

Mathematics 2204

Final Review

Chapter 1 Systems of Equations

1. Which of the following systems has no solution?

(A)
$$\begin{aligned} 2x + 8y &= 3 \\ -x + 4y &= 1.5 \end{aligned}$$

(B)
$$\begin{aligned} 2x - 8y &= 3 \\ x - 4y &= -1.5 \end{aligned}$$

(C)
$$\begin{aligned} 2x + 8y &= 3 \\ x - 4y &= 1.5 \end{aligned}$$

(D)
$$\begin{aligned} 2x - 8y &= 3 \\ x + 4y &= -1.5 \end{aligned}$$

2. What is the solution to the system of equations represented by the matrix multiplication

$$\begin{bmatrix} 2 & 3 \\ -4 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 29 \end{bmatrix} ?$$

(A) $\begin{bmatrix} -23 \\ -2 \end{bmatrix}$ (B) $\begin{bmatrix} -16 \\ -15 \end{bmatrix}$ (C) $\begin{bmatrix} -2 \\ 3 \end{bmatrix}$ (D) $\begin{bmatrix} 97 \\ 183 \end{bmatrix}$

3. What is the solution for the following system of equations?

$$2x - 3y = 13$$

$$2x + 7y = 3$$

(A) $\left(\frac{7}{2}, 1\right)$ (B) $5, -1$ (C) $5, 7$ (D) $\left(\frac{27}{2}, 4\right)$

4. What is the determinant of the matrix $\begin{bmatrix} 11 & 12 \\ 9 & 7 \end{bmatrix}$?

(A) -69 (B) -31 (C) 31 (D) 69

5. Megan went to the store and picked up 3 bottles of juice and 2 bags of chips for \$5.95. Amanda went to the same store and bought a bottle of juice and 2 bags of chips for \$3.45. If j represents the cost of a bottle of juice and c represents the cost of a bag of chips, which system models this situation?

(A)
$$\begin{aligned} 2c + 3c &= 5.95 \\ 2j + j &= 3.45 \end{aligned}$$

(B)
$$\begin{aligned} 2j + 2c &= 5.95 \\ 3j + c &= 3.45 \end{aligned}$$

(C)
$$\begin{aligned} 2j + 3c &= 5.95 \\ 2c + j &= 3.45 \end{aligned}$$

(D)
$$\begin{aligned} 3j + 2c &= 5.95 \\ j + 2c &= 3.45 \end{aligned}$$

6. Which matrix multiplication is equivalent to the following system?

$$2x + 3y = -9$$

$$-4x + 5y = 16$$

(A)
$$\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$$

(B)
$$\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix} \begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$$

(C)
$$\begin{bmatrix} 5 & -3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$$

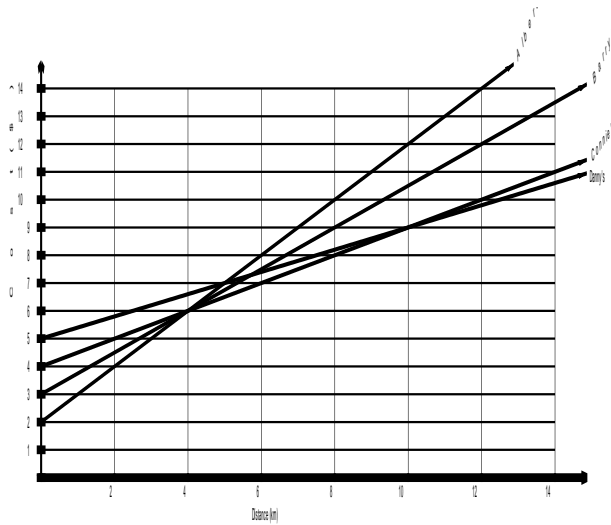
(D)
$$\begin{bmatrix} 5 & -3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$$

7. Given $A = \begin{bmatrix} 4 & 3 \\ -2 & 1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, which of the following statements is true?

- (A) $\frac{1}{A} \cdot A = I$ (B) $A \cdot A = I$ (C) $A^{-1} \cdot A = I$ (D) $A^{-1} + A = I$

8. The following graph represents the cost structure for four taxi companies – Albert’s Cabs, Barry’s Ride, Connie’s Shuttle Service, and Danny’s Taxi. If you are taking a 12km trip, which company should you use?

