Student: Cole Lamers **Date:** 06/29/19	**Instructor:** Kelly Galarneau **Course:** CA&T Internet (70263) Galarneau	**Assignment:** 9.1 Matrices and Systems of Equations

1. A matrix is any rectangular array of ———.

   A matrix is any rectangular array of numbers.

2. Determine the order of the matrix.

$$\begin{bmatrix} -6 & 4 & 5 & 1 \\ -1 & 0 & 5 & 8 \end{bmatrix}$$

   What is the order of the matrix?

2	×	4

3. Determine the order of the matrix.

$$\begin{bmatrix} 0 & 4 & -5 \\ 3 & 5 & 6 \\ -2 & 1 & 7 \\ 1 & -1 & 2 \end{bmatrix}$$

   What is the order of the matrix?

4	×	3

4. Determine the order of the matrix.

$$\begin{bmatrix} 1 & 1 & 1 & 5 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

   The order of the matrix is 2 × 5 .
   (Type whole numbers.)

5. For matrix A, find a_{13}.

$$A = \begin{bmatrix} 2 & -4 & 0 \\ 6 & 2 & -5 \end{bmatrix}$$

   $a_{13} =$ 0

6. Write an augmented matrix for the following system of equations.

$$\begin{aligned} -x + 4y &= 9 \\ 9x - 5y &= 2 \end{aligned}$$

   The entries in the matrix are:

$$\left[\begin{array}{cc|c} -1 & 4 & 9 \\ 9 & -5 & 2 \end{array} \right]$$

7. Write an augmented matrix for the following system of equations.

$$\begin{cases} 8x_1 - 12 = 7x_2 \\ 17x_2 - 18 = 13x_1 \end{cases}$$

Select the correct augmented matrix below.

A. $\begin{bmatrix} 8 & -7 & | & 12 \\ -13 & 17 & | & 18 \end{bmatrix}$ ✔

B. $\begin{bmatrix} 8 & -7 & | & 12 \\ 17 & -13 & | & 18 \end{bmatrix}$

C. $\begin{bmatrix} 8 & 7 & | & -12 \\ 17 & 13 & | & -18 \end{bmatrix}$

D. $\begin{bmatrix} 8 & -12 & | & 7 \\ 17 & -18 & | & 13 \end{bmatrix}$

8. Write the augmented matrix for the following system of linear equations.

$$\begin{cases} -2x + 7y + 9z = 11 \\ 3x - 5y + 7z = 20 \\ 4x - 3y - 8z = 29 \end{cases}$$

Augmented matrix →

−2	7	9	11
3	−5	7	20
4	−3	−8	29

9. Write the system of equations that corresponds to the following augmented matrix. Write the equations in the form ax + by + cz = d.

$$\begin{bmatrix} 7 & -2 & 7 & | & 4 \\ 7 & 3 & -7 & | & 5 \\ -5 & 6 & 7 & | & 5 \end{bmatrix}$$

What is the first equation?

$7x - 2y + 7z = 4$

What is the second equation?

$7x + 3y - 7z = 5$

What is the third equation?

$-5x + 6y + 7z = 5$

10. Perform the indicated elementary row operations in the stated order.

$$\begin{bmatrix} 5 & 19 & 3 \\ 1 & 4 & 1 \end{bmatrix}; \quad \text{(i) } R_1 \leftrightarrow R_2 \quad \text{(ii) } -5R_1 + R_2 \rightarrow R_2 \quad \text{(iii) } -R_2$$

(i) $\begin{bmatrix} 5 & 19 & 3 \\ 1 & 4 & 1 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2}$

1	4	1
5	19	3

(ii) $\begin{bmatrix} 5 & 19 & 3 \\ 1 & 4 & 1 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \xrightarrow{-5R_1 + R_2 \rightarrow R_2}$

1	4	1
0	−1	−2

(iii) $\begin{bmatrix} 5 & 19 & 3 \\ 1 & 4 & 1 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \xrightarrow{-5R_1 + R_2 \rightarrow R_2} \xrightarrow{-R_2}$

1	4	1
0	1	2

11. Perform the indicated elementary row operations in the stated order.

$$\begin{bmatrix} 1 & 6 & 4 & 2 \\ 0 & 2 & -1 & 5 \\ 0 & 1 & 5 & -14 \end{bmatrix};$$

(i) $R_2 \leftrightarrow R_3$ (ii) $-2R_2 + R_3 \rightarrow R_3$ (iii) $-\frac{1}{11}R_3$

(i) $\begin{bmatrix} 1 & 6 & 4 & 2 \\ 0 & 2 & -1 & 5 \\ 0 & 1 & 5 & -14 \end{bmatrix}$ $\xrightarrow{R_2 \leftrightarrow R_3}$

1	6	4	2
0	1	5	−14
0	2	−1	5

(ii) $\begin{bmatrix} 1 & 6 & 4 & 2 \\ 0 & 2 & -1 & 5 \\ 0 & 1 & 5 & -14 \end{bmatrix}$ $\xrightarrow{R_2 \leftrightarrow R_3}$ $\xrightarrow{-2R_2 + R_3 \rightarrow R_3}$

1	6	4	2
0	1	5	−14
0	0	−11	33

(iii) $\begin{bmatrix} 1 & 6 & 4 & 2 \\ 0 & 2 & -1 & 5 \\ 0 & 1 & 5 & -14 \end{bmatrix}$ $\xrightarrow{R_2 \leftrightarrow R_3}$ $\xrightarrow{-2R_2 + R_3 \rightarrow R_3}$ $\xrightarrow{-\frac{1}{11}R_3}$

1	6	4	2
0	1	5	−14
0	0	1	−3

12.

