MTHH039058: Unit 4 Evaluation

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Evaluation ID: 4
Evaluation Name: Unit 4 Evaluation

Unit 4 Evaluation

Your graphing calculator may be used on this evaluation. You may also use scratch paper to work out the solutions. Select the response that best completes the statement or answers the question.

1. Which element in the matrix $A = \begin{bmatrix} 5 & -2 & -\frac{1}{2} & 0 \end{bmatrix}$ is the number zero?

- a. a_{40}
- b. a_4
- c. a_{14}
- d. a_{41}

2. In which matrix is the value of a_{32} less than the value of a_{21}?

- a. $\begin{bmatrix} -1 & 0 & 5 \\ 4 & 3 & -1 \\ -3 & 2 & 6 \end{bmatrix}$
- b. $\begin{bmatrix} -1 & 5 & 0 \\ 3 & 4 & -1 \\ -3 & 6 & 2 \end{bmatrix}$
- c. $\begin{bmatrix} 0 & 5 & -1 \\ -1 & 4 & 3 \\ 6 & 2 & -3 \end{bmatrix}$

d. $\begin{bmatrix} 0 & -1 & 5 \\ 0 & 3 & 4 \\ -3 & 1 & 6 \end{bmatrix}$

3. You can put the pentathalon scores below into three matrices, one for each athlete. If you add the matrices, what does the sum matrix show?

Event	James Gregory	Velizar Iliev	Chad Senior
Shooting	1132	1072	1072
Fencing	760	910	610
Swimming	1173	1177	1285
Riding	1100	1100	1070
Running	1114	1118	1174

a. the total team score
b. the team score for each event
c. each athlete's total score
d. each athlete's score for each event

Use matrices $A = \begin{bmatrix} 5 & 7 & 3 \\ -1 & 0 & -4 \end{bmatrix}$ and $C = \begin{bmatrix} -7 & 4 & 2 \\ 1 & -2 & -3 \end{bmatrix}$ **to answer questions 4 and 5.**

4. What is the sum $A + C$?

a. The matrices cannot be added.
b. $\begin{bmatrix} -2 & 11 & 5 \\ 0 & -2 & -7 \end{bmatrix}$
c. $\begin{bmatrix} 12 & 3 & 1 \\ -2 & 2 & -1 \end{bmatrix}$
d. $\begin{bmatrix} -35 & 28 & 6 \\ -1 & 0 & 12 \end{bmatrix}$

5. What is matrix Y if $Y - A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$?

a. $\begin{bmatrix} 4 & 7 & 2 \\ -1 & -1 & -5 \end{bmatrix}$
b. $\begin{bmatrix} 6 & 7 & 4 \\ -1 & 1 & -4 \end{bmatrix}$
c. $\begin{bmatrix} -6 & 4 & 3 \\ 1 & -1 & -3 \end{bmatrix}$

d. $\begin{bmatrix} -4 & -7 & -2 \\ 1 & 1 & 5 \end{bmatrix}$

6. Columns in matrix $A = \begin{bmatrix} 3 & 8 \\ 0 & 12 \end{bmatrix}$ show, respectively, the numbers of erasers and pencils sold. The rows show, respectively, the numbers sold on Monday and Tuesday. Matrix $B = \begin{bmatrix} 0.50 \\ 0.25 \end{bmatrix}$ shows the 50 cent cost of one eraser and the quarter cost of one pencil. What does the product *AB* show?

a. the total paid for erasers on Monday and Tuesday and the total paid for pencils on Monday and Tuesday
b. the total paid for erasers and pencils on Monday and the total paid for erasers and pencils on Tuesday
c. the total amount paid for pencils and erasers on Monday
d. the cost of 1 pencil and 1 eraser

7. Which product is **not** defined?

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

8. Given $P = \begin{bmatrix} 4 & 3 & -2 \\ -1 & 0 & 5 \end{bmatrix}$ and $Q = \begin{bmatrix} 3 & -2 & -5 \\ -1 & -2 & -1 \end{bmatrix}$, what is $2P - 3Q$?

a. $\begin{bmatrix} 1 & -5 & 3 \\ 0 & -2 & 6 \end{bmatrix}$
b. $\begin{bmatrix} 17 & 0 & 19 \\ -5 & 6 & 7 \end{bmatrix}$
c. $\begin{bmatrix} -1 & 12 & 11 \\ 1 & 6 & 13 \end{bmatrix}$
d. $\begin{bmatrix} 1 & 5 & 3 \\ 0 & 2 & 6 \end{bmatrix}$

9. What is true about $\begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}\begin{bmatrix} 1 & -2 & 4 \\ 1 & -1 & 2 \end{bmatrix}$ and $-3\begin{bmatrix} 1 & -2 & 4 \\ 1 & -1 & 2 \end{bmatrix}$?