- (A) Albert’s
(B) Barry’s
(C) Connie’s
(D) Danny’s



9. What is the inverse of $\begin{bmatrix} -2 & 4 \\ -3 & 5 \end{bmatrix}$?

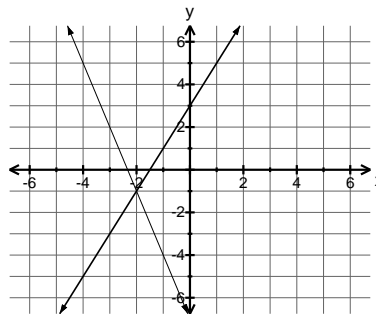
- (A) $\begin{bmatrix} -1 & 2 \\ -3 & 5 \\ 2 & 2 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & -3 \\ 4 & -5 \end{bmatrix}$ (C) $\begin{bmatrix} \frac{5}{2} & -2 \\ 3 & -1 \end{bmatrix}$ (D) $\begin{bmatrix} 5 & -4 \\ 3 & -2 \end{bmatrix}$

10. Which system of equations is equivalent to $\begin{cases} x + 2y = 7 \\ -x - y = 4 \end{cases}$?

- (A) $\begin{cases} x + 2y = 7 \\ 2x + 2y = 8 \end{cases}$ (B) $\begin{cases} 2x + 4y = 14 \\ x + y = -4 \end{cases}$
(C) $\begin{cases} 2x + 2y = 14 \\ x + y = 4 \end{cases}$ (D) $\begin{cases} 2x + 4y = -14 \\ 2x + 2y = -8 \end{cases}$

11. What is the solution to the system of equations graphed below?

- (A) $-2, -1$
(B) $-2, 1$
(C) $-1, -2$
(D) $-1, 2$



12. What is the solution for the system of equations below?

$$\begin{cases} 3x - y = 16 \\ 2x + y = 9 \end{cases}$$

- (A) $5, -1$
(B) $5, 1$
(C) $7, -5$
(D) $7, 5$

12. Bernard went to his local computer store and purchased 3 packs of paper and 2 ink cartridges for \$59.75. Patrick went to the same store and bought 4 packs of paper and 6 ink cartridges for \$129.50. If p represents the cost of a pack of paper and c represents the cost of an ink cartridge, which system of equations models this situation?

- (A) $2p + 3c = 59.75$
 $6p + 4c = 129.50$ (B) $3p + 2c = 59.75$
 $4p + 6c = 129.50$
- (C) $3c + 2c = 59.75$
 $4p + 6p = 129.50$ (D) $3p + 2p = 59.75$
 $4c + 6c = 129.50$

14. What is the inverse of $\begin{bmatrix} 2 & 6 \\ -1 & -2 \end{bmatrix}$?

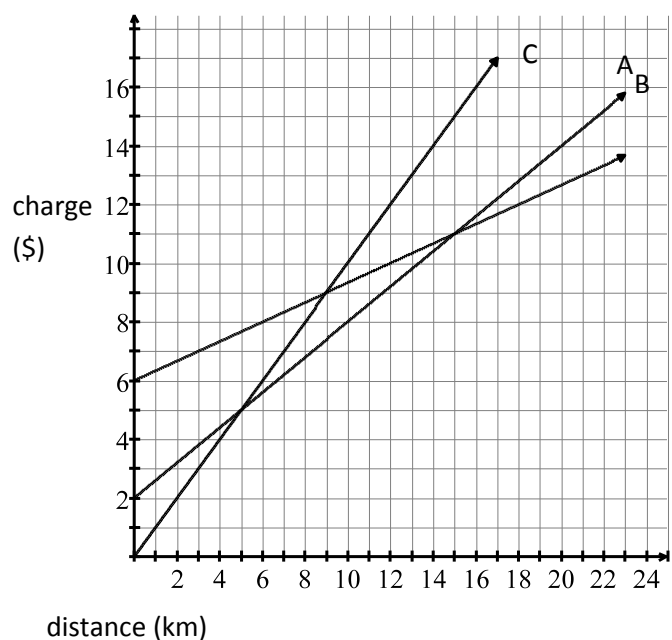
- (A) $\begin{bmatrix} -1 & -3 \\ \frac{1}{2} & 1 \end{bmatrix}$ (B) $\begin{bmatrix} -1 & -\frac{1}{2} \\ 3 & 1 \end{bmatrix}$ (C) $\begin{bmatrix} \frac{1}{5} & \frac{1}{10} \\ -\frac{3}{5} & -\frac{1}{5} \end{bmatrix}$ (D) $\begin{bmatrix} \frac{1}{5} & \frac{3}{5} \\ -\frac{1}{10} & -\frac{1}{5} \end{bmatrix}$

