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Assignment: Practice Quiz 5 (Chapter 8 & 9)

1. Determine which of the ordered pairs (1,1), (−3,4), and (−2,−1) are solutions of the following system of equations.

$$\begin{cases} 3x + 4y = 7 \\ -2x + 3y = 1 \end{cases}$$

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

- ☒ **A.**
(Use a comma to separate answers as needed. Type an ordered pair.)
- ☐ **B.** None of the ordered pairs are solutions.

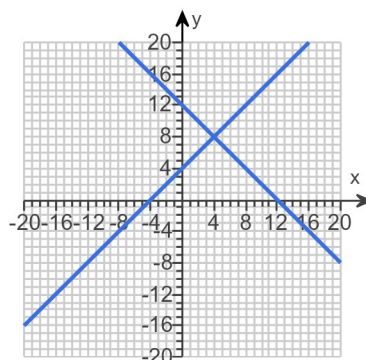
2. Solve the system of equations by graphing.

$$\begin{aligned} x - y &= -4 \\ x + y &= 12 \end{aligned}$$

Use the graphing tool to graph the system.

What is the solution of the system of equations? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☒ **A.** The solution is . (Type an ordered pair.)
- ☐ **B.** The system of equations has infinitely many solutions.
- ☐ **C.** The system of equations has no solution.



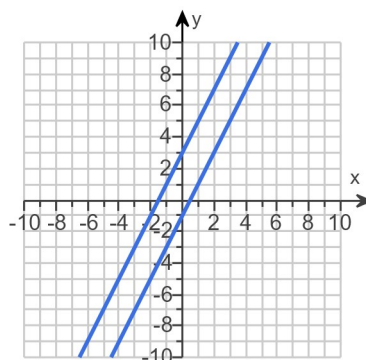
3. Determine the solution to the system of equations graphically. If the system is inconsistent or dependent, so state.

$$\begin{aligned} y &= 2x - 1 \\ 3y &= 6x + 9 \end{aligned}$$

Use the graphing tool to graph the system.

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

- ☐ **A.** The solution to the system is .
(Type an ordered pair.)
- ☐ **B.** The system is dependent.
- ☒ **C.** The system is inconsistent.



4. Solve the following system of equations by the substitution method. Check the solutions.

$$\begin{cases} 3x - 8y = -8 \\ 8x + 62 = y \end{cases}$$

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

- ☒ **A.** There is one solution. The solution set is $\{(-8, -2)\}$.
(Type an ordered pair. Simplify your answer.)
- ☐ **B.** There are infinitely many solutions. The solution set is the set of all ordered pairs $\{(x, \text{ })\}$, where x is any real number.
(Type an expression using x as the variable. Simplify your answer.)
- ☐ **C.** The solution set is the empty set.

5. Solve the following system of equations by the substitution method. Check the solutions.

$$\begin{cases} x - y = 1 \\ 4x + 7y = -40 \end{cases}$$

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

- ☒ **A.** There is one solution. The solution set is $\{ (-3, -4) \}$.
(Type an ordered pair. Simplify your answer.)
- ☐ **B.** There are infinitely many solutions. The solution set is the set of all ordered pairs $\{(x, \quad)\}$, where x is any real number.
(Type an expression using x as the variable. Simplify your answer.)
- ☐ **C.** The solution set is the empty set.

6. Solve the following system of equations by the substitution method. Check the solutions.

$$\begin{cases} 2x - y = 8 \\ 8x - 4y = 17 \end{cases}$$

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

- ☐ **A.** There is one solution. The solution set is $\{ \quad \}$.
(Type an ordered pair. Simplify your answer.)
- ☐ **B.** There are infinitely many solutions. The solution set is the set of all ordered pairs $\{(x, \quad)\}$, where x is any real number.
(Type an expression using x as the variable. Simplify your answer.)
- ☒ **C.** The solution set is the empty set.

7. Solve the following system of equations by the substitution method. Check the solutions.

$$\begin{cases} x - 2y = 5 \\ -4x + 8y = -20 \end{cases}$$

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

- ☐ **A.** There is one solution. The solution set is $\{ \quad \}$.
(Type an ordered pair. Type an integer or a simplified fraction.)
There are infinitely many solutions. The solution set is the set of all ordered pairs
- ☒ **B.** $\left\{ \left(x, \frac{1}{2}(x - 5) \right) \right\}$, where x is any real number.
(Simplify your answer. Type an expression using x as the variable. Use integers or fractions for any numbers in the expression.)
- ☐ **C.** There is no solution.

