# Ch 8 Final Exam Review

Name:________________________

## Non-Calculator

1. Determine the order of the following matrices:

a) $\begin{bmatrix} 2 & 1 & -6 \\ 8 & 9 & 7 \end{bmatrix}$ b) $\begin{bmatrix} 4 & -3 & 7 & -1 \end{bmatrix}$ c) $\begin{bmatrix} -3 \\ 5 \\ 7 \end{bmatrix}$

2. Evaluate: a) $-3\begin{bmatrix} 2 & 6 \\ 1 & -1 \end{bmatrix} - 5\begin{bmatrix} 6 & 2 \\ 4 & -7 \end{bmatrix}$ b) $\frac{1}{2}\begin{bmatrix} 2 & 6 \\ -8 & 4 \end{bmatrix} + 3\begin{bmatrix} -1 & 3 \\ -2 & -3 \end{bmatrix}$

3. Multiply: a) $\begin{bmatrix} 1 & 2 & -3 \\ -1 & 2 & 0 \end{bmatrix}\begin{bmatrix} -2 & -1 \\ 1 & 0 \\ -3 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 6 & 2 & -3 \\ -1 & 7 & 0 \end{bmatrix}\begin{bmatrix} -1 & 2 \\ 4 & 5 \end{bmatrix}$ c) $\begin{bmatrix} -1 & 2 & -3 \end{bmatrix}\begin{bmatrix} 7 \\ -2 \\ -5 \end{bmatrix}$

4. Find the inverse: a) $\begin{bmatrix} -6 & 2 \\ 5 & -2 \end{bmatrix}$ b) $\begin{bmatrix} 6 & 2 \\ -3 & -1 \end{bmatrix}$ c) $\begin{bmatrix} -2 & -1 \\ 5 & 4 \end{bmatrix}$

5. Use the inverse of the coefficient matrix to solve the system of linear equations:

a) $\begin{cases} 6x+5y=13 \\ 5x+4y=10 \end{cases}$ b) $\begin{cases} 7x+5y=23 \\ 3x+2y=10 \end{cases}$

6. Use Cramer's Rule to solve the system of linear equations:

a) $\begin{cases} x+y=7 \\ x-y=3 \end{cases}$ b) $\begin{cases} 12x+3y=15 \\ 2x-3y=13 \end{cases}$

7. Evaluate:

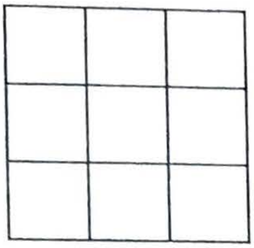
a) $\begin{vmatrix} 7 & 5 \\ -1 & 3 \end{vmatrix}$ b) $\begin{vmatrix} 1 & 2 & 2 \\ -1 & -4 & 1 \\ 1 & 0 & 4 \end{vmatrix}$ c) $\begin{vmatrix} 3 & 2 & 1 \\ -2 & 0 & 2 \\ 4 & -5 & -2 \end{vmatrix}$

8. Use a determinant to find the area of the triangle with the following vertices:

a) (1, -1), (4, 2), and (1, -3) b) (0, -3), (2, -1), and (-5, 2)

c) (-1, -2), (2, -3), and (2, -1) d) (-4, -6), (11, 12), and (1, 0)

9. Using nine pixels in a 3x3 grid and the color levels shown:



| 1 | 2 | 3 | 4 |
|---|---|---|---|
| White | Light Grey | Dark Grey | Black |

a) Write a 3x3 matrix to represent the letter L in Light Grey on a Black background. This is matrix A.

b) Find a matrix, B, that A + B changes the letter L from Light Grey to Black and the background from Black to White

Calculator Problems

10. Use the inverse of the coefficient matrix to solve the system of linear equations:

a) $\begin{cases} 4x-5y-6z=-1 \\ x-2y-5z=-12 \\ 2x-y \qquad\quad =7 \end{cases}$

b) $\begin{cases} w+x+y+z=4 \\ w+3x-2y+2z=7 \\ 2w+2x+y+z=3 \\ w-x+2y+3z=5 \end{cases}$

11. Multiply: a) $\begin{bmatrix} 1 & 1 & 0 \\ 5 & 1 & 6 \\ 2 & -1 & 2 \end{bmatrix}\begin{bmatrix} 2 & 8 & 1 & 2 \\ 7 & 1 & 9 & 1 \\ -1 & -2 & -3 & 7 \end{bmatrix}$

b) $\begin{bmatrix} -1 & 0 & 1 & 2 \\ 3 & 1 & 5 & 4 \\ -1 & 1 & -3 & 7 \end{bmatrix}\begin{bmatrix} 1 & 1 & 0 \\ -1 & 1 & -5 \\ -2 & -1 & -3 \end{bmatrix}$

12. Using A and B to the right, find: $A=\begin{bmatrix} 2 & -4 & -3 \\ -1 & 3 & 0 \end{bmatrix}$ $B=\begin{bmatrix} -3 & 2 & 1 \\ 0 & 3 & 5 \end{bmatrix}$

a) B - 2A

b) 2A – 3B

c) 3A – 2B

d) AB

13. Find the inverse (leave answers as fractions): a) $\begin{bmatrix} 0 & 2 & -1 \\ -2 & -1 & 2 \\ 4 & 0 & 3 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 2 & -1 \\ 3 & -1 & 0 \\ -2 & -1 & 5 \end{bmatrix}$

14. Find the determinant: a) $\begin{bmatrix} 6 & -3 & 2 \\ -5 & -2 & 1 \\ 3 & 1 & 4 \end{bmatrix}$ b) $\begin{bmatrix} 1 & -1 & 0 \\ 2 & -3 & 4 \\ 1 & 4 & 2 \end{bmatrix}$

15. The final grade for a course is determined by 2 different grading systems. The grades for five students are given in matrix A. The grading systems are modeled by matrix B.

a) Compute the matrix AB

$$\begin{array}{c} \\ \text{Student 1} \\ \text{Student 2} \\ \text{Student 3} \\ \text{Student 4} \\ \text{Student 5} \end{array} \begin{array}{c} \begin{array}{cc} \text{Mid-Term} & \text{Final} \end{array} \\ \begin{bmatrix} 65 & 72 \\ 71 & 63 \\ 86 & 82 \\ 73 & 68 \\ 60 & 67 \end{bmatrix} \end{array}$$

Matrix A

$$\begin{array}{c} \\ \text{Mid-Term} \\ \text{Final} \end{array} \begin{array}{c} \begin{array}{cc} \text{Grading System 1} & \text{Grading System 2} \end{array} \\ \begin{bmatrix} .4 & .2 \\ .6 & .8 \end{bmatrix} \end{array}$$

Matrix B

b) What is the final course grade for student 3, using grading system 2?

c) What is the final course grade for student 4, using grading system 1?

16. Use Cramer's Rule to solve for x, y and z : a) $\begin{cases} 3x + y + 4z = -8 \\ 2x + 3y - 2z = 11 \\ x - 3y - 2z = 4 \end{cases}$

Show set-up for each:

b) $\begin{cases} x \qquad + 2z = 4 \\ \qquad 2y - z = 5 \\ 2x + 3y \qquad = 13 \end{cases}$