Assignment 13

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The link to the solution is

https://github.com/Adarsh1310/EE5609

***Abstract*—This documents solves a problem based on invertible matrix.**

1 Problem

Suppose **A** is a 2×1 matrix and **B** is 1×2 matrix.Prove that **C**=**AB** is non invertible.

2 Solution

Let's assume,

$$\mathbf{A} = \begin{pmatrix} a \\ b \end{pmatrix} \tag{2.0.1}$$

$$\mathbf{B} = \begin{pmatrix} c & d \end{pmatrix} \tag{2.0.2}$$

Now,

$$\mathbf{C} = \mathbf{AB} \tag{2.0.3}$$

$$= \begin{pmatrix} a \\ b \end{pmatrix} \begin{pmatrix} c & d \end{pmatrix} \tag{2.0.4}$$

$$= \begin{pmatrix} ac & ad \\ bc & bd \end{pmatrix} \tag{2.0.5}$$

Reducing equation (2.0.5)

$$\begin{pmatrix} ac & ad \\ bc & bd \end{pmatrix} \tag{2.0.6}$$

$$\xleftrightarrow{R_2 = R_2 - \frac{b}{a} R_1} \begin{pmatrix} ac & ad \\ 0 & 0 \end{pmatrix} \tag{2.0.7}$$

Since one of the row of **C** is zero i.e. the rows are linearly dependent, we can say that the matrix is non invertible