

Use Scantron 882E to transfer the answers. Be sure you keep your scantron CLEAN and FLAT before its submission.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the value of the determinant.

1) $\begin{vmatrix} 4 & 8 \\ 9 & 3 \end{vmatrix}$ 1) _____
 A) 60 B) 84 C) -60 D) 5

2) $\begin{vmatrix} -6 & -2 \\ 4 & -9 \end{vmatrix}$ 2) _____
 A) 46 B) 48 C) 62 D) -62

3) $\begin{vmatrix} 2 & 1 \\ 1 & 3 \end{vmatrix}$ 3) _____
 A) 5 B) -5 C) 7 D) -1

4) $\begin{vmatrix} 12 & -7 \\ -4 & 3 \end{vmatrix}$ 4) _____
 A) 8 B) 64 C) 4 D) -8

Solve for x.

5) $\begin{vmatrix} 8 & x \\ 2 & 5 \end{vmatrix} = 32$ 5) _____
 A) 4 B) -3 C) -4 D) 3

6) $\begin{vmatrix} 5 & 9 \\ -2 & x \end{vmatrix} = 8$ 6) _____
 A) -4 B) -2 C) -5 D) 2

Solve the system of equations using Cramer's Rule if it is applicable. If Cramer's Rule is not applicable, say so.

7) $\begin{cases} 5x + 2y = -17 \\ 5x + y = -21 \end{cases}$ 7) _____
 A) $x = 4, y = -5; (4, -5)$ B) $x = -5, y = 4; (-5, 4)$
 C) $x = -4, y = -5; (-4, -5)$ D) $x = 5, y = -4; (5, -4)$

8) $\begin{cases} 2x + 2y = 10 \\ -2x + 5y = -3 \end{cases}$ 8) _____
 A) $x = 4, y = 1; (4, 1)$ B) $x = -1, y = 4; (-1, 4)$
 C) $x = 1, y = 4; (1, 4)$ D) $x = -4, y = -1; (-4, -1)$

9) $\begin{cases} 2x + 2y = 24 \\ 2x - 3y = 9 \end{cases}$ 9) _____
 A) $x = -9, y = -3; (-9, -3)$ B) $x = 9, y = 3; (9, 3)$
 C) $x = 3, y = 9; (3, 9)$ D) $x = -3, y = 9; (-3, 9)$

$$10) \begin{cases} 4x - 7y = 5 \\ 2x + 5y = -3 \end{cases}$$

10) _____

A) $x = \frac{23}{3}, y = -\frac{11}{3}; \left(\frac{23}{3}, -\frac{11}{3}\right)$

B) $x = -\frac{2}{17}, y = \frac{11}{17}; \left(-\frac{2}{17}, \frac{11}{17}\right)$

C) $x = \frac{2}{3}, y = \frac{1}{3}; \left(\frac{2}{3}, \frac{1}{3}\right)$

D) $x = \frac{2}{17}, y = -\frac{11}{17}; \left(\frac{2}{17}, -\frac{11}{17}\right)$

Find the value of the determinant.

$$11) \begin{vmatrix} 5 & -1 & 4 \\ -5 & 5 & -1 \\ 4 & 4 & -2 \end{vmatrix}$$

11) _____

A) -176

B) -76

C) -184

D) 176

$$12) \begin{vmatrix} 1 & 2 & 2 \\ 2 & 5 & 1 \\ 2 & 3 & 4 \end{vmatrix}$$

12) _____

A) -3

B) 3

C) 75

D) -11

$$13) \begin{vmatrix} -2 & 5 & 4 \\ 3 & -2 & 1 \\ 1 & 6 & -3 \end{vmatrix}$$

13) _____

A) 130

B) 80

C) -12

D) -90

$$14) \begin{vmatrix} 5 & 0 & 0 \\ 2 & 6 & 5 \\ 7 & 3 & 5 \end{vmatrix}$$

14) _____

A) -75

B) 80

C) 75

D) 225

Solve for x.

$$15) \begin{vmatrix} x & -4 & -1 \\ -2 & 2 & 0 \\ -1 & -2 & 8 \end{vmatrix} = 10$$

15) _____

A) 1

B) 2

C) 5

D) -2

$$16) \begin{vmatrix} 5 & -3 & 1 \\ -2 & -2 & x \\ 8 & 2 & -1 \end{vmatrix} = 28$$

16) _____

A) -1

B) 1

C) 0

D) 2

Solve the problem.