- a. They are equal matrices.
- b. They are opposite matrices.
- c. Both are matrices for reflection.
- d. Neither product exists.

10. What are the coordinates of *X*(5, 1), *Y*(–5, –3), and *Z*(–1, 3) reflected in the line *y* = *x*?

- a. $X'(-5,-1), Y'(5,3), Z'(1,-3)$
- b. $X'(1,5),\ Y'(-3,-5),\ Z'(3,-1)$
- c. $X'(-1,-5), Y'(3,5),\ Z'(-3,1)$
- d. $X'(5,1), Y'(-5,-3), Z'(-1,3)$

11. Reflection in which line takes the figure with vertices *A*(0, 0), *B*(–2, 4), *C*(–4, 2), and *D*(–3, 0) to *A'*0, 0), *B'*–2, –4), *C'*(–4, –2), and *D'*(–3, 0)?'

- a. *x*-axis
- b. *y*-axis
- c. *y* = *x*
- d. *y* = –*x*

12. What is the determinant of $\begin{bmatrix} -2 & -3 \\ 5 & 0 \end{bmatrix}$?

- a. 5
- b. 10
- c. 15
- d. 0

13. What is the determinant of $\begin{bmatrix} \frac{3}{5} & \frac{1}{5} \\ \frac{1}{8} & \frac{1}{3} \end{bmatrix}$?

- a. $\frac{1}{10}$
- b. $\frac{3}{40}$
- c. $\frac{3}{8}$

d. $\frac{7}{40}$

14. If $A=\begin{bmatrix}4 & 2\\ -3 & -1\end{bmatrix}$, and the inverse of A is $x\begin{bmatrix}-1 & -2\\ 3 & 4\end{bmatrix}$, what is the value of x?

a. $\frac{1}{2}$
b. $\frac{1}{10}$
c. $\frac{2}{3}$
d. $\frac{1}{4}$

15. If $B=\begin{bmatrix}4 & 1\\ 2 & 0\end{bmatrix}$, what is $\det B^{-1}$?

a. 8
b. $-\frac{1}{2}$
c. $\frac{1}{2}$
d. 2

16. If Matrix A has an inverse, which of the following must be true?

a. $AA^{-1}=I$ only
b. $A^{-1}A=I$ only
c. $AA^{-1}=I$ and $A^{-1}A=I$ only
d. $AA^{-1}=I$, $A^{-1}A=I$, and $A^{-1}I=A$

17. What is the determinant of $\begin{bmatrix}5 & 0 & 0\\ 0 & 5 & 0\\ 0 & 0 & 5\end{bmatrix}$?

a. 5
b. 25
c. 125
d. 155

18. Which matrix has no inverse?

a. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

c. $\begin{bmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$

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

19. Which matrix equation represents the system $\begin{cases} x - 3y = -3 \\ -5x + y = 14 \end{cases}$?

a. $\begin{bmatrix} x \\ y \end{bmatrix}\begin{bmatrix} 1 & -3 \\ -5 & 1 \end{bmatrix} = \begin{bmatrix} -3 \\ 14 \end{bmatrix}$

b. $\begin{bmatrix} 1 & -3 \\ -5 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -3 \\ 14 \end{bmatrix}$

c. $\begin{bmatrix} 1 & -3 \\ -5 & 1 \end{bmatrix}\begin{bmatrix} -3 \\ 14 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

d. $\begin{bmatrix} -3 \\ 14 \end{bmatrix}\begin{bmatrix} x & y \end{bmatrix} = \begin{bmatrix} 1 & -3 \\ -5 & 1 \end{bmatrix}$

20. What is the solution to the matrix equation: $\begin{bmatrix} 3 & -1 \\ -1 & 2 \end{bmatrix}\begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 7 \\ -9 \end{bmatrix}$?

a. $a = 7, b = -9$

b. $a = 2, b = 1$

c. $a = \frac{7}{3}, b = -\frac{9}{2}$

d. $a = 1, b = -4$

Use this system to answer questions 21 – 23: $\begin{cases} 2x - 3y + z = 6 \\ x + 2y - 4z = 5 \\ -3x - 2y + 3z = -5 \end{cases}$.

21. Which matrix is the coefficient matrix for the system?

a. $\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 4 \\ 3 & 2 & 3 \end{bmatrix}$

b. $\begin{bmatrix} 2 & -3 & 1 & 6 \\ 1 & 2 & -4 & 5 \\ -3 & -2 & 3 & -5 \end{bmatrix}$

c. $\begin{bmatrix} 2 & -3 & 1 \\ 1 & 2 & -4 \\ -3 & -2 & 3 \end{bmatrix}$

d. $\begin{bmatrix} 6 \\ 5 \\ -5 \end{bmatrix}$

22. Which matrix is the constant matrix for the system?

a. $\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 4 \\ 3 & 2 & 3 \end{bmatrix}$

