Name: _____ Per: _____ Date: _____

Algebra II 2nd Six Weeks Test Review (Chapters 3 and 4)

Please do all work on separate paper. Reviews are due on test day – no late reviews accepted!
***You may use a graphing calculator ONLY for problems with an asterisk (*)**

Write the dimensions of each matrix. Identify the indicated element.

1. $\begin{bmatrix} 2 & -3 \\ 5 & 1 \\ -7 & 4 \end{bmatrix}; a_{21}$

2. $\begin{bmatrix} 5 & -7 & 23 & 10 \\ -9 & 3 & 5 & -2 \\ 1 & 9 & 0 & 2 \end{bmatrix}; a_{23}$

Find the value of each variable.

3. $\begin{bmatrix} a & 2b \\ c-2 & d+3 \end{bmatrix} = \begin{bmatrix} 5 & -7 \\ 10 & 10 \end{bmatrix}$

4. $\begin{bmatrix} 3 & 5 & -y & x \\ z & 0 & 3a & 6 \end{bmatrix} = \begin{bmatrix} 3 & 3c & 7 & 4 \\ 8 & 0 & -9 & 3b \end{bmatrix}$

Solve each matrix equation.

5. $X - 2\begin{bmatrix} 3 & 4 \\ 4 & 2 \\ 1 & 9 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 12 \\ 3 & 2 \end{bmatrix}$

6. $X + 3\begin{bmatrix} 2 & 2 & 0 \\ 1 & -1 & -1 \end{bmatrix} = \begin{bmatrix} 2 & -2 & 3 \\ -3 & -3 & 4 \end{bmatrix}$

Use matrices A, B, C to find each product, sum or difference if possible, If not write undefined.

$A = \begin{bmatrix} 1 & -1 \\ 3 & -2 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 2 \\ -2 & 1 \\ -1 & 0 \end{bmatrix}$ $C = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

7. CA
8. BA
9. 2A + 4C

State whether each product is possible. If so, state the dimensions of the product, AND find the product.

10. $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}\begin{bmatrix} 1 & 2 & 3 & 4 \end{bmatrix}$

11. $\begin{bmatrix} 1 & 2 \\ 12 & 2 \end{bmatrix}\begin{bmatrix} 3 & 4 \\ 4 & 3 \\ 5 & 2 \end{bmatrix}$

12. $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

Evaluate the determinant of each matrix.

13. $\begin{bmatrix} -3 & 4 \\ 1 & -1 \end{bmatrix}$

14. $\begin{bmatrix} 3 & 9 \\ 3 & 2 \end{bmatrix}$

Find the inverse matrix, if it exists.

15. $A = \begin{bmatrix} 2 & -2 \\ -1 & 2 \end{bmatrix}$

16. $C = \begin{bmatrix} 3 & 4 \\ 3 & 4 \end{bmatrix}$

Solve each equation.

17. $\begin{bmatrix} 1 & 3 \\ 1 & 4 \end{bmatrix} X = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$

18. $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} X = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$

Determine whether the matrices are multiplicative inverses.

19. $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}, \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$

20. $\begin{bmatrix} 4 & 9 \\ 2 & 6 \end{bmatrix}, \begin{bmatrix} 1 & \frac{-3}{2} \\ \frac{-1}{3} & \frac{2}{3} \end{bmatrix}$

Evaluate the determinant of each matrix.

21. $\begin{bmatrix} -1 & 2 & -2 \\ 0 & 1 & 3 \\ 4 & 2 & -1 \end{bmatrix}$

22. $\begin{bmatrix} 2 & 6 & -1 \\ 1 & 0 & 0 \\ 1 & 3 & -2 \end{bmatrix}$

Find the inverse matrix, if it exists.

*23. $\begin{bmatrix} 1 & 2 & 0 \\ -2 & 0 & -3 \\ 3 & -1 & 5 \end{bmatrix}$

*24. $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 0 \\ 0 & 2 & 3 \end{bmatrix}$

Solve each equation for X (use a graphing calculator).

*25. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} X = \begin{bmatrix} 4 \\ -5 \\ 3 \end{bmatrix}$

*26. $\begin{bmatrix} 1 & 2 & 0 \\ -2 & 0 & -3 \\ 3 & -1 & 5 \end{bmatrix} X = \begin{bmatrix} -1 \\ 12 \\ -20 \end{bmatrix}$

Determine whether the matrices are multiplicative inverse of each other.

