

## Practice test for the rest of Chapter 6

You will NEED a graphing calculator that does matrices, and you will need to know how to use it.

1. You have received a message that was encoded with the following matrix:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 4 \\ 1 & 1 & 5 \end{pmatrix}. \text{ The message you received is } 73, 85, 86, 62, 77, 84, 96, 123, 149.$$

Decode the message.

Message: \_\_\_\_\_

2. (based on page 358 number 34) Somebody made a model of the Chinese economy with three sectors, Agriculture, Industry and Transportation. They found that the Technology matrix for this model was the following matrix:

$$A = \begin{bmatrix} .158 & .156 & .009 \\ .136 & .432 & .071 \\ .013 & .041 & .011 \end{bmatrix} \quad \text{The Demands matrix was } D = \begin{bmatrix} 106,674 \\ 144,739 \\ 26,725 \end{bmatrix}$$

- a. Find the corresponding gross production matrix.

$$X = \begin{bmatrix} \text{_____} \\ \text{_____} \\ \text{_____} \end{bmatrix}$$

- b. Describe in words what the third entry in your gross production matrix means.

- c. Describe in words what the number 0.41 in row 3 column 2 of the Technology matrix means.

- d. What is the value of the Industrial products necessary to make \$10 worth of Agricultural products?

3. Let  $A = \begin{bmatrix} 1 & 14 & 2 \\ 2 & 8 & 1 \\ 9 & 3 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 2 \\ 5 & 1 \\ -3 & 3 \end{bmatrix}$ ,  $C = \begin{bmatrix} 2 & 0 & 3 \\ 8 & 6 & 0 \end{bmatrix}$ ,  $D = \begin{bmatrix} 51 & 4 \\ 1 & 0 \end{bmatrix}$ ,

$$E = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

a.  $A_{3,2} =$  \_\_\_\_\_

b. Which of these matrices is an identity matrix? \_\_\_\_\_

c.  $AE =$

d.  $E - A =$

4. Using the same matrices as in problem 3, find the dimensions of the following matrices. If the product does not exist, answer "NA"

a.  $AB$  \_\_\_\_\_ f.  $BA$  \_\_\_\_\_

b.  $AC$  \_\_\_\_\_ g.  $CA$  \_\_\_\_\_

c.  $BC$  \_\_\_\_\_ h.  $BE$  \_\_\_\_\_

d.  $AD$  \_\_\_\_\_ i.  $EB$  \_\_\_\_\_

e.  $BD$  \_\_\_\_\_ j.  $DD$  \_\_\_\_\_

5. Use matrices to solve the following linear system:

$$\begin{array}{cccccc} x & +3y & +z & +w & = & 12 \\ 2x & +3y & +z & +w & = & 14 \\ x & -y & -z & +2w & = & 3 \\ 3x & +y & +z & -w & = & 8 \end{array}$$

$x =$  \_\_\_\_\_  $y =$  \_\_\_\_\_  $z =$  \_\_\_\_\_  $w =$  \_\_\_\_\_