Name: _____ Hour: _____ Date: _____ ID: Practice

Chapter 3 Practice Test

NO CALCULATOR 1-4!!!

Solve the linear system.

1. $3x+y=17$
   $-4x-y=-21$

$-x=-4$
$x=4$

$3(4)+y=17$
$12+y=17$
$y=5$
$(4,5)$

2. $y=-4x+4$
   $y=-x-5$

$-4x+4=-x-5$
$9=3x$
$3=x$

$y=-4(3)+4$
$y=-12+4$
$y=-8$
$(3,-8)$

3. Find $A+B$.

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

$$\begin{bmatrix}-3 & 0 & -6\\ 2 & -2 & 0\end{bmatrix}$$

4. $\begin{bmatrix}6 & 9\end{bmatrix}\begin{bmatrix}6 & 7\\ 4 & 3\end{bmatrix}$

$1\times 2 \quad X \quad 2\times 2$

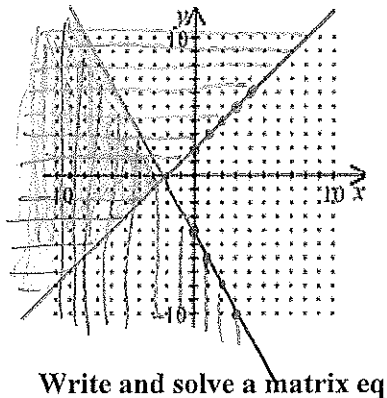
Answer Matrix $= 1\times 2$ $\begin{bmatrix}72 & 69\end{bmatrix}$

$6\cdot 6+9\cdot 4$
$36+36$
72

$6\cdot 7+9\cdot 3$
$42+27$
69

Graph the system of inequalities.

5. $y\le -2x-4$
   $y\ge x+2$



Write and solve a matrix equation to solve the system of equations.

6. $2x+3y-z=1$
   $x+y+z=3$
   $3x-y+z=15$

$$\begin{bmatrix}2 & 3 & -1\\ 1 & 1 & 1\\ 3 & -1 & 1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}1\\ 3\\ 15\end{bmatrix}$$

In Home screen $A^{-1}\cdot B$

$$\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}4\\ -2\\ 1\end{bmatrix} \quad (4,-2,1)$$

7. $x+y+z=13$
   $-2x-y+z=-4$
   $x-2y-z=-18$

$$\begin{bmatrix}1 & 1 & 1\\ -2 & -1 & 1\\ 1 & -2 & -1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}13\\ -4\\ -18\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}1\\ 7\\ 5\end{bmatrix} \quad (1,7,5)$$

Perform the indicated matrix operation, if possible.

8. $5\begin{bmatrix} 2 & 1 & -5 \\ 6 & -3 & 4 \end{bmatrix} = \begin{bmatrix} 10 & 5 & -25 \\ 30 & -15 & 20 \end{bmatrix}$

Find the sum of the matrices.

9. $\begin{bmatrix} -31 & -24 \\ -19 & -11 \end{bmatrix} + \begin{bmatrix} 10 & 19 \\ 39 & 49 \end{bmatrix} = \begin{bmatrix} -21 & -5 \\ 20 & 38 \end{bmatrix}$

10. Given $A = \begin{bmatrix} 0 & 2 & -6 \\ 9 & -1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -6 \\ 0 & -9 \\ -7 & 8 \end{bmatrix}$, find AB.

2×3 $\quad$ 3×2

$\begin{bmatrix} 42 & -66 \\ 9 & -45 \end{bmatrix}$

11. The ordered pair (–6, 2) is a solution of which system?

a. $4x - 3y = 7$
$x + y = -4$

b. $2x - 3y = -18$
$x - y = 8$

c. $10x + 13y = -34$ → $-60+26=-34$
$-15x - 17y = 56$ → $90-34=56$

d. $x + y = 10$
$x - y = -8$

12. Student Government and the cheerleaders at a local school are ordering supplies. The supplies they need are listed below.

	Paint	Paper	Tape
Student Government	12	15	5
Cheerleaders	10	14	7

If a bottle of paint costs \$5, a roll of paper costs \$12, and a roll of tape costs \$2, which of the following shows the use of matrices to find the total cost of supplies for each group? Write a cost matrix, then find the total amount of money needed by each group. Write this answer as a matrix. Be sure to label all your matrices.

Paint Paper Tape $\quad$ \$

S.G. $\begin{bmatrix} 12 & 15 & 5 \\ 10 & 14 & 7 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ 12 \\ 2 \end{bmatrix}$ Paint / Paper / Tape $=$

\$

S.G. \$160 / Cheer \$232

13. Use an inverse matrix to solve the linear system.

$16x + 5y = 211$
$16x + y = 183$

$\begin{bmatrix} 16 & 5 \\ 16 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 211 \\ 183 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 11 \\ 7 \end{bmatrix}$

16. During a season, a football team scored a total of 168 points on touchdowns, extra points, and field goals. A touchdown is worth 6 points, an extra point is worth 1 point, and a field goal is worth 3 points. The team had a total of 48 scoring plays and scored twice as many touchdowns as field goals.

a. Write a system of equations to represent the teams scoring during the season. Use x for the number of touchdowns, y for the number of extra points, and z for the number of field goals.

$$\begin{cases} 6x + 1y + 3z = 168 \\ x + y + z = 48 \\ x + 0y - 2z = 0 \end{cases}$$

$2z = x$

$x + 0y - 2z = 0$

b. Solve the system you wrote in part (a). Could the team have scored an extra point after every touchdown? ***Explain.***

$x = 20$ touchdowns

$y = 18$ extra points

$z = 10$ Field goals.

No – otherwise x and y would be equal

Solve the matrix equation for x and y.