15. Which system has a solution of $1, -2, 5$?

- (A) $x = 1$
 $x - y = -1$
 $x + y + z = 4$ (B) $x + y = 3$
 $y = 2$
 $x - 2y + z = 2$
- (C) $x + 2y - z = -8$
 $2x - z = -3$
 $z = 5$ (D) $y - z = -3$
 $y = -2$
 $x - y + z = 4$

16. The graph below shows the fee structure for 3 taxi companies in Stephenville. For what distances is it cheapest to use Company C?

- (A) less than 5 kilometres
 (B) between 5 and 15 kilometres
 (C) greater than 15 kilometres
 (D) it is never best to use Company C



17. Wade's Furniture charges a delivery fee of \$10 plus an additional \$0.75 per kilometre. Claudine's Furniture charges a delivery fee of \$5 plus an additional \$1.00 per kilometre. At what distance, in kilometres, will both companies charge the same amount?

- (A) 20 (B) 25 (C) 55 (D) 60

18. A system of equations is given below:

$$\text{Equation A: } \frac{2}{3}x + y = 2$$

$$\text{Equation B: } x - \frac{4}{5}y = 1$$

If Equation A is multiplied by three and Equation B is multiplied by five, what is the sum of the two new equations?

- (A) $3x - 4y = 3$ (B) $6x + 2y = 11$ (C) $7x - y = 3$ (D) $7x - y = 11$

19. Which system is equivalent to the system of equations given below?

$$3x + 5y = -11$$

$$x - y = -1$$

- (A) $-6x - 10y = -11$
 $-2x + 2y = -1$ (B) $-6x - 10y = 22$
 $-2x + 2y = 2$

- (C) $-3x - 5y = -11$
 $-x + y = -1$ (D) $3x - 5y = 11$
 $x + y = 1$

20. What is the matrix representation for the system of equations given below?

$$3x - 2y = 8$$

$$5y - 4z = 5$$

$$x + 8z = -9$$

- (A) $\begin{bmatrix} 3 & -2 \\ 5 & -4 \\ 1 & 8 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 5 \\ -9 \end{bmatrix}$ (B) $\begin{bmatrix} 3 & -2 \\ 5 & -4 \\ 1 & 8 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 5 \\ -9 \end{bmatrix}$

- (C) $\begin{bmatrix} 3 & -2 & 0 \\ 0 & 5 & -4 \\ 1 & 0 & 8 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 5 \\ -9 \end{bmatrix}$ (D) $\begin{bmatrix} 3 & -2 & 0 \\ 5 & -4 & 0 \\ 1 & 8 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 5 \\ -9 \end{bmatrix}$

21. What is the solution to the system of equations given below?

$$\begin{bmatrix} 2 & 5 \\ -1 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 14 \\ -5 \end{bmatrix}$$

- (A) $-4, 3$ (B) $-3, 4$ (C) $3, -4$ (D) $4, -3$

22. If $A = \begin{bmatrix} 2 & 5 \\ -1 & 3 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, which statement is true?

- (A) $AA^{-1} = AI$ (B) $AA^{-1} = I$ (C) $A^{-1}I = A$ (D) $AI = A^{-1}$

23. Dennis shoots a marble from a sling shot. The marble takes a parabolic path modeled by the equation $h = -4t^2 + 10t + 1$, where h is the height, in metres, t seconds after the marble is shot. How high, in metres, is the marble at 2 seconds?

(A) 3 (B) 5 (C) 13 (D) 29

24. Which matrix has a determinant of zero?

(A) $\begin{bmatrix} -2 & -5 \\ -2 & -5 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & -5 \\ 2 & 5 \end{bmatrix}$ (C) $\begin{bmatrix} 2 & 5 \\ -2 & 5 \end{bmatrix}$ (D) $\begin{bmatrix} 2 & 5 \\ 2 & -5 \end{bmatrix}$

