

## Math 110 – Chapter 6 – Worksheet 1 – Version A

### Matrices and Systems of Equations; Matrix Algebra

#### 6.1 Matrices and Systems of Equations

1. Determine the order of each matrix.

(a)  $\begin{bmatrix} -1 & 3 \\ 7 & 4 \\ 1 & 5 \end{bmatrix}$                       (b)  $[3 \quad -8]$

2. Write the augmented matrix associated with the linear system.

$$\begin{cases} 3y - z = 8 \\ x + 4y = 14 \\ -2y + 9z = 0 \end{cases}$$

3. Perform the indicated row operations (a), (b), and (c) in order on the following matrix.

$$\begin{bmatrix} 3 & 4 & 5 \\ 2 & 4 & 6 \end{bmatrix}$$

(a)  $R_1 \leftrightarrow R_2$                       (b)  $\frac{1}{2}R_1$                       (c)  $-3R_1 + R_2 \rightarrow R_2$

4. Solve the system of linear equations

$$\begin{cases} x - 6y + 3z = -2 \\ 3x + 3y - 2z = -2 \\ 2x - 3y + z = -2 \end{cases}$$

5. Solve by Gaussian elimination.

$$\begin{cases} x - 2y = 1 \\ 2x + 3y = 16 \end{cases}$$

6. Solve by Gaussian elimination or by Gauss-Jordan elimination

$$\begin{cases} 2x + y - z = 7 \\ x - 3y - 3z = 4 \\ 4x + y + z = 3 \end{cases}$$

7. Solve by Gaussian elimination or by Gauss-Jordan elimination

$$\begin{cases} 6x + 8y - 14z = 3 \\ 3x + 4y - 7z = 12 \\ 6x + 3y + z = 0 \end{cases}$$

8. Solve by Gaussian elimination or by Gauss-Jordan elimination

$$\begin{cases} x + y = -1 \\ 3y + 2z = 5 \\ 3x - 3y + z = -8 \end{cases}$$

## 6. 2 Matrix Algebra

9. Find  $x$  and  $y$  such that

$$\begin{bmatrix} 1 & 2x - y \\ x + y & 5 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 2 & 5 \end{bmatrix}$$

10. Let  $A = \begin{bmatrix} 2 & -1 & 4 \\ 5 & 0 & 9 \end{bmatrix}$  and  $B = \begin{bmatrix} -8 & 2 & 9 \\ 7 & 3 & 6 \end{bmatrix}$ . Find  $A + B$ .

11. Let  $A = \begin{bmatrix} 7 & -4 \\ 3 & 6 \\ 0 & -2 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & -3 \\ 2 & 2 \\ 5 & 8 \end{bmatrix}$ . Find  $2A - 3B$ .

12. Solve the matrix equation  $5A + 3X = 2B$  for  $X$ , where  $A = \begin{bmatrix} 1 & -1 \\ 3 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 7 \\ -3 & -5 \end{bmatrix}$ .

13. Determine whether the product matrix  $AB$  is defined. If defined, find the order of  $AB$ .

$$A = \begin{bmatrix} 1 & 4 & 7 \\ 0 & 2 & -2 \end{bmatrix}, \text{ and } B = \begin{bmatrix} 4 \\ 3 \\ -1 \end{bmatrix}$$

14. Find the product  $AB$ .

$$A = \begin{bmatrix} 3 & -1 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} -2 \\ 0 \\ 4 \end{bmatrix}$$

15. Find  $AB$  and  $BA$ , if possible.

$$A = \begin{bmatrix} 5 & 0 \\ 2 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 8 & 1 \\ -2 & 6 \\ 0 & 4 \end{bmatrix}$$