YOU ANSWERED: B.: $-\frac{5}{2}$

8. Use a system of equations to solve the following problem.

The sum of the diameters of the largest and smallest pizzas sold at a pizza shop is 40 inches. The difference in their diameters is 16 inches. Find the diameters of the largest and smallest pizzas.

The diameter of the largest pizza is 28 inches and the diameter of the smallest pizza is 12 inches. (Simplify your answer. Type an integer or a decimal.)

9. A certain municipality recycled six times as many tons of aluminum as plastic in one year. If the total amount recycled was 1141 tons, how much aluminum and how much plastic was recycled?

978 tons of aluminum were recycled.
(Type an integer or a decimal.)

163 tons of plastic were recycled.
(Type an integer or a decimal.)

10. The Coffee Counter charges \$7 per pound for Kenyan French Roast coffee and \$6 per pound for Sumatran coffee.

How much of each type should be used to make a 20 pound blend that sells for \$ 6.50 per pound?

The Coffee Counter should mix pounds of Kenyan Roast coffee and pounds of Sumatran coffee to make 20 pounds of a blend that sells for \$ 6.50 per pound.

11. Solve the system for x and y.

$$\begin{cases} 7e^x - 3e^y = 38 \\ 5e^x + 2e^y = 52 \end{cases}$$

The solution set is $\{ (\ln(8), \ln(6)) \}$. (Type an ordered pair. Type an exact answer.)

12. Find x if $6x + 3y - 7z = 49$, $y - z = 11$, and $z = -7$.

For $6x + 3y - 7z = 49$, $y - z = 11$, and $z = -7$, the value of x is .
(Simplify your answer. Type an integer or a fraction.)

13. Solve the following triangular linear system.

$$\begin{aligned} x - 4y + 3z &= -3 \\ y - 3z &= -10 \\ z &= 4 \end{aligned}$$

The solution set is $\{ (-7, 2, 4) \}$. (Simplify your answer. Type an ordered triple.)

14. Solve the following system of equations by the substitution method. Check the solutions.

$$\begin{cases} y = x^2 & (1) \\ y = 2x + 8 & (2) \end{cases}$$

The solution set is $\{ (4, 16), (-2, 4) \}$.
(Type ordered pairs. Use a comma to separate answers as needed.)

15. Solve the following system of equations by the substitution method. Check your solutions.

$$\begin{cases} x^2 - y = 24 & (1) \\ 2x - y = 0 & (2) \end{cases}$$

The solution set is $\{ (-4, -8), (6, 12) \}$.
(Type ordered pairs. Use a comma to separate answers as needed.)

16. Solve the following system of equations by using the substitution method. Check your solutions.

$$\begin{cases} x^2 + y^2 = 121 \\ x = 11 \end{cases}$$

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

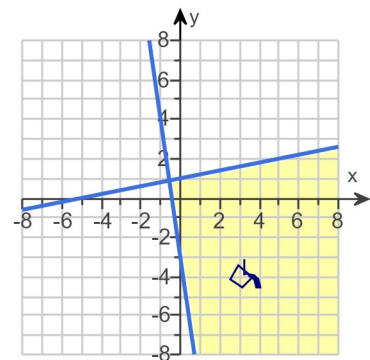
- ☒ **A.** The solution set is $\{ (11, 0) \}$.
(Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

17. Graph the system of inequalities. Then find the coordinates of the vertices.

$5y - x \leq 5$
 $y + 7x \geq -3$

Use the graphing tool to graph the system.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☒ **A.** The vertices are .
- (Type an ordered pair. Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ **B.** There are no vertices of the solution set.

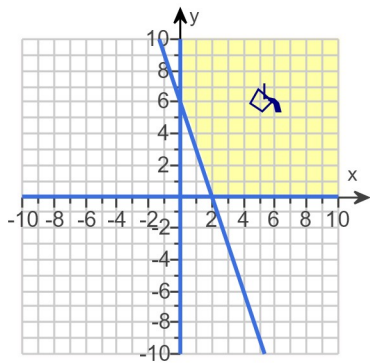


18. Graph the solution set of the system of linear inequalities. Then, find all the vertices, (if any) of the solution set.

$x \geq 0$
 $y \geq 0$
 $6x + 2y \geq 12$

Use the graphing tool to graph the solution set of the system of linear inequalities.
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☒ **A.** The vertices are .
- (Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ **B.** There are no vertices of the solution set.



