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 take,

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

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

assuming **A** and **B** to be non zero vectors. Now,we know that for **C** to be non invertible $\mathbf{Cx} = 0$ should have a non trivial solution.So,

$$\mathbf{Cx} = 0 \tag{2.0.3}$$

$$\implies \mathbf{ABx} = 0 \tag{2.0.4}$$

Here, we know that **B** is 1×2 matrix and **x** is 2×1 matrix then **Bx** will result to a scalar constant k.

$$\implies \mathbf{A}k = 0 \tag{2.0.5}$$

For (2.0.5) to be true k should be zero. We also know that **B** is 1×2 matrix i.e. rows are less than column hence,

$$\mathbf{Bx} = 0 \tag{2.0.6}$$

will have a non trivial solution. Hence, using (2.0.5) and (2.0.6) we can say,

$$\mathbf{ABx} = 0 \tag{2.0.7}$$

will have a non trivial solution so, **C** is non invertible.