27. $A = \begin{bmatrix} -2 & 2 & 3 \\ 1 & -1 & 0 \\ 0 & 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} \frac{-4}{3} & \frac{-5}{3} & 1 \\ \frac{-4}{3} & \frac{-8}{3} & 1 \\ 1 & \frac{2}{3} & 0 \end{bmatrix}$

Solve each system using inverse matrices (show your matrix equations!!!).

28. $\begin{cases} x+3y=5 \\ x+4y=6 \end{cases}$

29. $\begin{cases} 2x+y=1 \\ 3x-y=9 \end{cases}$

*30. $\begin{cases} 2x+2y+5z=16 \\ 4x-2y+3z=-2 \\ 8z-5y-2z=4 \end{cases}$

*31. $\begin{cases} x+y+z=-1 \\ 3x+5y+4z=2 \\ 3x+6y+5z=0 \end{cases}$

Solve each system of equations by using: a) Substitution b) Elimination c) Cramer's Rule
If done properly, you should get the same answer all 3 times.

32. $\begin{cases} x+3y=5 \\ x+4y=6 \end{cases}$

33. $\begin{cases} 2x+y=1 \\ 3x-y=9 \end{cases}$

34. Solve by elimination:
$\begin{cases} 4x-3y=-2 \\ 4x+5y=14 \end{cases}$

35. Solve each system of inequalities by graphing:
$\begin{cases} 2x \geq y+3 \\ x < 3-2y \end{cases}$

36. Graph the system of constraints. Find the coordinates of the vertices, and maximize the function $P=3x-5y$.
$\begin{cases} x \geq 0 \\ y \geq 0 \\ x \leq 3 \\ -2x+3y \leq 6 \end{cases}$

*37. Suzie has \$1, \$5 and \$10 bills in her wallet worth \$96. If she had one more \$1, she would have just as many \$1 bills as \$5 and \$10 bills combined. She has 23 bills total. How many of each denomination does she have? *(set up a system of 3 equations/3 variables, and solve using inverse matrices)*

** problems with an asterisk are graphing calculator ALLOWED*

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Solutions to selected questions

1. 3x2 matrix; $a_{21} = 5$
3. a = 5; b = -3.5; c = 12; d = 7
5. $X = \begin{bmatrix} 11 & 15 \\ 17 & 16 \\ 5 & 20 \end{bmatrix}$
7. $CA = \begin{bmatrix} 1 & -1 \\ 3 & -2 \end{bmatrix}$
9. $2A + 4C = \begin{bmatrix} 6 & -2 \\ 6 & 0 \end{bmatrix}$
10. Yes, product will be a 3x4 matrix:
$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \end{bmatrix}$
11. Not defined (2x**2** times a **3**x2)
12. Yes, product will be a 2x2 matrix: $\begin{bmatrix} 4 & 5 \\ 5 & 4 \end{bmatrix}$
13. -1
14. -21
15. Yes, the inverse exists… det A = 2,
$A^{-1} = \begin{bmatrix} 1 & 1 \\ 1/2 & 1 \end{bmatrix}$
16. det C = 0… so no inverse exists.
17. $X = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$
18. $X = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$
19. Product = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, so yes,
they are multiplicative inverses.
21. 39
*23. The multiplicative inverse matrix is
$\begin{bmatrix} 3 & 10 & 6 \\ -1 & -5 & -3 \\ -2 & -7 & -4 \end{bmatrix}$
*26. $X = \begin{bmatrix} -3 \\ 1 \\ -2 \end{bmatrix}$
27. Product = $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 1 & 0 \\ 8/3 & 0 & 1 \end{bmatrix}$,
so they are NOT multiplicative inverses.
28. (2, 1)
29. (2, -3)
*30. (5, 8, -2)
*31. (1, 7, -9)
32. (2, 1)
33. (2, -3)
34. (1, 2)
*37. Setup: x = # of $1 bills, y = # of $5 bills, z = # of $10 bills:

$$\begin{cases} x + 5y + 10z = 96 \\ x + y + z = 23 \\ x + 1 = y + z \quad or \quad x - y - z = -1 \end{cases}$$

Solution:
$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 11 \\ 7 \\ 5 \end{bmatrix}$

** problems with an asterisk are graphing calculator ALLOWED*