17. $$\begin{bmatrix} 2 & -3 \\ 3 & -4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -8 \\ -9 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$$

18. A company stocks items A, B, and C at each of its two stores. Use matrix multiplication to determine the value of the inventory at each store.

Inventory

	Item A	Item B	Item C
Store 1	10	12	15
Store 2	9	11	8

Value of Each Item($)

Item A	12
Item B	15
Item C	20

Matrix A × Matrix B =

$

Store1 [600

Store2 [433]

19. How many solutions does the following system have?

$2(x + y = 4)$ $\quad -2x + 2y = 8$

$2x + 2y = 8$ $\quad 2x + 2y = 8$

$0 = 0$

a. no solution

b. infinitely many solutions

c. two solutions

d. one solution

Use matrices A and B to evaluate the matrix expression.

$$A=\begin{bmatrix}5 & -3\\ 7 & 2\end{bmatrix} \quad B=\begin{bmatrix}-2 & 7\\ -5 & 1\end{bmatrix}$$

14. a.) $A-4B$

$$\begin{bmatrix}5 & -3\\ 7 & 2\end{bmatrix}-\begin{bmatrix}-8 & 28\\ -20 & 4\end{bmatrix}$$

$$=\begin{bmatrix}13 & -31\\ 27 & -2\end{bmatrix}$$

b.) $-2(A+B)$

$$-2\begin{bmatrix}3 & 4\\ 2 & 3\end{bmatrix}=\begin{bmatrix}-6 & -8\\ -4 & -6\end{bmatrix}$$

c.) $2A+3B$

$$\begin{bmatrix}10 & -6\\ 14 & 4\end{bmatrix}+\begin{bmatrix}-6 & 21\\ -15 & 3\end{bmatrix}$$

$$=\begin{bmatrix}4 & 15\\ -1 & 7\end{bmatrix}$$

15. Tasty Bakery sells three kinds of muffins: apple muffins at 30 cents each, blueberry muffins at 35 cents each, and cherry muffins at 40 cents each. Charles buys some of each kind and chooses three times as many cherry muffins as apple muffins. He spends $4.75 on 13 muffins.

Let a = # apple muffins
b = # bluebery muffins
c = # cherry muffins

a. Write three equations to represent the information given in the problem.

$a+b+c=13$

$.30a+.35b+.40c=4.75$

$3a=c \rightarrow 3a+0b-c=0$

b. Set up and solve a matrix equation to find the number of each type of muffin that Charles bought.

$$\begin{bmatrix}1 & 1 & 1\\ .30 & .35 & .40\\ 3 & 0 & -1\end{bmatrix}\begin{bmatrix}a\\ b\\ c\end{bmatrix}=\begin{bmatrix}13\\ 4.75\\ 0\end{bmatrix}$$

$a=2$

$b=5$

$c=6$

20. The Figure Skating Team is running a brat stand to raise money for costumes. They have $300 to spend on food. Cases of hamburgers cost $30 and cases of brats cost $25. They know they will buy at least three cases of hamburgers and two cases of brats.

a. Write a system of linear inequalities that describes the given information. Use x for the number of cases of hamburgers and y for the number of cases of brats. (You should write three inequalities.)

$30x + 25y \leq 300$

$x \geq 3$

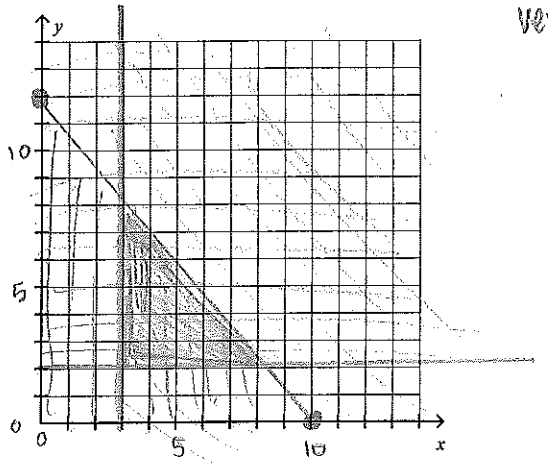
$y \geq 2$

horizontal line at 2

vertical line at 3

x	y
0	12
10	0

b. Graph the system you wrote in part (a).



c. Can the team buy 6 cases of hamburgers and 5 cases of brats? Explain.

$30(6) + 25(5) \leq 300$?

$180 + 125 \leq 300$?

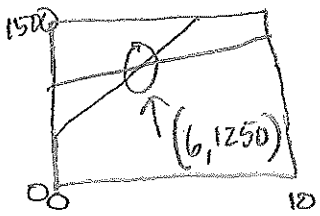
No.

21. The cost of buying a front-loading washing machine is $800 at it uses $75 in electricty per year.
The cost of buying a top-loading washing machine is $500 and it uses $125 in electricty per year.

a. Find when the total costs are equal. Use your graphing calculator. Show your solution using BOTH a graph and a table. Sketch, label, and number your graph. Show at least three table entries.

$Y_1 = 800 + 75x$

$Y_2 = 500 + 125x$



x	Y_1	Y_2
5	1175	1125
6	1250	1250
7	1325	1375

b. When is a top-loading machine cheaper? Explain how you know.

After 6 years — the cost is lower.

22. Tickets to a local movie were sold at $4.00 for adults and $2.50 for students. 410 tickets were sold for a total of $1505.00. Write a system of equations to model this situation. Find the number of adult tickets sold and the number of student tickets sold.

$4x + 2.50y = 1505$

$x + y = 410$

$4x + 250y = 1505$

$-4x - 4y = -1640$

$-1.50y = -135$

$y = 90$

$x + 90 = 410$

$x = 320$

(320, 90)

320 adult tix, 90 student tix