Problem 1. Consider the following matrices:

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 1 & 1 & 1 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \\ 2 & 0 \end{pmatrix}$$

(a) Compute the matrix products AB and BA.

(b) Find a vector \vec{x} such that $A\vec{x} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

$$| 0 | 2 | 1$$
 $| x_1 + 0 + 2x_3 = 1$
 $| x_2 - x_3 = -1$
 $| x_2 - x_3 = -1$
 $| x_3 - x_3 = -1$
 $| x_4 - x_3 = -1$
 $| x_4 - x_3 = -1$
 $| x_5 - x_3 = -1$
 $| x_6 - x_3 = -1$
 $| x_7 - x_3 = -1$
 $| x_8 - x_8 - x_8 = -1$

(c) Find a vector \vec{y} such that $A\vec{y} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$.

$$| 02 | 0$$
 $| x_1 + 0 + 2x_2 = 0$
 $| x_2 - x_3 = 1$
 $| x_3 - x_3 = 1$
 $| x_4 - x_3 - x_4 - x_5 -$

Problem 2. Consider the same matrices again:

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 1 & 1 & 1 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \\ 2 & 0 \end{pmatrix}$$

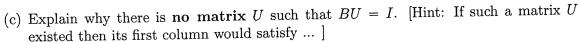
(a) Find a matrix X such that AX = I. [Hint: Use Problem 1.]

$$\begin{pmatrix} 1 & 0 & 2 \\ 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} -1 & 1 \\ 0 & 0 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}.$$

(b) Show that the following equation has **no solution**: $B \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$.

$$\begin{cases} u_1 - u_2 = 1 & \text{(1)} \\ u_2 = 0 & \text{(2)} \\ 2u_1 = 0 & \text{(3)} \end{cases}$$

Equations @ 20 8 8 9 4 = 42 = 0.



existed then its first column would satisfy ...]

If such a matrix U existed, its first column (u, 12) would satisfy the

equation of part (b)

which has NO SOLUTION