17) The equation of the line passing through the distinct points (x_1, y_1) and (x_2, y_2) is given by

17) _____

$$\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 0. \text{ Find the equation of the line passing through the points } (3, 5) \text{ and } (-1, 4).$$

A) $x + 4y + 17 = 0$

B) $-x + 4y - 17 = 0$

C) $x + 7y + 17 = 0$

D) $x - 4y + 17 = 0$

24)

Let $A = \begin{bmatrix} -1 & 2 \\ 0 & 4 \\ 9 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 2 \\ 17 & 4 \\ 4 & 2 \end{bmatrix}$. Find $A - B$.

A)

$$\begin{bmatrix} 1 & 3 \\ 7 & 8 \\ 13 & 2 \end{bmatrix}$$

B)

$$\begin{bmatrix} 3 & -1 \\ 7 & 0 \\ -5 & 6 \end{bmatrix}$$

C)

$$\begin{bmatrix} 1 & 0 \\ 7 & 0 \\ 5 & -2 \end{bmatrix}$$

D)

$$\begin{bmatrix} -8 & 0 \\ -17 & 0 \\ 5 & -6 \end{bmatrix}$$

24) _____

25)

Let $A = \begin{bmatrix} -4 & 1 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 2 \\ 6 & 3 \end{bmatrix}$. Find $A + B$.

A)

$$\begin{bmatrix} 3 & 4 \\ 4 & 8 \end{bmatrix}$$

B)

$$\begin{bmatrix} 2 & -2 \\ 2 & -1 \end{bmatrix}$$

C)

$$\begin{bmatrix} 2 & 3 \\ 8 & 8 \end{bmatrix}$$

D)

$$[21]$$

25) _____

26)

Let $A = \begin{bmatrix} -1 & 0 \\ 5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 5 \\ 3 & 1 \end{bmatrix}$. Find $A - B$.

A)

$$[-3]$$

B)

$$\begin{bmatrix} 0 & -5 \\ 2 & 0 \end{bmatrix}$$

C)

$$\begin{bmatrix} -2 & 5 \\ 8 & 2 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0 & 5 \\ -2 & 0 \end{bmatrix}$$

26) _____

27)

Let $A = \begin{bmatrix} 3 & -8 & 1 \\ 6 & -10 & -3 \\ 2 & 4 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 8 & 3 \\ 2 & 0 & -4 \\ -3 & 7 & -4 \end{bmatrix}$. Find $A + B$.

A)

$$\begin{bmatrix} 8 & 16 & 4 \\ 8 & -10 & 1 \\ 1 & 11 & 5 \end{bmatrix}$$

B)

$$\begin{bmatrix} 4 & 0 & 4 \\ 4 & -10 & 1 \\ 1 & 11 & 5 \end{bmatrix}$$

C)

$$\begin{bmatrix} 8 & 16 & 4 \\ 4 & -10 & -7 \\ -1 & 11 & 5 \end{bmatrix}$$

D)

$$\begin{bmatrix} 4 & 0 & 4 \\ 8 & -10 & -7 \\ -1 & 11 & 5 \end{bmatrix}$$

27) _____

Use the given matrices to compute the given expression.

28) Let $B = \begin{bmatrix} -1 & 6 & 6 & -3 \end{bmatrix}$. Find $-4B$.

A) $\begin{bmatrix} -3 & 4 & 4 & -5 \end{bmatrix}$

C) $\begin{bmatrix} -4 & 24 & 24 & -12 \end{bmatrix}$

B) $\begin{bmatrix} 4 & 6 & 6 & -3 \end{bmatrix}$

D) $\begin{bmatrix} 4 & -24 & -24 & 12 \end{bmatrix}$

28) _____

29) Let $A = \begin{bmatrix} 2 & 3 \\ 2 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}$. Find $3A + B$.

