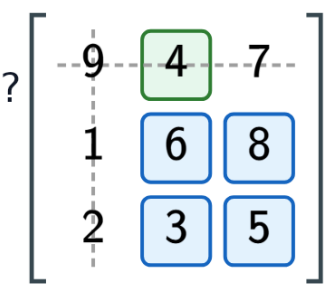
Name

Matrix Operations - Determinants, Co-factors, Adjoints

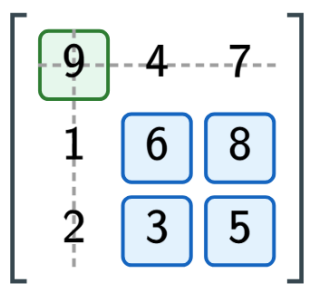
1 For the cofactor expansion along the first row, which diagram shows the second term?

$$\begin{bmatrix} 9 & 4 & 7 \\ 1 & 6 & 8 \\ 2 & 3 & 5 \end{bmatrix}$$

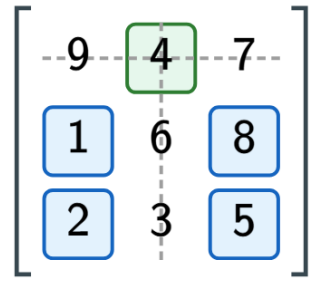
A



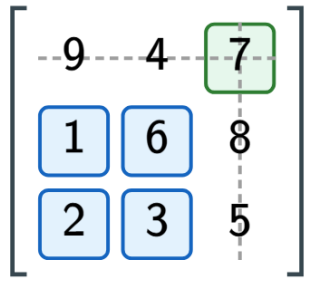
B



C



D



2 For the cofactor expansion along the first row, which shows the second term?

$$\begin{bmatrix} 2 & 2 & 8 \\ -2 & 9 & -9 \\ 6 & 2 & 3 \end{bmatrix}$$

A $-2 \cdot (48)$

B $2 \cdot (45)$

3 For the cofactor expansion along the first row, what is the value of the third term?

A	B	C
-13	-4	-9
D	**E**	**F**
-11	-14	-10

4 Using cofactor expansion along the first row, which shows the fully expanded determinant calculation?

$$\begin{bmatrix} -9 & -2 & -1 \\ -6 & -1 & -4 \\ 1 & -4 & 6 \end{bmatrix}$$

A $-9 \cdot (-1 \cdot 6 - -4 \cdot -4) - -2 \cdot (-6 \cdot 6 - -4 \cdot 1) + -1 \cdot (-6 \cdot -4 - -1 \cdot 1)$

B $-9 \cdot (-1 \cdot 6 - -4 \cdot -4) - -6 \cdot (-2 \cdot 6 - -4 \cdot -1) + 1 \cdot (-2 \cdot -4 - -1 \cdot -1)$

Name

Matrix Operations - Determinants, Co-factors, Adjoints

5 What is the determinant of this matrix?

$$\begin{bmatrix} 4 & 6 & 2 \\ 5 & -7 & 0 \\ -5 & -5 & 8 \end{bmatrix}$$

A	B	C
-590	-584	-588
D	E	F
-583	-578	-580

6 What is the determinant of this matrix?

$$\begin{bmatrix} 0 & 9 & 7 \\ 8 & 8 & -5 \\ -1 & -9 & 8 \end{bmatrix}$$

A	B	C
-983	-981	-977
D	E	F
-978	-979	-974

7 Using Sarrus' rule, which shows this matrix supplemented with its first two columns?

$$\begin{bmatrix} -3 & 4 & 7 \\ -8 & -7 & 7 \\ -5 & 8 & -6 \end{bmatrix}$$

A

$$\begin{bmatrix} -3 & 4 & 7 & -3 & 4 \\ -8 & -7 & 7 & -8 & -7 \\ -5 & 8 & -6 & -5 & 8 \end{bmatrix}$$

B

$$\begin{bmatrix} -3 & 3 & 7 & -3 & 4 \\ -8 & -7 & 7 & -8 & -7 \\ -5 & 8 & -6 & -5 & 8 \end{bmatrix}$$

C

$$\begin{bmatrix} -3 & 4 & 7 & -3 & 4 \\ -8 & -7 & 7 & -8 & -7 \\ -5 & 8 & -6 & -6 & 8 \end{bmatrix}$$

