Additional Problems Assignment 8

1. Find all matrices X that satisfy:

   (a)
   $$\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix} X = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

   (b)
   $$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix} X = I_2$$

   where
   $$I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}.$$

2. Let:
   $$A = \begin{bmatrix} 1 & 2 & 4 \\ -1 & 7 & 2 \end{bmatrix}, B = \begin{bmatrix} -1 & 2 & -5 & 4 \\ 2 & 1 & 2 & -2 \\ -1 & -4 & -2 & -3 \end{bmatrix} C = \begin{bmatrix} 6 & -2 \\ -2 & -12 \\ 15 & -11 \\ 2 & -2 \end{bmatrix}$$

   (a) Find AB

   (b) Find BC

   (c) Show that $A(BC) = (AB)C$

3. Show if A is an $n \times p$ matrix and B is a $p \times m$ matrix and $k \in \mathbb{R}$ then:
   $$k(AB) = A(kB) = (kA)B$$