PreCalculus　　　　　　　　　　　　　　　　　　　　Name _____
Review for Midterm Exam
Matrices

Given the following matrices, simplify the expressions, using fractions instead of decimals.

$$A = \begin{bmatrix} -3 & 2 \\ 0 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 2 & -3 \\ 4 & -1 \end{bmatrix} \quad C = \begin{bmatrix} 6 & -4 \\ 3 & -2 \end{bmatrix} \quad D = \begin{bmatrix} -1 & 4 & 0 \\ 3 & -5 & 2 \\ -4 & 3 & -2 \end{bmatrix} \quad E = \begin{bmatrix} 1 & 6 & -3 \\ 2 & -4 & -1 \end{bmatrix}$$

1. $3(A - C)$

2. $|D|$

3. $-\frac{1}{2}(ED)$

4. C^{-1}

5. B^2

6. $|B|$

7. $2A - 3B + C$

8. Evaluate by expansion by minors.

$$\begin{vmatrix} 3 & 4 & -1 \\ -2 & 3 & 0 \\ 1 & 2 & 0 \end{vmatrix}$$

9. Solve.

$$\begin{vmatrix} 5 & 7x \\ -x & -6 \end{vmatrix} = -2$$

10. Solve for x and y. $2\begin{bmatrix} x+2 \\ y-3 \end{bmatrix} + \begin{bmatrix} 5 \\ -4 \end{bmatrix} = \begin{bmatrix} 7 \\ 1 \end{bmatrix}$

11. Solve using a matrix equation.　　　　　　　　12. Solve for x and y.

$$2x + 4y = -5$$
$$3x - 7y = 4$$

$$\begin{bmatrix} x & -7 \\ 3 & y \end{bmatrix}\begin{bmatrix} 2 \\ 5 \end{bmatrix} = \begin{bmatrix} 10 \\ 1 \end{bmatrix}$$

13. Multiply: $\begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}\begin{bmatrix} 1 & 6 \\ 2 & -1 \end{bmatrix}$

14. Multiply: $\begin{bmatrix} 1 & 5 & -4 \\ 6 & 0 & -1 \end{bmatrix}\begin{bmatrix} 2 & -1 \\ 3 & -3 \\ 1 & 1 \end{bmatrix}$

15. Find the inverse of

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

b) $\begin{bmatrix} 2 & 4 \\ -6 & -12 \end{bmatrix}$

16. You can only find the inverse of a _____ matrix.

17. If $A_{2x3} \cdot B_{3x1} = C$ find the dimensions of C. _____

Word Problems. (a) define the variables (b) write the system of equations
(c) write the matrix representation of the system (d) write your answer in a complete sentence.

18. The perimeter of a rectangular picture is 86 inches. Twice the width exceeds the length by 2 inches. What are the dimensions of the picture?

19. Mrs. Mardis buys 2 granola bars and 3 coffee's for $21.83. Mrs. Doyle buys 5 granola bars and 1 coffee for $15.90. How much does one granola bar and one coffee cost?

20. Your team goes to eat at a restaurant. There are 26 people eating dinner. Some team members order the buffet for $12.99 and some order the grilled steak meal for $15.95. Coach got the bill. It was $364.38. How many people ordered the buffet?

21. Ramona spent $17.00 on two different types of lollipops for Spring Fling prizes. Some cost $0.50 and some cost $0.35. If she bought a total of 40 lollipops, how many of each kind did she buy?

22. Flourish and Blotts store sells books. Some cost $6.00 and some cost $7.00. On Wednesday, Flourish and Blotts sold 27 books for $177.00. How many of each did they sell?

23. At a spring concert, tickets for adults cost $4.00 and tickets for students cost $2.50. How many of each kind of ticket were purchased if 125 tickets were bought for $413.

Answers

1. $\begin{bmatrix} -27 & 18 \\ -9 & 21 \end{bmatrix}$

2. -12

3. $\begin{bmatrix} \dfrac{-29}{2} & \dfrac{35}{2} & -9 \\ 5 & \dfrac{-25}{2} & 3 \end{bmatrix}$

4. Not possible

5. $\begin{bmatrix} -8 & -3 \\ 4 & -11 \end{bmatrix}$

6. 10

7. $\begin{bmatrix} -6 & 9 \\ -9 & 11 \end{bmatrix}$

8. 7

9. $x = \pm 2$

10. $x = -1; y = \dfrac{11}{2}$

11. $\left(\dfrac{-19}{26}, \dfrac{-23}{26} \right)$

12. $x = \dfrac{45}{2}; y = -1$

13. $\begin{bmatrix} 1 & 19 \\ 4 & -2 \end{bmatrix}$

14. $\begin{bmatrix} 13 & -20 \\ 11 & -7 \end{bmatrix}$

15. a) $\begin{bmatrix} -\dfrac{1}{5} & \dfrac{2}{5} \\ -\dfrac{2}{5} & \dfrac{3}{10} \end{bmatrix}$ b) Not possible

16. Square

17. 2 x 1

18. a) L = length, W = width

b) $2L + 2W = 86$
$-L + 2W = 2$

c) $\begin{bmatrix} 2 & 2 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} L \\ W \end{bmatrix} = \begin{bmatrix} 86 \\ 2 \end{bmatrix}$

d) The length of the picture is 28 inches and the width is 15 inches.

19. a) g = granola, c = coffee

b) $2g + 3c = 21.83$
$5g + c = 15.90$

c) $\begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix} \begin{bmatrix} g \\ c \end{bmatrix} = \begin{bmatrix} 21.83 \\ 15.9 \end{bmatrix}$

d) The granola costs $1.99 and the coffee costs $5.95.

20. a) b= buffet, g = grilled steak

b) $12.99b + 15.95g = 364.38$
$b + g = 26$

c)

$\begin{bmatrix} 12.99 & 15.95 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} b \\ g \end{bmatrix} = \begin{bmatrix} 364.38 \\ 26 \end{bmatrix}$

d) 17 people ordered the buffet.

21. a) x = lollipop 1, y = lollipop 2

b) $.5x + .35y = 17$
$x + y = 40$

c) $\begin{bmatrix} .5 & .35 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 17 \\ 40 \end{bmatrix}$

d) She bought 20 of each kind.

22. a) x = $6 dollar book, y = $7 book

b) $6x + 7y = 177$
$x + y = 27$

c) $\begin{bmatrix} 6 & 7 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 177 \\ 27 \end{bmatrix}$

d) They sold 12 of the $6 books and 15 of the $17 books

23. a) a = adults, s = students

b) $4a + 2.5s = 413$
$a + s = 125$

c) $\begin{bmatrix} 4 & 2.5 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} a \\ s \end{bmatrix} = \begin{bmatrix} 413 \\ 125 \end{bmatrix}$

d) 67 adults and 58 student tickets were purchased.