D

$$\begin{bmatrix} -3 & 4 & 7 & -3 & 4 \\ -8 & -7 & 7 & -8 & -7 \\ -5 & 5 & -6 & -5 & 8 \end{bmatrix}$$

8 Which grid shows the cofactor signs for a matrix of this size?

$$\begin{bmatrix} -7 & -7 \\ -4 & 3 \end{bmatrix}$$

A

$$\begin{bmatrix} - & + \\ + & - \end{bmatrix}$$

B

$$\begin{bmatrix} + & - \\ - & + \end{bmatrix}$$

9 Which grid shows the cofactor signs for a matrix of this size?

$$\begin{bmatrix} 3 & -3 & 2 \\ 4 & 8 & -6 \\ -2 & -6 & 1 \end{bmatrix}$$

A

$$\begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$$

B

$$\begin{bmatrix} - & + & - \\ + & - & + \\ - & + & - \end{bmatrix}$$

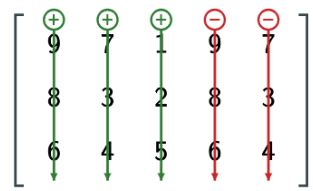
Name

Matrix Operations - Determinants, Co-factors, Adjoints

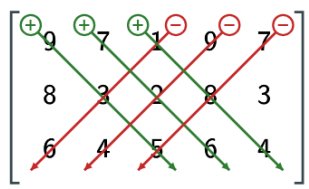
10 Using Sarrus' rule, which diagram multiplies along the diagonals correctly? Green diagonals are added, red are subtracted.

$$\begin{bmatrix} 9 & 7 & 1 \\ 8 & 3 & 2 \\ 6 & 4 & 5 \end{bmatrix}$$

A



B



11 Using Sarrus' rule, which equation gives the determinant of this matrix?

$$\begin{bmatrix} -1 & -4 & 0 \\ 0 & 7 & -6 \\ 6 & -3 & 5 \end{bmatrix}$$

A

$$(-1 \cdot 7 \cdot 5) + (-4 \cdot -4 \cdot 4) + (0 \cdot 0 \cdot -3)$$
$$-(0 \cdot 7 \cdot 4) - (-1 \cdot -4 \cdot -3) - (-4 \cdot 0 \cdot 5)$$

B

$$(-1 \cdot 7 \cdot 5) + (0 \cdot -3 \cdot 0) + (6 \cdot -4 \cdot -6)$$
$$-(6 \cdot 7 \cdot 0) - (-1 \cdot -3 \cdot -6) - (0 \cdot -4 \cdot 5)$$

C

$$(-1 \cdot 7 \cdot 5) + (-4 \cdot -6 \cdot 6) + (0 \cdot 0 \cdot -3)$$
$$-(0 \cdot 7 \cdot 6) - (-1 \cdot -6 \cdot -3) - (-4 \cdot 0 \cdot 5)$$

Name

Matrix Operations - Determinants, Co-factors, Adjoints

12 What is the determinant of this matrix?

$$\begin{bmatrix} -6 & 9 & 7 \\ 3 & 3 & -5 \\ -6 & -6 & -2 \end{bmatrix}$$

A 536	B 545	C 546
D 534	E 540	F 544

13 Which is the minor matrix for the entry at row 2, column 2?

A $[6]$	B $[-6]$
C $[-3]$	

14 Which is the minor matrix for the entry at row 1, column 1?

A $[-1]$	B $[-3]$
C $[-6]$	

15 What is the determinant of the minor matrix for the entry at row 2, column 1?

A 7	B 9	C 6
D 0	E 11	F 1

16 What is the determinant of the minor matrix for the entry at row 2, column 2?

A -6	B 6	C -1
D 2	E 0	F 4

17 What is the entry at row 2, column 1 of the cofactor matrix of this matrix?

A 2	B 0	C 8
D 1	E 5	F 6

18 Which shows row 1 of the cofactor matrix of this matrix? Fill only that row and leave the other entries blank.

A $\begin{bmatrix} 8 & 6 \\ \square & \square \end{bmatrix}$	B $\begin{bmatrix} 7 & 7 \\ \square & \square \end{bmatrix}$
C $\begin{bmatrix} 7 & 6 \\ \square & \square \end{bmatrix}$	D $\begin{bmatrix} 6 & 7 \\ \square & \square \end{bmatrix}$