Identify the elementary row operation used and supply the missing entries in each row-equivalent matrix.

$\rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & -3 & -2 & 0 \\ 0 & 13 & 9 & -3 \end{bmatrix}$

$\rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & 1 & ? & 0 \\ 0 & 13 & 9 & -3 \end{bmatrix}$

$\rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & 1 & ? & 0 \\ 0 & 0 & ? & -3 \end{bmatrix}$

$\rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & 1 & ? & 0 \\ 0 & 0 & 1 & ? \end{bmatrix}$

$\begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & -3 & -2 & 0 \\ 0 & 13 & 9 & -3 \end{bmatrix}$

$-\frac{1}{3}R_2 \rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & 1 & \frac{2}{3} & 0 \\ 0 & 13 & 9 & -3 \end{bmatrix}$

(Type an integer or a simplified fraction.)

$-13R_2 + R_3 \rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & 1 & \frac{2}{3} & 0 \\ 0 & 0 & \frac{1}{3} & -3 \end{bmatrix}$

(Type an integer or a simplified fraction.)

$3R_3 \rightarrow \begin{bmatrix} 1 & 5 & 2 & 4 \\ 0 & 1 & \frac{2}{3} & 0 \\ 0 & 0 & 1 & -9 \end{bmatrix}$

(Type an integer or a simplified fraction.)

13. Determine whether the following matrix is in row-echelon form. If your answer is no, explain why. If your answer is yes, is the matrix in reduced row-echelon form?

$$\begin{bmatrix} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

Choose the correct answer below.

✓ **A.** The matrix is in row‑echelon form but not in reduced row-echelon form.

○ **B.** The matrix is in reduced row-echelon form.

○ **C.** The matrix is not in row-echelon form because the leading entry of the fourth column is not 1.

14. Determine whether the following matrix is in row-echelon form. If your answer is no, explain why. If your answer is yes, is the matrix in reduced row-echelon form?

$$\begin{bmatrix} 1 & 3 & 0 & 4 \\ 0 & 1 & 0 & 7 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

Choose the correct answer below.

   A. The matrix is in row – echelon form but not in reduced row-echelon form. ✓

   ○ **B.** The matrix is not in row-echelon form because the leading entry of the fourth column is not 1.

   ○ **C.** The matrix is in reduced row-echelon form.

15. Determine whether the following matrix is in row-echelon form. If your answer is no, explain why. If your answer is yes, is the matrix in reduced row-echelon form?

$$\begin{bmatrix} 1 & 2 & 0 & -3 \\ 0 & 1 & 2 & 5 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Choose the correct answer below.

   A. The matrix is in row – echelon form but not in reduced row-echelon form. ✓

   ○ **B.** The matrix is in reduced row-echelon form.

   ○ **C.** The matrix is not in row-echelon form because the leading entry of the fourth column is not 1.

16. The augmented matrix of a system of equations has been transformed to an equivalent matrix in row-echelon form or reduced row-echelon form. Using x, y, z, and w as variables, write the system of equations corresponding to the matrix. If the system is consistent, solve it.

$$\left[\begin{array}{cc|c} 1 & 3 & -11 \\ 0 & 1 & 5 \end{array}\right]$$

Write the corresponding linear equations for the given augmented matrix.

$$\left[\begin{array}{cc|c} 1 & 3 & -11 \\ 0 & 1 & 5 \end{array}\right] \rightarrow \begin{array}{c} x + 3y = -11 \\ y = 5 \end{array}$$

(Type equations using x and y as the variables.)

Select the correct choice below, and fill in the answer box, if necessary.

   A. The solution set is $\{$ (−26,5) $\}$. (Type an ordered pair.) ✓

   ○ **B.** The system is inconsistent.

17. The augmented matrix of a system of equations has been transformed to an equivalent matrix in row-echelon form. Using x, y, and z as variables, write the system of equations corresponding to the following matrix. If the system is consistent, solve it.

$$\left[\begin{array}{ccc|c} 1 & 3 & 5 & 6 \\ 0 & 1 & -2 & 5 \\ 0 & 0 & 1 & -1 \end{array}\right]$$

Which of the following system of equations corresponds to the given matrix?

- **A.** 3x + 5y + 6z = 1
     − 2y + 5z = 1
           − z = 1

- ✔ **B.** x + 3y + 5z = 6
         y − 2z = 5
              z = − 1

- **C.**   x = 6
      3x + y = 5
      5x − 2y + z = − 1

- **D.** 3x + 5y = 6
        − 2y = 5
            z = − 1

Select the correct choice below and fill in any answer boxes in your choice.