19. Determine the order of the matrix.

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

What is the order of the matrix?

×

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

$$\left[\begin{array}{ccc|c} 3 & -4 & 4 & 2 \\ 3 & 6 & -5 & 4 \\ -5 & 4 & 4 & 6 \end{array} \right]$$

What is the first equation?

What is the second equation?

What is the third equation?

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

$$\begin{bmatrix} 7 & 13 & 6 \\ 1 & 2 & 4 \end{bmatrix}; \quad \text{(i) } R_1 \leftrightarrow R_2 \quad \text{(ii) } -7R_1 + R_2 \rightarrow R_2 \quad \text{(iii) } -R_2$$

$$\text{(i)} \begin{bmatrix} 7 & 13 & 6 \\ 1 & 2 & 4 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \begin{bmatrix} \boxed{1} & \boxed{2} & \boxed{4} \\ \boxed{7} & \boxed{13} & \boxed{6} \end{bmatrix}$$

$$\text{(ii)} \begin{bmatrix} 7 & 13 & 6 \\ 1 & 2 & 4 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \xrightarrow{-7R_1 + R_2 \rightarrow R_2} \begin{bmatrix} \boxed{1} & \boxed{2} & \boxed{4} \\ \boxed{0} & \boxed{-1} & \boxed{-22} \end{bmatrix}$$

$$\text{(iii)} \begin{bmatrix} 7 & 13 & 6 \\ 1 & 2 & 4 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \xrightarrow{-7R_1 + R_2 \rightarrow R_2} \xrightarrow{-R_2} \begin{bmatrix} \boxed{1} & \boxed{2} & \boxed{4} \\ \boxed{0} & \boxed{1} & \boxed{22} \end{bmatrix}$$

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

$$\begin{cases} 3x + 2y + 4z = 28 & (1) \\ 2x - y + z = 5 & (2) \\ 6x + 5y - z = 23 & (3) \end{cases}$$

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

- ☒ **A.** The solution set is $\{(\boxed{2}, \boxed{3}, \boxed{4})\}$.
- ☐ **B.** The solution set is $\{(\quad, \quad, z)\}$.
- ☐ **C.** The system is inconsistent.

23. Find x and y.

$$\begin{bmatrix} 1 & 3x \\ y & 6 \end{bmatrix} = \begin{bmatrix} 1 & 18 \\ -2 & 6 \end{bmatrix}$$

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

- ☒ **A.** $x = \boxed{6}$, $y = \boxed{-2}$
- ☐ **B.** There is no solution.

24. Solve the matrix equation $A + X = B$ for X. Let

$$A = \begin{bmatrix} 8 & 1 & -1 \\ 3 & -6 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} -3 & 6 & 0 \\ 5 & 2 & 9 \end{bmatrix}.$$

$$X = \begin{bmatrix} \boxed{-11} & \boxed{5} & \boxed{1} \\ \boxed{2} & \boxed{8} & \boxed{7} \end{bmatrix} \text{ (Type an integer or simplified fraction for each matrix element.)}$$

25. Find the product if possible.

- a. AB
b. BA

$$A = \begin{bmatrix} -8 & 1 & -3 \end{bmatrix}, B = \begin{bmatrix} -3 \\ -4 \\ 6 \end{bmatrix}$$

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

- ☒ A. $AB = \begin{bmatrix} 2 \end{bmatrix}$
(Type an integer or simplified fraction for each matrix element.)
☐ B. The matrix product is not defined.

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

- ☒ A. $BA = \begin{bmatrix} 24 & -3 & 9 \\ 32 & -4 & 12 \\ -48 & 6 & -18 \end{bmatrix}$
(Type an integer or simplified fraction for each matrix element.)
☐ B. The matrix product is not defined.

26. Let $A = \begin{bmatrix} 0 & -2 \\ 0 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 0 \\ 0 & 0 \end{bmatrix}$. Check whether $AB = BA$ or not.

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

- ☒ A. $AB = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ (Simplify your answers.)
☐ B. The matrix operation is not defined.

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

- ☒ A. $BA = \begin{bmatrix} 0 & 4 \\ 0 & 0 \end{bmatrix}$ (Simplify your answers.)
☐ B. The matrix operation is not defined.

Is $AB = BA$?

