Chapter 6: Matrices

Topics: Addition and scalar multiplication, matrix multiplication, word problems, find determinant, verify and find inverse matrices, solve a system using matrices and inverses

$$A = \begin{bmatrix} 4 & 1 & -3 \\ 0 & 2 & 8 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 1 \\ 0 & 1 \\ 3 & -2 \end{bmatrix} \quad C = \begin{bmatrix} -1 & 9 & -6 \\ 7 & 5 & 0 \end{bmatrix} \quad D = \begin{bmatrix} 7 & 2 \\ -4 & -1 \end{bmatrix} \quad E = \begin{bmatrix} 0 & -2 \\ 1 & 3 \end{bmatrix}$$

Use the matrices above to solve #1-6 by hand and then check your answers on a graphing calculator.

1. A+C
2. A+D
3. 3E+D
4. AB
5. AD
6. DA

7. Solve for the variable x and y.
$$\begin{bmatrix} 2 & x \\ y & -1 \end{bmatrix} \begin{bmatrix} 5 \\ 3 \end{bmatrix} = \begin{bmatrix} 19 \\ 17 \end{bmatrix}$$

8. Solve for the variable a and b.
$$\begin{bmatrix} 4 & 5 \\ -1 & a \end{bmatrix} \begin{bmatrix} -2 & 3 \\ b & 4 \end{bmatrix} = \begin{bmatrix} 12 & 32 \\ 26 & 21 \end{bmatrix}$$

9. Find the determinant and inverse by hand (if it exists):

a) $$M = \begin{bmatrix} 3 & -4 \\ 2 & -5 \end{bmatrix}$$

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

10. Find the determinant and inverse of matrix R using a graphing calculator: $$R = \begin{bmatrix} -3 & 1 & 5 \\ 2 & 4 & 7 \\ -1 & 3 & -2 \end{bmatrix}$$

11. Solve the system of equations by hand using matrices. Check your answer with a graphing calculator using matrices.
$$\begin{cases} 2x - 3y = -1 \\ -3x + 5y = 3 \end{cases}$$

12. Solve the system of equations using matrices and a graphing calculator.
$$\begin{cases} 2x - 5y + 3z = 9 \\ 4x + y - 6z = 35 \\ -3x + 9y - 7z = -6 \end{cases}$$

13. For each word problem below, write a system of equations, set up a matrix equation, and then solve using matrices.

a) At a fruit stand, Josh bought 12 apples and 4 bananas for $10.56. Dennis bought 6 apples and 10 bananas for $8.88. Find the cost of one apple and one banana.

b) For a school fund raiser, David is selling cookie dough for $4.05/package, wrapping paper for $3.20/roll and coupon books for $8.50/book. He sold a total of 15 items and turned in $68.15. If he sold 4 more rolls of wrapping paper than coupon books, how many of each item did he sell?

c) An ice cream shop sells single scoop cones for $2.45, double scoop cones for $3.10, and triple scoop cones for $3.75. One day, Hannah sells 29 cones total. She sold 5 times as many single cones as triple cones. If she sold $82.10 of ice cream, how many double scoop cones did she sell?

14. Write a matrix equation and then solve using matrices:
Scores at a skating competition are calculated by the weights below.
If a pair of skaters are awarded the scores at right, find their final score for the competition.

Category	Scores
Lifts	5
Jumps	6
Spins	3
Technique	4

Category	Lifts	Jumps	Spins	Technique
Weight	20%	25%	30%	25%