1. Which of the following is the graph of a single linear equation?

2. What is the y-intercept of the line $3x + 4y = 2$?

a. $\left(\frac{2}{3}, 0\right)$ b. $(2,0)$ c. $\left(0, \frac{2}{3}\right)$ d. $\left(\frac{1}{2}, 0\right)$ e. $\left(0, \frac{1}{2}\right)$

3.

What is the feasible set for the following system of linear inequalities?

$$\begin{cases} 2x \geq y \\ y \geq -\frac{2}{3}x + \frac{16}{3} \end{cases}$$

a. I b. II c. III d. IV e. none of the others

4. Which of the following points satisfies the inequality $x - 2y \geq 4$?

a. (3,4) b. (0,1) c. (4,2) d. (4,0) e. (5,1)

5. What is the point of intersection of the following lines?

$$\begin{cases} 2x + y = 5 \\ x + 3y = 10 \end{cases}$$

a. (2,1) b. (5,10) c. (1,3) d. (0,5) e. (4,–3)

6. What is the slope of the line passing through the points (4,2) and (8,3)?

a. -4 b. $\frac{1}{4}$ c. 4 d. $-\frac{1}{4}$ e. $\frac{5}{12}$

7. What is the x-intercept of the line passing through the point (2,13) and perpendicular to the line $y = 2x + 13$?

a. (0,0) b. (7,0) c. $\left(-\frac{11}{2},0\right)$ d. (– 24,0) e. (28,0)

8. Which of the following pairs of lines is <u>not</u> parallel?

a. $y = -3x + 2$ and $-3x + y = 4$
b. $y = -2x + 1$ and $2x + y = 0$
c. $y = 3$ and $y = 1$
d. $y = -6x$ and $12x + 2y = 0$
e. $4y = 8x + 16$ and $y - 2x = 0$

9. A dogowner finds that the number of times his puppy responds correctly to his commands is related to the amount of time he spends practicing with her by a linear equation. One week he practices 420 minutes with her and she responds correctly 560 times. The next week he practices 300 minutes and she responds correctly 320 times. If x is the number of minutes spent practicing and y is the number of correct responses by the puppy, which of the following equations correctly describes the relationship between x and y

a. $y + 2x = -280$ b. $y - 2x = -280$ c. $2y + x = -280$

d. $2y - x = 280$ e. $y + 2x = 280$

10. Use Gaussian elimination to find the solution of the following matrix.

$$\begin{matrix} x & y & \\ \left[\begin{array}{cc|c} 1 & 2 & 1 \\ 0 & 2 & 4 \end{array}\right] & . \end{matrix}$$

a. $\begin{matrix} x = -3 \\ y = 4 \end{matrix}$ b. $\begin{matrix} x = 1 \\ y = 4 \end{matrix}$ c. $\begin{matrix} x = 1 \\ y = 2 \end{matrix}$ d. $\begin{matrix} x = -3 \\ y = 2 \end{matrix}$

e. The system has no solution.

11. Suppose he following matrix is pivoted about the circled entry. In the resulting matrix, what is the entry in the third row, third column?

$$\begin{bmatrix} 1 & -1 & 1 & 2 \\ 0 & 2 & 1 & 4 \\ 0 & -2 & 8 & 7 \\ 0 & 4 & 3 & 1 \end{bmatrix}$$

a. 8 b. 7.5 c. 9 d. 8.5 e. 7

12. What is the solution of the following system of linear equations?

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

a. $\begin{aligned} x &= 1 \\ y &= 1 \\ z &= -1 \end{aligned}$ b. $\begin{aligned} x &= 1 \\ y &= 0 \\ z &= -1 \end{aligned}$ c. $\begin{aligned} x &= -1 \\ y &= 0 \\ z &= 1 \end{aligned}$ d. $\begin{aligned} x &= -1 \\ y &= 1 \\ z &= 1 \end{aligned}$ e. no solution

