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.

$$\begin{bmatrix}2 & x\\ y & -1\end{bmatrix}\cdot\begin{bmatrix}5\\ 3\end{bmatrix}=\begin{bmatrix}19\\ 17\end{bmatrix}$$

8. Solve for the variable a and b.

$$\begin{bmatrix}4 & 5\\ -1 & a\end{bmatrix}\cdot\begin{bmatrix}-2 & 3\\ b & 4\end{bmatrix}=\begin{bmatrix}12 & 32\\ 26 & 21\end{bmatrix}$$

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

Category	Scores
Lifts	5
Jumps	6
Spins	3
Technique	4