25. Which of the following system of equations has $(-1, 1)$ as a solution?

A) $\begin{cases} 5x + 6y = 1 \\ 6x + 2y = -3 \end{cases}$ B) $\begin{cases} 3x + 4y = 1 \\ 5x - 3y = -8 \end{cases}$ C) $\begin{cases} 3x - 4y = -6 \\ 3x + 3y = 1 \end{cases}$ D) $\begin{cases} 7x - 3y = 10 \\ 6x + 5y = -1 \end{cases}$

26. Which of the following ordered triples lie on the plane defined by the equation

$$4x - z = 8 + y ?$$

A) $-1, 3, 5$ B) $3, -1, -5$ C) $3, -1, 5$ D) $3, 4, -1$

27. Which system of equations is represented by the matrix multiplication

$$\begin{bmatrix} 2 & -5 \\ 6 & -3 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \end{bmatrix} ?$$

A) $\begin{cases} 2x + 6y = 3 \\ -5x - 3y = 4 \end{cases}$ B) $\begin{cases} 2x - 3y = 3 \\ 6x - 5y = 4 \end{cases}$ C) $\begin{cases} -5x + 2y = 3 \\ -3x + 6y = 4 \end{cases}$ D) $\begin{cases} 2x - 5y = 3 \\ 6x - 3y = 4 \end{cases}$

28. What is the solution for $\begin{cases} 2x + 5y = -4 \\ 3x + 2y = 5 \end{cases}$?

A) $-\frac{9}{2}, 1$ B) $-2, 3$ C) $1, 1$ D) $3, -2$

29. The Physical Education Committee held a car wash to raise money. They washed cars for \$5 each and trucks for \$7 each. They washed 105 vehicles and earned \$595. If c represents the number of cars washed and t represents the number of trucks washed, which system of equation models this situation?

A) $\begin{cases} c + t = 105 \\ c + t = 595 \end{cases}$ B) $\begin{cases} 5c + 7t = 105 \\ c + t = 595 \end{cases}$ C) $\begin{cases} c + t = 105 \\ 5c + 7t = 595 \end{cases}$ D) $\begin{cases} c + t = 105 \\ 7c + 5t = 595 \end{cases}$

30. What is the solution for the system of equations below ?

$$-2y + z = 13$$

$$2x = 12$$

$$3x + y = 13$$

- A) 3, -5, 6 B) -3, -5, 6 C) 6, -5, -3 D) 6, -5, 3

31. Which of the following matrices has a determinant equal to 6 ?

A) $\begin{bmatrix} -3 & -5 \\ -3 & -3 \end{bmatrix}$

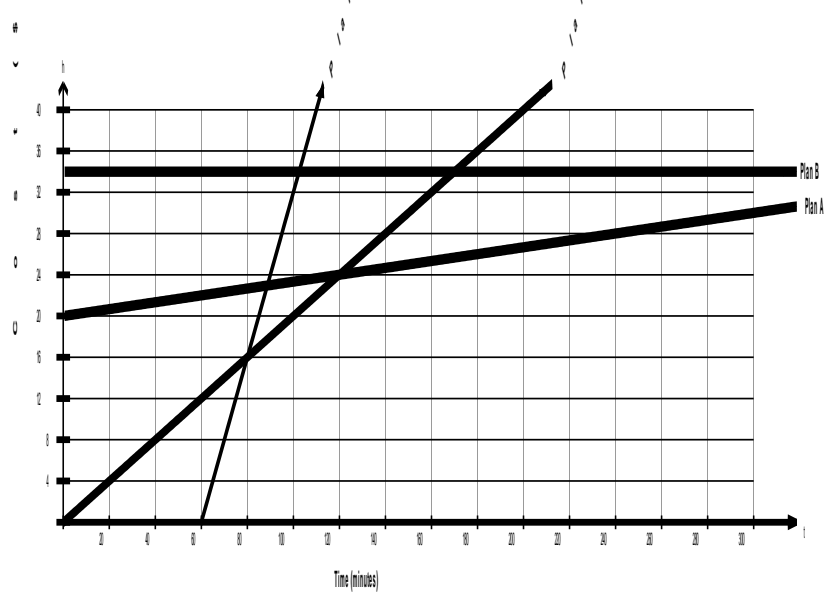
B) $\begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$