13. What is the solution of the system of linear equations represented by the following matrix:

$$\begin{array}{c} x\ \ y\ \ z \\ \left[\begin{array}{ccc|c} 1 & 0 & 0 & 2 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right] \end{array}$$

a. $x = 2$, $y = -4z + 1$, $z =$ any value

b. $x = 2$, $y = 4z - 1$, $z =$ any value

c. $x = -2$, $y =$ any value, $z = 4y + 1$

d. $x = -2$, $y = -4z + 1$, $z =$ any value

e. $x = 2$, $y =$ any value, $z = 4y + 1$

14. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 2 & 3 \\ 4 & 2 \end{bmatrix}$. What is AB?

a. $\begin{bmatrix} 16 & 10 \\ 13 & 11 \end{bmatrix}$ b. $\begin{bmatrix} 0 & 3 & 1 \\ 2 & 13 & 9 \\ 4 & 14 & 14 \end{bmatrix}$ c. $\begin{bmatrix} 0 & 2 & 4 \\ 3 & 13 & 14 \\ 1 & 9 & 14 \end{bmatrix}$ d. $\begin{bmatrix} 16 & 13 \\ 10 & 11 \end{bmatrix}$

e. undefined

15. If A is a 2x3 matrix, B is a 3x2 matrix, C is a 3x3 matrix and D is a 2x6 matrix, which of the following products is always defined?

a. C^{-1} b. BAD c. BACD d. BDC e. AC

16. The matrix $\begin{bmatrix} 3 & x \\ 4 & 12 \end{bmatrix}$ has no inverse if x is equal to:

a. 12 b. 36 c. 4 d. 9 e. 32

17. Suppose $A = \begin{bmatrix} 6 & 3 \\ 0 & 1 \end{bmatrix}$. What is A^{-1}?

a. $\begin{bmatrix} \frac{1}{6} & -\frac{3}{6} \\ 0 & \frac{6}{6} \end{bmatrix}$ b. $\begin{bmatrix} \frac{6}{6} & -\frac{3}{6} \\ 0 & \frac{1}{6} \end{bmatrix}$ c. $\begin{bmatrix} \frac{1}{6} & \frac{3}{6} \\ 0 & \frac{6}{6} \end{bmatrix}$ d. $\begin{bmatrix} \frac{6}{6} & \frac{3}{6} \\ 0 & \frac{1}{6} \end{bmatrix}$ e. $\begin{bmatrix} \frac{1}{6} & 0 \\ -\frac{3}{6} & \frac{6}{6} \end{bmatrix}$

18. Suppose $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ what is $A + A^{-1}$?

a. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ b. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ c. $\begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix}$ d. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ e. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

19. If $A = \begin{bmatrix} -7 & 8 & 4 \\ -1 & 1 & 1 \\ 2 & -2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & 0 & 4 \\ 1 & -1 & 3 \\ 0 & 2 & 1 \end{bmatrix}$ then what is the solution of the following system of linear equations?

$$\begin{aligned} -7x + 8y + 4z &= 3 \\ -x + y + z &= 1 \\ 2x - 2y - z &= 4 \end{aligned}$$

a. $x = 19$, $y = 14$, $z = 0$ b. $x = 19$, $y = 14$, $z = 6$ c. $x = 3$, $y = 2$, $z = 0$ d. $x = 3$, $y = 14$, $z = 6$ e. $x = 19$, $y = 2$, $z = 0$

20. Use the Gauss-Jordan method to calculate the inverse of the following matrix. $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$

a. $\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & -1 & 1 \end{bmatrix}$ b. $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$ c. $\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ \frac{1}{2} & 1 & -\frac{1}{2} \end{bmatrix}$

d. $\begin{bmatrix} 1 & -2 & 0 \\ 0 & 1 & 0 \\ 1 & -2 & 1 \end{bmatrix}$ e. $\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & -2 & 1 \end{bmatrix}$