b. $\begin{bmatrix} 2 & -3 & 1 & 6 \\ 1 & 2 & -4 & 5 \\ -3 & -2 & 3 & -5 \end{bmatrix}$

c. $\begin{bmatrix} 2 & -3 & 1 \\ 1 & 2 & -4 \\ -3 & -2 & 3 \end{bmatrix}$

d. $\begin{bmatrix} 6 \\ 5 \\ -5 \end{bmatrix}$

23. What is the determinant of the coefficient matrix?

a. –150
b. –27
c. 6
d. 29

24. Suppose you had $5000 which you invested in three different funds for a period of one year. The funds paid simple interests of 8%, 10%, and 7%, respectively. The total interest at the end of one year was $405. If you invested $500 more in the fund at 10% than the one at 8%, how much did you invest in the 10% fund?

- a. $150
- b. $1000
- c. $1500
- d. $2500

Use this system to answer questions 25-26: $\begin{cases} 5x-4y=-13 \\ -3x+6y=6 \end{cases}$.

25. Which is the determinant D_x?

- a. $\begin{vmatrix} 5 & -4 \\ -3 & 6 \end{vmatrix}$
- b. $\begin{vmatrix} -13 & -4 \\ 6 & 6 \end{vmatrix}$
- c. $\begin{vmatrix} 5 & -13 \\ -3 & 6 \end{vmatrix}$
- d. $\begin{vmatrix} 5 & 4 & -13 \\ -3 & 6 & 6 \end{vmatrix}$

26. What is the solution of the system?

- a. (–13, 6)
- b. $\left(-\frac{13}{5}, 1\right)$
- c. $\left(-3, -\frac{1}{2}\right)$
- d. $2x + 2y = -7$

Use this system to answer questions 27-28: $\begin{cases} 2x + y - 3z = 2 \\ 4x - 3y + 6z = 9 \\ -2x - 2y + 9z = 7 \end{cases}$

27. What is the value of the determinant D_y?

- a. –24
- b. –80
- c. –18
- d. –156

28. What is the value of the determinant D_z?

- a. –36
- b. –80
- c. –18
- d. –78

29. What is the sum of $\begin{bmatrix} 3 & 7 & -2 \\ 0 & 10 & 5 \end{bmatrix} + \begin{bmatrix} 6 & -8 & 1 \\ 9 & -4 & 11 \end{bmatrix}$?

- a. $\begin{bmatrix} 9 & -1 & -1 \\ 9 & 6 & 16 \end{bmatrix}$
- b. $\begin{bmatrix} 9 & 15 & -1 \\ 9 & 6 & 16 \end{bmatrix}$
- c. $\begin{bmatrix} 9 & 15 & -3 \\ 9 & 6 & 16 \end{bmatrix}$
- d. $\begin{bmatrix} -3 & 1 & -3 \\ -9 & 14 & -6 \end{bmatrix}$

30. Which equation has the solution $\begin{bmatrix} 1 & -2 & 0 \\ -5 & 4 & 7 \end{bmatrix}$?

- a. $\begin{bmatrix} 7 & -2 & -3 \\ 0 & 1 & 8 \end{bmatrix} - X = \begin{bmatrix} 8 & -4 & -3 \\ -5 & 5 & 15 \end{bmatrix}$
- b. $\begin{bmatrix} 10 & -8 & 12 \\ 4 & 0 & 5 \end{bmatrix} - \begin{bmatrix} -9 & -6 & 12 \\ -1 & -4 & -2 \end{bmatrix} = X$
- c. $\begin{bmatrix} 0 & 6 & 5 \\ 2 & -1 & -9 \end{bmatrix} + X = \begin{bmatrix} 1 & 4 & 5 \\ -3 & 3 & -2 \end{bmatrix}$
- d. $X - \begin{bmatrix} 3 & 7 & 4 \\ 8 & -6 & 1 \end{bmatrix} = \begin{bmatrix} 2 & -5 & 4 \\ -3 & 2 & 6 \end{bmatrix}$

Choose the correct vocabulary term to complete each sentence.

a. zero matrix
b. equal matrices
c. determinants
d. transformations
e. matrix

31. A _____ is a rectangular array of numbers.

32. Translations, dilations, reflections, and rotations are all _____.

33. Cramer's Rule uses _____ to solve a system of equations.

34. If corresponding elements of matrices are

equal, the matrices are _____.

☐ 35. The additive identity of a matrix is the _____.

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a. matrix equation
b. preimage
c. square matrix
d. multiplication identity matrix
e. scalar multiplication

☐ 36. A _____consists of a coefficient, variable, and constant matrices.

☐ 37. An *n* x *n* matrix is called a _____.

☐ 38. The image of a figure is a transformation of the _____.

☐ 39. The product of a real number and a matrix is called a _____.

☐ 40. A matrix is the inverse of another matrix if their product is the _____.

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