Math 54: Worksheet #5

Name: _____ Date: September 14, 2021

Fall 2021

Problem 1 (True/False)**.** If $AB = 0$, then either $A = 0$ or $B = 0$.

Problem 2 (True/False)**.** Suppose that A is an $m \times n$ matrix and AB is an $m \times p$ matrix. Then B is an $p \times n$ matrix.

Problem 3 (True/False)**.** If $AB = I$, then $BA = I$.

Problem 4 (True/False)**.** If A is an invertible $n \times n$ matrix, then $\underline{x} = A^{-1}\underline{b}$ is the only solution to $A\underline{x} = \underline{b}$.

Problem 5 (2.1 #6)**.** Compute the product AB for the following two matrices in two ways: (a) by the definition, where $A\underline{b}_1$ and $A\underline{b}_2$ are computed separately, and (b) by the row-column rule for computing AB:

$$A = \begin{bmatrix} 4 & -2 \\ -3 & 0 \\ 3 & 5 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$$

Problem 6 (2.1 #24)**.** Suppose that $AD = I_m$. Show that for any $\underline{b}$ in $\mathbb{R}^m$, the equation $A\underline{x} = \underline{b}$ has a solution. [*Hint*: Think about the equation $AD\underline{b} = \underline{b}$.] Explain why A cannot have more rows than columns.

Problem 7 (2.2 #4-ish)**.** Find the inverse of the matrix

$$\begin{bmatrix} 3 & -4 \\ 7 & -8 \end{bmatrix}.$$

Use the inverse to solve the system

$$\begin{aligned} 3x_1 - 4x_2 &= 3 \\ 7x_1 - 8x_2 &= 2 \end{aligned}$$