C) $\begin{bmatrix} -2 & -4 \\ 3 & 3 \end{bmatrix}$

D) $\begin{bmatrix} -2 & -4 \\ -3 & 3 \end{bmatrix}$

32. Four phone plans are graphed below. Which plan would you use if you called between 80 -120 minutes ?

- A) Plan A
B) Plan B
C) Plan C
D) Plan D



33. What is the coefficient matrix for the system of equations below?

$$2x - 3y + 4z = 7$$

$$3x + y = 4$$

$$3y - 5z = 8$$

A) $\begin{bmatrix} 2 & -3 & 4 \\ 3 & 1 & 4 \\ 3 & -5 & 8 \end{bmatrix}$

B) $\begin{bmatrix} 2 & 3 & 3 \\ -3 & 1 & -5 \\ 7 & 4 & 8 \end{bmatrix}$

C) $\begin{bmatrix} 2 & -3 & 4 \\ 3 & 1 & 0 \\ 3 & -5 & 0 \end{bmatrix}$

D) $\begin{bmatrix} 2 & -3 & 4 \\ 3 & 1 & 0 \\ 0 & 3 & -5 \end{bmatrix}$

34. Given the system of equations below, which of the following is equivalent to

$$3A + (-2B) ?$$

Equation A: $2x - 3y = 4$

Equation B: $x + 2y = -2$

- A) $3x - y = 16$ B) $4x - y = 2$ C) $4x - 13y = 2$ D) $4x - 13y = 16$

20. George is on top of a building and throws a ball which takes a parabolic path defined by the equation $h = -2.5t^2 + 8.5t + c$ where t is time, in seconds, and h is the height, in metres, of the ball above the ground. If the ball lands after 4 seconds, what is the value of c ?

- A) -6 B) 0 C) 4 D) 6

21. Which of the following matrices has an inverse?

A) $\begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$

B) $\begin{bmatrix} 4 & -4 \\ -3 & 3 \end{bmatrix}$

C) $\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$

D) $\begin{bmatrix} 2 & 0 & 3 \\ -1 & 2 & 4 \end{bmatrix}$

PART II:

1. Solve the following system of equations using either substitution or elimination:

$$-3x + 5y + z = -20$$

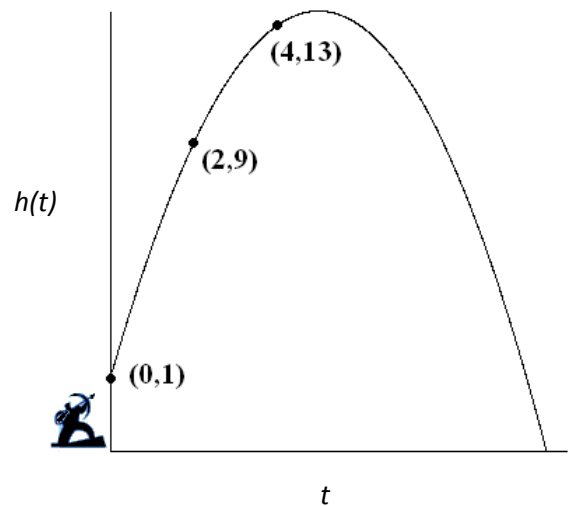
$$2x - 2y + 3z = 18$$

$$4x + 2y + 3z = 18$$

2. The student council is having a dance as a fundraiser. They are selling two kinds of tickets: singles and couples. On the first day, 39 singles tickets and 24 couples tickets are sold for a total of \$268.50. On the second day, 13 singles tickets and 18 couples tickets are sold for a total of \$144.50. Create a system of equations to represent this information and, using matrices, find the cost for each type of ticket.

3. An arrow is fired into the air from a height of 1 metre. After 2 seconds, the arrow is 9 metres in the air. After 4 seconds, the arrow is 13 metres in the air. Set up and solve a system of equations to determine the quadratic relation, of the form $h(t) = at^2 + bt + c$, that models this situation.

Use this relation to determine the height, $h(t)$, of the arrow at $t=10$ seconds.



4. Solve the following system of equations using either substitution or elimination:

$$x + y + 2z = 0$$

$$3x + 2y - z = 13$$

$$x - 2y + z = -1$$

5. Barry's Bakery sells cookies and muffins. One customer orders 5 muffins and 8 cookies, and is charged \$17.50. Another customer orders 3 muffins and 5 cookies, and is charged \$10.75. Create a system of equations to represent this information and, using matrices, find the price of each item.

6. Amy kicked a soccer ball. After the ball travelled a distance of 8 metres, it was at a height of 3.2 metres. When the ball hit the ground, it was 40 metres away from Amy. Set up and solve a system of equations to determine the quadratic function that models the path of the soccer ball.