19 Which expression is equivalent?

$$A\,\mathrm{adj}(A)$$

A $\mathrm{adj}(A)\lvert A\rvert^{-1}$
B I
C $\lvert A\rvert I$

Name

Matrix Operations - Determinants, Co-factors, Adjoints

20 Which is the cofactor matrix of this matrix?

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

A $\begin{bmatrix} 6 & -6 \\ -6 & 2 \end{bmatrix}$

B $\begin{bmatrix} 3 & -7 \\ -6 & 2 \end{bmatrix}$

C $\begin{bmatrix} 3 & -6 \\ -8 & 5 \end{bmatrix}$

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

21 Is this matrix identity correct?

$$|A^{-1}| = \frac{1}{|A|}$$

A Incorrect

B Correct

22 Which is the minor matrix for the entry at row 1, column 3?

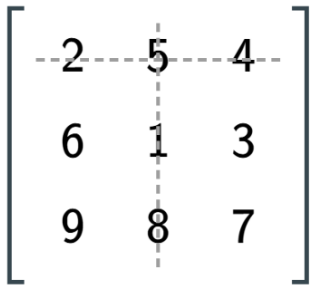
A $\begin{bmatrix} 0 & 4 \\ -3 & 1 \end{bmatrix}$

B $\begin{bmatrix} -7 & 0 \\ 7 & -3 \end{bmatrix}$

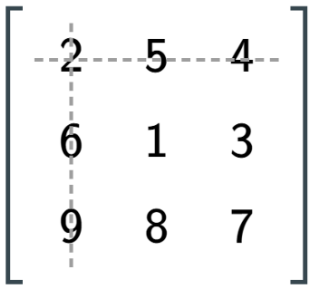
C $\begin{bmatrix} 6 & 4 \\ -7 & -5 \end{bmatrix}$

23 Which diagram shows how to form the minor matrix for the entry at row 1, column 2 by crossing out its row and column?

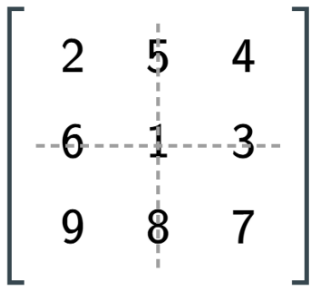
A



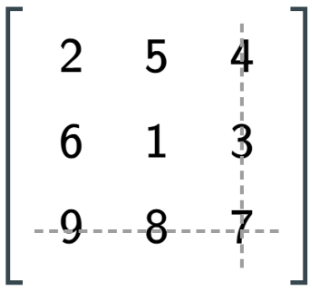
B



C



D

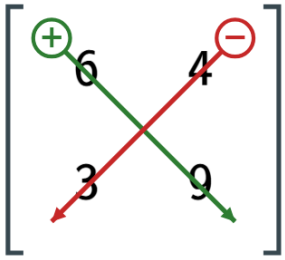


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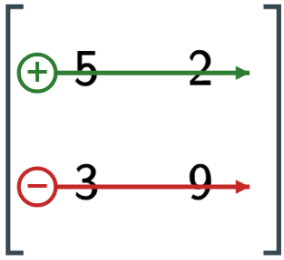
Matrix Operations - Determinants, Co-factors, Adjoints

24 Which diagram correctly finds the determinant of the minor matrix for the entry at row 1, column 3? Green is added, red is subtracted.

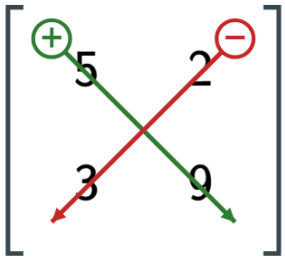
A



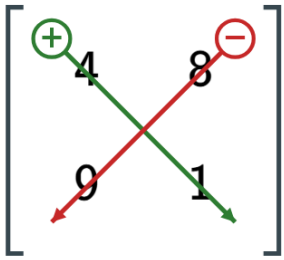
B



C



D



25 What is the determinant of the minor matrix for the entry at row 1, column 1?

A	B	C
25	21	20
D	E	F
19	22	26

26 What is the entry at row 3, column 1 of the matrix of minors of this matrix?

A	B	C
33	29	34
D	E	F
35	40	36

27 Which shows column 1 of the matrix of minors of this matrix? Fill only that column and leave the other entries blank.

A

$$\begin{bmatrix} -10 & \square & \square \\ -62 & \square & \square \\ -65 & \square & \square \end{bmatrix}$$

