Additional Problems Assignment 9

1. Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ be a general 2×2 matrix.

   (a) Find a matrix $B = \begin{bmatrix} e & f \\ g & h \end{bmatrix}$ that satisfy:

   $$AB = I_2$$

   where

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

   (b) Show for this B:

   $$BA = I_2$$

   and thus $B = A^{-1}$.

   (c) What conditions must you put on a, b, c, d in order for A to be invertible?

2. Finish showing the inverse of an invertible linear transformation is a linear transformation by showing that if $T : \mathbb{R}^m \to \mathbb{R}^n$ is linear and $\vec{y}_1, \vec{y}_2 \in \mathbb{R}^n$ then:

   $$T^{-1}(\vec{y}_1 + \vec{y}_2) = T^{-1}(\vec{y}_1) + T^{-1}(\vec{y}_2)$$