A)

$$\begin{bmatrix} 6 & 13 \\ 5 & 24 \end{bmatrix}$$

B)

$$\begin{bmatrix} 6 & 21 \\ 3 & 36 \end{bmatrix}$$

C)

$$\begin{bmatrix} 6 & 7 \\ 5 & 12 \end{bmatrix}$$

D)

$$\begin{bmatrix} 6 & 13 \\ 1 & 12 \end{bmatrix}$$

29) _____

30) If $A = \begin{bmatrix} 2 & -1 \\ 7 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & -3 \\ 4 & 7 \end{bmatrix}$, find $-2A + 4B$.

A)

$$\begin{bmatrix} -3 & -6 \\ 3 & 5 \end{bmatrix}$$

B)

$$\begin{bmatrix} 16 & -10 \\ 2 & 10 \end{bmatrix}$$

C)

$$\begin{bmatrix} -24 & -18 \\ -30 & -34 \end{bmatrix}$$

D)

$$\begin{bmatrix} 7 & 4 \\ 11 & 13 \end{bmatrix}$$

30) _____

31) Let $A = \begin{bmatrix} 3 & -8 & -5 \\ -4 & -1 & 5 \\ -1 & -9 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & -7 & -1 \\ 8 & -1 & 8 \\ -3 & -3 & 7 \end{bmatrix}$. Find $2A - 4B$. 31) _____

A) $\begin{bmatrix} -1 & 4 & -4 \\ -15 & -2 & -12 \\ -6 & 13 & 5 \end{bmatrix}$

B) $\begin{bmatrix} 22 & 12 & -6 \\ -40 & 2 & -22 \\ 10 & -6 & -32 \end{bmatrix}$

C) $\begin{bmatrix} -1 & -15 & -6 \\ 4 & -2 & 13 \\ -4 & -12 & 5 \end{bmatrix}$

D) $\begin{bmatrix} 2 & -23 & -11 \\ 0 & -3 & 18 \\ -5 & -21 & 3 \end{bmatrix}$

Compute the product.

32) $\begin{bmatrix} -2 & 3 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} -2 & 0 \\ -1 & 2 \end{bmatrix}$ 32) _____

A) $\begin{bmatrix} 4 & 0 \\ -2 & 4 \end{bmatrix}$

B) $\begin{bmatrix} 1 & 6 \\ -6 & 4 \end{bmatrix}$

C) $\begin{bmatrix} 4 & -6 \\ -2 & 1 \end{bmatrix}$

D) $\begin{bmatrix} 6 & 1 \\ 4 & -6 \end{bmatrix}$

33) $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 0 & 4 \end{bmatrix} \begin{bmatrix} 3 & 0 \\ -1 & 1 \\ 0 & 4 \end{bmatrix}$ 33) _____

A) $\begin{bmatrix} 0 & -1 \\ 9 & 16 \end{bmatrix}$

B) $\begin{bmatrix} 3 & -3 & 0 \\ 0 & 0 & 16 \end{bmatrix}$

C) $\begin{bmatrix} -1 & 0 \\ 16 & 9 \end{bmatrix}$

D) not defined

34) $\begin{bmatrix} 0 & -3 & 1 \\ 5 & -1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 1 & -1 \end{bmatrix}$ 34) _____

A) $\begin{bmatrix} 1 & 5 \\ -4 & 9 \end{bmatrix}$

B) $\begin{bmatrix} 0 & 10 \\ 0 & -1 \\ 0 & 0 \end{bmatrix}$

C) $\begin{bmatrix} 10 & -5 & 1 \\ 5 & -1 & 0 \\ -5 & -2 & 0 \end{bmatrix}$

D) $\begin{bmatrix} 1 & -4 \\ 5 & 9 \end{bmatrix}$

35) $\begin{bmatrix} -4 & -6 & -7 \\ 1 & -2 & 7 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \\ 8 \end{bmatrix}$ 35) _____