B

$$\begin{bmatrix} -13 & \square & \square \\ -62 & \square & \square \\ -68 & \square & \square \end{bmatrix}$$

C

$$\begin{bmatrix} -16 & \square & \square \\ -65 & \square & \square \\ -67 & \square & \square \end{bmatrix}$$

D

$$\begin{bmatrix} -13 & \square & \square \\ -62 & \square & \square \\ -66 & \square & \square \end{bmatrix}$$

28 What is the entry at row 2, column 2 of the cofactor matrix of this matrix of minors? Apply the sign pattern $(-1)^{i+j}$ to each entry of the matrix of minors.

A	B	C
5	3	1
D	E	F
7	8	6

29 What is the entry at row 2, column 1 of the cofactor matrix of this matrix of minors? Apply the sign pattern $(-1)^{i+j}$ to each entry of the matrix of minors.

A	B	C
-6	-8	-13
D	E	F
-10	-2	-11

Name

Matrix Operations - Determinants, Co-factors, Adjoints



30 Which is the matrix of minors of this matrix?

$$\begin{bmatrix} 5 & -7 & 3 \\ -1 & 9 & -4 \\ -7 & 5 & 5 \end{bmatrix}$$

A

$$\begin{bmatrix} 65 & -33 & 58 \\ -50 & 43 & -26 \\ 1 & -17 & 38 \end{bmatrix}$$

B

$$\begin{bmatrix} 65 & -33 & 58 \\ -50 & 46 & -24 \\ 1 & -17 & 38 \end{bmatrix}$$

C

$$\begin{bmatrix} 65 & -34 & 58 \\ -50 & 46 & -24 \\ 1 & -17 & 36 \end{bmatrix}$$

D

$$\begin{bmatrix} 65 & -33 & 58 \\ -50 & 46 & -24 \\ 1 & -20 & 38 \end{bmatrix}$$

31 Which shows row 1 of the cofactor matrix of this matrix of minors? Fill only that row and leave the other entries blank. Apply the sign pattern $(-1)^{i+j}$ to each entry of the matrix of minors.

A

$$\begin{bmatrix} 10 & 9 \\ \square & \square \end{bmatrix}$$

B

$$\begin{bmatrix} 7 & 8 \\ \square & \square \end{bmatrix}$$

C

$$\begin{bmatrix} 7 & 7 \\ \square & \square \end{bmatrix}$$

D

$$\begin{bmatrix} 6 & 4 \\ \square & \square \end{bmatrix}$$

32 Which shows row 1 of the cofactor matrix of this matrix of minors? Fill only that row and leave the other entries blank. Apply the sign pattern $(-1)^{i+j}$ to each entry of the matrix of minors.

A

$$\begin{bmatrix} 5 & 12 & 0 \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

B

$$\begin{bmatrix} 6 & 8 & 1 \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

C

$$\begin{bmatrix} 1 & 11 & 0 \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

D

$$\begin{bmatrix} 3 & 9 & 1 \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

Name

Matrix Operations - Determinants, Co-factors, Adjoints



33 Which is the cofactor matrix of this matrix of minors? Apply the sign pattern $(-1)^{i+j}$ to each entry of the matrix of minors.

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

A $\begin{bmatrix} 7 & -4 \\ 5 & 6 \end{bmatrix}$

B $\begin{bmatrix} 10 & -3 \\ 5 & 6 \end{bmatrix}$

C $\begin{bmatrix} 7 & -3 \\ 8 & 7 \end{bmatrix}$

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

34 Which is the cofactor matrix of this matrix of minors? Apply the sign pattern $(-1)^{i+j}$ to each entry of the matrix of minors.

