Math 392 Quiz 8B

April 24, 2018

Name: ANSWERS

Instructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

1. For the matrix $A = [a_{ij}] = \begin{pmatrix} 7 & 2 & 3 \\ 5 & 0 & -1 \\ 6 & 7 & \pi \end{pmatrix}$, what is $a_{32} =$ 7 ?

2. Let $A = \begin{pmatrix} 1 & -2 & 2 \\ 3 & 0 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 & 9 \\ -1 & 1 & 5 \\ 3 & 4 & 7 \end{pmatrix}$, $C = \begin{pmatrix} 2 & -1 \\ 1 & 0 \end{pmatrix}$ and $D = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$. Compute the following, or write "DNE", for "does not exist".

(a) $B + 2D =$ DNE

(b) $AB = \begin{pmatrix} 9 & 6 & 13 \\ 6 & 4 & 34 \end{pmatrix}$

(c) $BA =$ DNE

(d) $A - 3D = \begin{pmatrix} -2 & -2 & 2 \\ 3 & 0 & -2 \end{pmatrix}$

3. Suppose A and C above were multiplied to find CA. Write the size of the result, or "DNE" if they actually cannot be multiplied: 2×3

4. List the square matrices in problem 2. B, C

5. Solve the system $\begin{aligned} x + 2y - z &= -2 \\ x \qquad + z &= 2 \\ 2x - 4y + z &= 7 \end{aligned}$ by doing the following:

(a) Write down the augmented matrix for the system:

$$\left(\begin{array}{ccc|c} 1 & 2 & -1 & -2 \\ 1 & 0 & 1 & 2 \\ 2 & -4 & 1 & 7 \end{array}\right)$$

(b) Find the reduced row-echelon form of the augmented matrix:

$$\left(\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & 2 & -2 & -4 \\ 0 & 8 & -3 & -11 \end{array}\right) \begin{array}{l} R_2 \\ R_1 - R_2 \\ 2R_1 - R_3 \end{array}$$

$$\left(\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & 1 & -1 & -2 \\ 0 & 0 & -5 & -5 \end{array}\right) \begin{array}{l} R_1 \\ R_2/2 \\ 4R_2 - R_3 \end{array}$$

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 1 \end{array}\right) \begin{array}{l} R_3/5 + R_1 \\ R_3/-5 + R_2 \\ R_3/-5 \end{array}$$

(c) Write down the solution as a column vector: $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$

Bonus: (a) If $A = \begin{pmatrix} 2 & -2 \\ 1 & 0 \end{pmatrix}$, find $A^{-1} = \frac{1}{2}\begin{pmatrix} 0 & 2 \\ -1 & 2 \end{pmatrix}$ (b) If $B = \begin{pmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 2 & 1 & 0 \end{pmatrix}$, find $\det B =$ 2