A) $[-96 \ 52]$

B) $\begin{bmatrix} -4 & -6 & -7 \\ 1 & -2 & 7 \\ 4 & 4 & 8 \end{bmatrix}$

C) $\begin{bmatrix} -96 \\ 52 \end{bmatrix}$

D) not defined

36) $\begin{bmatrix} -1 & 2 & 7 \\ -3 \end{bmatrix} \begin{bmatrix} 6 \\ 0 \\ -3 \end{bmatrix}$ 36) _____

A) $[-27]$

B) $\begin{bmatrix} -6 \\ 0 \\ -21 \end{bmatrix}$

C) $[36]$

D) $[-6 \ 0 \ -21]$

Perform the indicated operations and simplify.

37) Let $A = \begin{bmatrix} 3 & -4 \\ -2 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 5 & -2 & 8 \\ 1 & 0 & -3 \end{bmatrix}$, and $C = \begin{bmatrix} 7 & -9 & 0 \\ 3 & -5 & 1 \\ -1 & 6 & 2 \end{bmatrix}$. Find $AB + BC$. 37) _____

A) $\begin{bmatrix} 68 & 3 & 31 \\ 8 & -2 & -5 \end{bmatrix}$ B) $\begin{bmatrix} 32 & 7 & 50 \\ 5 & -23 & -37 \end{bmatrix}$ C) $\begin{bmatrix} -10 & -19 & 12 \\ -15 & 31 & -25 \end{bmatrix}$ D) $\begin{bmatrix} 32 & 19 & 40 \\ -15 & 31 & -37 \end{bmatrix}$

Solve the problem.

38) State University has a College of Arts & Sciences, a College of Business, and a College of Engineering. The percentage of students in each category are given by the following matrix. 38) _____

	Freshman	Sophomore	Junior	Senior
Arts & Sciences	60%	50%	40%	70%
Business	20%	40%	30%	10%
Engineering	20%	10%	30%	20%

The student population is distributed by class and age as given in the following matrix.

	Female	Male
Freshman	490	740
Sophomore	550	750
Junior	870	690
Senior	630	480

How many female students are in the College of Business? How many male students are in the College of Arts & Sciences?

- A) 1358 students; 642 students B) 540 students; 703 students
 C) 642 students; 1431 students D) 703 students; 526 students

39) The final grade for an algebra course is determined by grades on the midterm and final exam. The grades for four students and two possible grading systems are modeled by the following matrices. 39) _____

	Midterm	Final
Student 1	73	79
Student 2	44	62
Student 3	75	83
Student 4	98	96

	System 1	System 2
Midterm	0.2	0.5
Final	0.8	0.5

Find the final course score for Student 3 for both grading System 1 and System 2.

- A) System 1: 77.8; System 2: 76 B) System 1: 56.5; System 2: 101.5
 C) System 1: 81.4; System 2: 79 D) System 1: 39.8; System 2: 53

Each matrix is nonsingular. Find the inverse of the matrix. Be sure to check your answer.

40)

$$\begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$$

A) $\begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$

B) $\begin{bmatrix} \frac{1}{2} & 3 \\ 3 & \frac{1}{5} \end{bmatrix}$

C) $\begin{bmatrix} \frac{1}{2} & -3 \\ -3 & \frac{1}{5} \end{bmatrix}$

D) $\begin{bmatrix} 2 & -3 \\ -3 & 5 \end{bmatrix}$

40) _____

41)

$$\begin{bmatrix} 10 & 1 \\ -1 & 0 \end{bmatrix}$$

A) $\begin{bmatrix} 0 & -1 \\ 1 & 10 \end{bmatrix}$

B) $\begin{bmatrix} 0 & 1 \\ -1 & 10 \end{bmatrix}$

C) $\begin{bmatrix} 0 & -1 \\ -1 & 10 \end{bmatrix}$

D) $\begin{bmatrix} 0 & 1 \\ 1 & 10 \end{bmatrix}$

41) _____

42)