$$\begin{bmatrix} -7 & -4 & 8 \\ 1 & 5 & -2 \\ 6 & -8 & -7 \end{bmatrix}$$

A $\begin{bmatrix} -9 & 4 & 8 \\ -1 & 5 & 2 \\ 6 & 8 & -6 \end{bmatrix}$

B $\begin{bmatrix} -7 & 4 & 8 \\ -1 & 5 & 2 \\ 6 & 8 & -7 \end{bmatrix}$

C $\begin{bmatrix} -7 & 4 & 8 \\ 2 & 5 & 2 \\ 6 & 8 & -7 \end{bmatrix}$

D $\begin{bmatrix} -7 & 6 & 8 \\ -1 & 5 & 2 \\ 6 & 8 & -7 \end{bmatrix}$

35 What is the entry at row 1, column 1 of the adjoint of this cofactor matrix? The adjoint is the transpose of the cofactor matrix: $\text{adj}(A) = C^{T}$.

A	B	C
-2	-5	4
D	**E**	**F**
5	0	2

36 Which shows row 1 of the adjoint of this cofactor matrix? Fill only that row and leave the other entries blank. The adjoint is the transpose of the cofactor matrix: $\text{adj}(A) = C^{T}$.

A $\begin{bmatrix} -1 & -6 \\ \square & \square \end{bmatrix}$

B $\begin{bmatrix} 0 & -8 \\ \square & \square \end{bmatrix}$

C $\begin{bmatrix} 0 & -4 \\ \square & \square \end{bmatrix}$

D $\begin{bmatrix} 0 & -6 \\ \square & \square \end{bmatrix}$

37 Which is the adjoint of this cofactor matrix? The adjoint is the transpose of the cofactor matrix: $\text{adj}(A) = C^{T}$.

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

A $\begin{bmatrix} 1 & 1 \\ 6 & 5 \end{bmatrix}$

B $\begin{bmatrix} 1 & 3 \\ 6 & 0 \end{bmatrix}$

C $\begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix}$

D $\begin{bmatrix} 1 & 3 \\ 6 & 5 \end{bmatrix}$

Name

Matrix Operations - Determinants, Co-factors, Adjoints



38 What is the entry at row 2, column 3 of the adjoint of this cofactor matrix? The adjoint is the transpose of the cofactor matrix: $\text{adj}(A) = C^{T}$.

A -8	B -9	C -2
D -4	E -5	F 0

39 Which shows column 1 of the adjoint of this cofactor matrix? Fill only that column and leave the other entries blank. The adjoint is the transpose of the cofactor matrix: $\text{adj}(A) = C^{T}$.

A

$$\begin{bmatrix} 1 & \square & \square \\ 5 & \square & \square \\ 6 & \square & \square \end{bmatrix}$$

B

$$\begin{bmatrix} 0 & \square & \square \\ 8 & \square & \square \\ 6 & \square & \square \end{bmatrix}$$

C

$$\begin{bmatrix} 0 & \square & \square \\ 5 & \square & \square \\ 6 & \square & \square \end{bmatrix}$$

D

$$\begin{bmatrix} 2 & \square & \square \\ 7 & \square & \square \\ 6 & \square & \square \end{bmatrix}$$

40 What is the entry at row 1, column 2 of the adjoint of this matrix of minors? Apply the sign pattern $(-1)^{i+j}$ to the matrix of minors to get the cofactor matrix, then transpose it: $\text{adj}(A) = C^{T}$.

A -3	B 0	C 1
D -5	E -4	F -9

41 Which is the adjoint of this cofactor matrix? The adjoint is the transpose of the cofactor matrix: $\text{adj}(A) = C^{T}$.

$$\begin{bmatrix} -8 & 6 & 5 \\ -2 & -1 & 4 \\ -6 & 4 & 1 \end{bmatrix}$$

A $\begin{bmatrix} -8 & -2 & -3 \\ 6 & -1 & 4 \\ 5 & 5 & 1 \end{bmatrix}$

B $\begin{bmatrix} -7 & -2 & -6 \\ 6 & -1 & 4 \\ 5 & 4 & 1 \end{bmatrix}$

C $\begin{bmatrix} -8 & -2 & -6 \\ 6 & -1 & 4 \\ 5 & 4 & 1 \end{bmatrix}$

D $\begin{bmatrix} -8 & -3 & -6 \\ 6 & -1 & 4 \\ 5 & 4 & 1 \end{bmatrix}$