{2.0.4}$$

Now RHS is

$$A^2B = \begin{pmatrix} 2 & -1 & 1 \\ 5 & -2 & 3 \\ 6 & -3 & 4 \end{pmatrix}\begin{pmatrix} 2 & -2 \\ 1 & 3 \\ 4 & 4 \end{pmatrix} \tag{2.0.5}$$

$$A^2B = \begin{pmatrix} 7 & -3 \\ 20 & -4 \\ 25 & -5 \end{pmatrix} \tag{2.0.6}$$

Now LHS is

$$A(AB) = \begin{pmatrix} 1 & -1 & 1 \\ 2 & 0 & 1 \\ 3 & 0 & 1 \end{pmatrix}\begin{pmatrix} 5 & -1 \\ 8 & 0 \\ 10 & -2 \end{pmatrix} \tag{2.0.7}$$

$$A(AB) = \begin{pmatrix} 7 & -3 \\ 20 & -4 \\ 25 & -5 \end{pmatrix} \tag{2.0.8}$$

Hence verified.