- ✔ **A.** The solution set is { (2,3, − 1) }. (Type an ordered triple.)
- **B.** The solution is the empty set.

18. The augmented matrix of a system of equations has been transformed to an equivalent matrix in row-echelon form or reduced row-echelon form as shown to the right. Using x, y, z, and w as variables, write the system of equations corresponding to the matrix. If the system is consistent, solve it.

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 4 \\ 0 & 1 & 0 & 0 & -4 \\ 0 & 0 & 1 & 4 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

Which of the following system of equations corresponds to the given augmented matrix?

- **A.** x   = 4
         y   = 4
              z + 4w = 3

- ✔ **B.** x   = 4
         y   = − 4
              z + 4w = 3

- **C.** x   = 4
         y   = − 4
              z + 4 = 3

- **D.** x   = 4
         y   = 4
              z + 4 = 3

Select the correct choice below, and fill in the answer box, if necessary.

- ✔ **A.** The solution set is {(4 , − 4 , 3 − 4w ,w)}.
- **B.** The solution set is {(, , ,)}.
- **C.** The system is inconsistent.

19.

Solve the system of equations using the row echelon method.

7x − 3y = 34

6x + y = 22

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ✔ **A.** There is one solution. The solution set is { (4, − 2) }.
     (Type an ordered pair. Simplify your answer.)

- **B.** There are infinitely many solutions. The solution set is the set of all ordered pairs {(,y)}, where y is any real number.
     (Type an expression using y as the variable. Simplify your answer.)

- **C.** The solution set is the empty set.

20.

Solve the system of equations using the row echelon method.

$7x - 5y = 45$

$2x + y = 8$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. There is one solution. The solution set is
$\{ \quad (5, -2) \quad \}$.
(Type an ordered pair. Simplify your answer.)

B. There are infinitely many solutions. The solution set is the set of all ordered pairs $\{ (\underline{\quad\quad} , y) \}$, where y is any real number.
(Type an expression using y as the variable. Simplify your answer.)

C. The solution set is the empty set.

21. Use Gaussian elimination to find the complete solution to the following system of equations, or show that none exists.

$$\begin{cases} x + y - z = -2 \\ -x + 5y - 3z = 34 \\ -2x + 4y + 4z = 42 \end{cases}$$

Select the correct choice below and, if necessary, fill in the answer box within your choice.

A. The solution set is $\{ (\quad -7 \quad , \quad 6 \quad , \quad 1 \quad) \}$.
(Type an exact answer in simplified form. If there are infinitely many solutions, type an expression involving z for each coordinate, where z represents all real numbers.)

B. There is no solution.

22. Solve the following system of equations by using Gaussian elimination.

$$\begin{cases} 3x + 2y + 4z = 25 & (1) \\ 2x - y + z = 3 & (2) \\ 6x + 5y - z = 17 & (3) \end{cases}$$

Select the correct choice below, and fill in the answer box, if necessary.

A. The solution set is $\{ (\quad 1 \quad , \quad 3 \quad , \quad 4 \quad) \}$.

B. The solution set is $\{ (\underline{\quad\quad} , \underline{\quad\quad} , z) \}$.

C. The system is inconsistent.

23. Solve the system of equations by using row operations.

$$\begin{cases} 2 \cdot 4^x - 5 \cdot 5^y + 3^z = -13 \\ 4^x + 2 \cdot 5^y - 4 \cdot 3^z = -2 \\ 4 \cdot 4^x - 4 \cdot 5^y + 5 \cdot 3^z = 16 \end{cases}$$

The solution set is $\left\{ \left(\quad 1 \quad , \quad 1 \quad , \quad \dfrac{\ln 4}{\ln 3} \quad \right) \right\}$.

(Type exact answers in simplified form.)

24. Watch the video and then solve the problem given below.

Click here to watch the video.[1]

Write the augmented matrix of the linear system.

$$\begin{cases} 2x+6y & = & 9 \\ 5y-z & = & -5 \\ 3z+2x & = & 6 \end{cases}$$

The augmented matrix is $\begin{bmatrix} 2 & 6 & 0 & 9 \\ 0 & 5 & -1 & -5 \\ 2 & 0 & 3 & 6 \end{bmatrix}$.

1: http://mediaplayer.pearsoncmg.com/assets/mSbVHTfWgwAWSBilZ0M2b34kUjbE2C0Y?clip=2

25. Watch the video and then solve the problem given below.

Click here to watch the video.[2]

Solve the system of equations.

$$\begin{cases} x-y-z & = & -11 \\ y-2z & = & 9 \\ x+y-5z & = & 7 \end{cases}$$

Select the correct choice below and, if necessary, fill in the answer box within your choice.

- ○ **A.** There is exactly one solution, _____ .
  (Type an ordered triple.)
- ○ **B.** There is no solution.
- ◉ **C.** There are infinitely many solutions of the form $(3z-2, 2z+9, z)$.
  (Simplify your answer. Type an ordered triple.)

2: http://mediaplayer.pearsoncmg.com/assets/mSbVHTfWgwAWSBilZ0M2b34kUjbE2C0Y?clip=7