$$\begin{bmatrix} -5 & -1 \\ 6 & 0 \end{bmatrix}$$

A) $\begin{bmatrix} 0 & \frac{1}{6} \\ -1 & -\frac{5}{6} \end{bmatrix}$

B) $\begin{bmatrix} 0 & \frac{5}{6} \\ -1 & -\frac{1}{6} \end{bmatrix}$

C) $\begin{bmatrix} 0 & \frac{1}{6} \\ -1 & \frac{5}{6} \end{bmatrix}$

D) $\begin{bmatrix} 0 & -\frac{1}{6} \\ 1 & -\frac{5}{6} \end{bmatrix}$

42) _____

Solve the system using the inverse matrix method.

43)

$$\begin{cases} 3x + 9y = 3 \\ 2x - y = -5 \end{cases}$$

A) $x = -2, y = 1; (-2, 1)$

C) $x = 1, y = -2; (1, -2)$

B) $x = -1, y = 2; (-1, 2)$

D) $x = 2, y = -1; (2, -1)$

43) _____

44)

$$\begin{cases} x + 3y = -8 \\ 21x + 6y = 3 \end{cases}$$

A) $x = 1, y = -3; (1, -3)$

C) $x = -1, y = 3; (-1, 3)$

B) $x = 3, y = -1; (3, -1)$

D) $x = -3, y = 1; (-3, 1)$

44) _____

45)

$$\begin{cases} -3x + 9y = 9 \\ 3x + 2y = 13 \end{cases}$$

A) $x = -3, y = -2; (-3, -2)$

C) $x = 2, y = 3; (2, 3)$

B) $x = 3, y = 2; (3, 2)$

D) $x = -2, y = -3; (-2, -3)$

45) _____

Encode or decode the given message, as requested, numbering the letters of the alphabet 1 through 26 in their usual order.

46) Use the coding matrix $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ to encode the message LIFE.

A) $\begin{bmatrix} 54 & 28 \\ 129 & 67 \end{bmatrix}$

B) $\begin{bmatrix} -3 & -5 \\ 3 & 3 \end{bmatrix}$

C) $\begin{bmatrix} 99 & 53 \\ 69 & 37 \end{bmatrix}$

D) $\begin{bmatrix} 78 & 62 \\ 54 & 43 \end{bmatrix}$

46) _____

47) Use the coding matrix $A = \begin{bmatrix} -1 & -3 \\ 2 & 5 \end{bmatrix}$ to encode the message CARE.

47) _____

A) $\begin{bmatrix} -57 & -16 \\ 96 & 27 \end{bmatrix}$

B) $\begin{bmatrix} 18 & 105 \\ -7 & -4 \end{bmatrix}$

C) $\begin{bmatrix} -6 & -33 \\ 11 & 61 \end{bmatrix}$

D) $\begin{bmatrix} -1 & -8 \\ -4 & -29 \end{bmatrix}$

Write the partial fraction decomposition of the rational expression.

48) $\frac{x}{(x-5)(x-6)}$

48) _____

A) $\frac{-5}{x-5} + \frac{-6}{x-6}$

B) $\frac{-6}{x-5} + \frac{5}{x-6}$

C) $\frac{-5}{x-5} + \frac{6}{x-6}$

D) $\frac{5}{x-5} + \frac{-6}{x-6}$

49) $\frac{x}{x^2 - 13x + 42}$

49) _____

A) $\frac{-6}{x-6} + \frac{-7}{x-7}$

B) $\frac{-7}{x-6} + \frac{6}{x-7}$

C) $\frac{-6}{x-6} + \frac{7}{x-7}$

D) $\frac{6}{x-6} + \frac{-7}{x-7}$

50) $\frac{3x-19}{(x+3)(x-4)}$

50) _____

A) $\frac{4}{x+3} + \frac{1}{x-4}$

B) $\frac{1}{x-4} - \frac{4}{x+3}$

C) $\frac{4}{x+3} - \frac{1}{x-4}$

D) $\frac{3}{x+3} - \frac{19}{x-4}$