Reading Questions 7

page 89: theorem 2.4.4

page 90: example 1

1. If B is an invertible matrix then the linear system $A\vec{x} = \vec{1}$ has infinitely many solutions.
2. If A is not an invertible matrix then the linear system $A\vec{x} = \vec{b}$ has no solution.
3. If the $\text{rref}(\begin{bmatrix} A & | & I_4 \end{bmatrix}) = \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 2 & 3 & 0 \\ 0 & 1 & 0 & 3 & 0 & 1 \\ 0 & 0 & 1 & 0 & 3 & 2 \end{array}\right]$ what is the inverse of A?

Section 2.4 The Inverse of a Linear Transformation (Part 1)

Inverse of linear transformations

P 1. Let $A = \begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix}$. Suppose $\vec{b} \in \mathbb{R}^2$. How many solutions does the linear equation $A\vec{x} = \vec{b}$ have?

P 2. Let A be an $n \times n$ matrix.

1. Write down one way of determining if the inverse of a matrix A exists.
2. Explain why $\text{rank}(A) = n$ if A is invertible.
3. If A is invertible what is $\text{rank}(A^{-1})$?

P 3. Find B^{-1} where $B = \begin{bmatrix} 4 & 10 & 0 \\ 1 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.

P 4. Verify that $BB^{-1} = B^{-1}B = I_3$.

P 5. Solve the following linear system using B^{-1}.

$$\left|\begin{array}{rcr} 4x_1 + 10x_2 &=& 7 \\ x_1 + 3x_2 &=& -5 \\ x_3 &=& 4 \end{array}\right|$$