- ☐ Yes
☒ No

27. Every square matrix is invertible. State whether this statement is true or false.

Choose the correct answer below.

- ☒ False
☐ True

28. Determine whether the following statement is true or false.

$$A = \begin{bmatrix} 3 & 2 \\ 9 & 6 \end{bmatrix} \text{ is invertible.}$$

Choose the correct answer below.

- ☒ False
☐ True

29. Determine whether B is the inverse of A.

$$A = \begin{bmatrix} 1 & -7 \\ -3 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 4 & 7 \\ 3 & 1 \end{bmatrix}$$

Is B the inverse of A?

- ☒ No
☐ Yes

30. Use the fact that if $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then $A^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ to find the inverse of the given matrix, if possible. Check that $AA^{-1} = I_2$ and $A^{-1}A = I_2$.

$$A = \begin{bmatrix} -5 & -4 \\ -1 & 1 \end{bmatrix}$$

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

- ☒ A. $A^{-1} = \begin{bmatrix} -\frac{1}{9} & -\frac{4}{9} \\ -\frac{1}{9} & \frac{5}{9} \end{bmatrix}$ (Simplify your answers.)
☐ B. The inverse matrix is not possible.

31. Solve the following linear system by using an inverse matrix.

$$\begin{cases} x + 3y = -13 \\ -3x + 5y = -31 \end{cases}$$

The solution of the system is $\{ (2, -5) \}$. (Type an ordered pair.)

32. Determine whether B is the inverse of A.

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

Is B the inverse of A?

- ☐ No
☒ Yes

33. Find the products AB and BA to determine whether B is the multiplicative inverse of A.

$$A = \begin{bmatrix} 8 & -7 \\ -8 & 6 \end{bmatrix}, \quad B = \begin{bmatrix} -\frac{3}{4} & -\frac{7}{8} \\ -1 & -1 \end{bmatrix}$$

$$AB = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$BA = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Is B a multiplicative inverse of A?

- ☒ Yes
☐ No

34. Find the inverse of the following matrix A, if possible. Check that $A \cdot A^{-1}$ and $A^{-1} \cdot A = I$.

$$A = \begin{bmatrix} 4 & 8 \\ 3 & 6 \end{bmatrix}$$

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

☐ A. The inverse, A^{-1} is $\begin{bmatrix} & \\ & \end{bmatrix}$.

☒ B. Finding the inverse is not possible.

35. Find M^{-1} (if it exists) by forming the matrix $[M|I]$ and using row operations to obtain $[I|B]$, where $B = M^{-1}$.

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

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

(Type an integer or simplified fraction for each matrix element.)

☒ A. $M^{-1} = \begin{bmatrix} \boxed{-1} & \boxed{2} & \boxed{2} \\ \boxed{1} & \boxed{-1} & \boxed{-1} \\ \boxed{3} & \boxed{-3} & \boxed{-4} \end{bmatrix}$

☐ B. M^{-1} does not exist.

36. Write a matrix equation of the form $AX = B$ that corresponds to the following system of equations.

$$6x + 9y = 8$$

$$7x - y = -3$$

The matrix equation is:

$$\begin{bmatrix} \boxed{6} & \boxed{9} \\ \boxed{7} & \boxed{-1} \end{bmatrix} \begin{bmatrix} \boxed{x} \\ \boxed{y} \end{bmatrix} = \begin{bmatrix} \boxed{8} \\ \boxed{-3} \end{bmatrix}.$$

37. Write the matrix equation as a system of linear equations without matrices.

$$\begin{bmatrix} -5 & 1 & -1 \\ 8 & -2 & 8 \\ 4 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 4 \\ -6 \end{bmatrix}$$

Equation 1 $\boxed{-5x + 1y - 1z = 6}$

Equation 2 $\boxed{8x - 2y + 8z = 4}$

Equation 3 $\boxed{4x + 1y = -6}$

38.
- a.

Write the linear system as a matrix equation in the form $AX = B$.
- b.

Solve the system using the inverse that is given for the coefficient matrix.

$x - y + z = 0$

$-2y + z = 2$

$-3x - 4y = 3$

$A^{-1} = \begin{bmatrix} 4 & -4 & 1 \\ -3 & 3 & -1 \\ -6 & 7 & -2 \end{bmatrix}$

a.

$AX = B \rightarrow$

1

-1

1

0

-2

1

-3

-4

0

x

y

z

=

0

2

3

b.

The solution set is $\{(-5, 3, 8)\}$.