

# Accel PreCalc: Unit 5

## Test Review

Name Key  
Period \_\_\_\_\_ Date \_\_\_\_\_

Remember, the test will have two parts: one part where you must do all problems by hand (no calculator), and a second part where you may use a calculator. Problems #1-4 are like what you would see on the no calculator part of the test.

Given:

$$A = \begin{bmatrix} 2 & 3 & 4 \\ -1 & 4 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 5 & -2 \\ 1 & -2 & 3 \\ 4 & -5 & 1 \end{bmatrix} \quad C = \begin{bmatrix} -2 & -1 \\ 2 & 0 \\ -3 & 3 \end{bmatrix} \quad D = \begin{bmatrix} 2 & -4 \\ -6 & -11 \end{bmatrix} \quad E = \begin{bmatrix} 4 & -8 \\ -1 & 2 \end{bmatrix}$$

1. **Basic Matrix Operations.** Evaluate each expression, if possible. If impossible, explain why.

a.  $AB + A$   $\begin{bmatrix} 27 & -13 & 13 \\ 0 & -9 & 14 \end{bmatrix}$

b.  $AC - D$   $\begin{bmatrix} -12 & 14 \\ 16 & 12 \end{bmatrix}$

c.  $D^2E$   $\begin{bmatrix} 12 & -24 \\ -13 & 26 \end{bmatrix}$

d.  $CE$   $\begin{bmatrix} -7 & 14 \\ 8 & -16 \\ -15 & 30 \end{bmatrix}$

2. **Determinants.** Find each determinant.

a.  $|B| = 88$

b.  $|E| = 0$



3. **Inverses.** Find each inverse, if possible. If impossible, explain why.

$$a. D^{-1} = \frac{1}{-46} \begin{bmatrix} -11 & 4 \\ 6 & 2 \end{bmatrix} = \begin{bmatrix} \frac{11}{46} & -\frac{4}{46} \\ -\frac{6}{46} & -\frac{2}{46} \end{bmatrix} = \begin{bmatrix} \frac{11}{46} & -\frac{2}{23} \\ -\frac{3}{23} & -\frac{1}{23} \end{bmatrix}$$

$$e. E^{-1} = \text{Does not exist b/c } \det(E) = 0$$

4. **Basic Operations.** Find the value of each unknown.

$$a. 3 \begin{bmatrix} 4 & -2 & 5 \\ 11 & 8 & 1 \end{bmatrix} + x \begin{bmatrix} 2 & 1 & 0 \\ -4 & y & 5 \end{bmatrix} = \begin{bmatrix} 16 & -4 & 15 \\ 25 & 37 & 13 \end{bmatrix}$$

$$12 + 2x = 16$$

$$2x = 4$$

$$\boxed{x = 2}$$

$$24 + 2y = 37$$

$$2y = 13$$

$$\boxed{y = 13/2}$$

$$b. \begin{bmatrix} -2 & 0 & 1 \\ 4 & 2 & 3 \\ 8 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ 3 \end{bmatrix} = \begin{bmatrix} -6 \\ 23 \\ 34 \end{bmatrix}$$

$$-2x + 0y + 3 = -6$$

$$4x + 2y + 9 = 23$$

$$8x + y + 0 = 34$$

$$-2x + 3 = -6$$

$$-2x = -9$$

$$\boxed{x = 9/2}$$

$$8x + y = 34$$

$$8\left(\frac{9}{2}\right) + y = 34$$

$$36 + y = 34$$

$$\boxed{y = -2}$$

5. **Solving Using Inverses.** Solve each system of equations using inverse matrices.

SHOW WORK!

$$a. \begin{cases} 2x + y = 5 \\ 4x + 5y = 1 \end{cases}$$

$$\begin{bmatrix} 2 & 1 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$$

A      X      B

$$X = A^{-1} \cdot B = \begin{bmatrix} 4 \\ -3 \end{bmatrix} \begin{matrix} x \\ y \end{matrix}$$

$$b. \begin{cases} 3x + 10y = -5 \\ x + 6y = 1 \end{cases}$$

$$\begin{bmatrix} 3 & 10 \\ 1 & 6 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -5 \\ 1 \end{bmatrix}$$

A      X      B

$$X = A^{-1} \cdot B = \begin{bmatrix} -5 \\ 1 \end{bmatrix} \begin{matrix} x \\ y \end{matrix}$$



6. Tickets for a concert cost \$24 if purchased in advance, and \$32 if purchased at the door. 465 people attended for a total of \$12,304.

a. Write a system of equations that would help you find the number of people who purchased tickets in advance and the number who purchased tickets at the door.

$$\begin{aligned}D + A &= 465 \\32D + 24A &= 12,304\end{aligned}$$

b. Write your system of equations as a matrix equation.

$$\begin{bmatrix} 1 & 1 \\ 32 & 24 \end{bmatrix} \begin{bmatrix} D \\ A \end{bmatrix} = \begin{bmatrix} 465 \\ 12,304 \end{bmatrix}$$

c. Solve your system of equations using inverse matrices.

$$X = A^{-1} \cdot B = \begin{bmatrix} 143 \\ 322 \end{bmatrix} \begin{matrix} \text{Door} \\ \text{Advanced} \end{matrix}$$

7. Find a value of  $k$  so the determinant of  $\begin{bmatrix} 12 & 1 \\ -3 & k \end{bmatrix}$  is 0. SHOW WORK!

$$(12)(k) - (1)(-3) = 0$$

$$12k + 3 = 0$$

$$12k = -3$$

$$\boxed{k = -1/4}$$



8. Use Cramer's Rule to solve the following. If the system does not have exactly one solution, state how you know.

a.  $3x + 5y = 5$   
 $-2x + 6y = -22$

$$x = 5 \quad y = -2$$

b.  $4x - 6y = 10$   
 $10x - 15y = 25$

No unique solution b/c  $\det A = 0$

c.  $3x + y = 4$   
 $5x + 4y = -5$

$$x = 3 \quad y = -5$$

d.  $3x + 4y - z = 9$   
 $-2x - 3y + 4z = -14$   
 $4x - y = -16$

$$x = -3 \quad y = 4 \quad z = -2$$

e.  $2w + 3x - 4y + z = 9$   
 $6w + 5y - 2z = -21$   
 $4w + 3x - 3y + 5z = 20$   
 $x + y + z = 10$

$$w = -3$$
$$x = 5$$
$$y = 1$$
$$z = 4$$