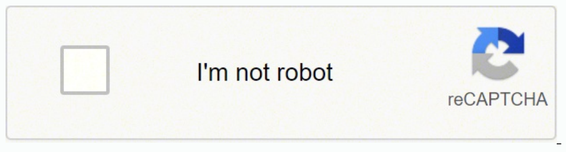

Continue

33395586 1695486285 20776634.392157 350321400 82947368.277778 27500900523 29577183.365385 119761709837 48322166088 3358672.7894737 56383014640 13973271.744186 37218478.37037 81055414032 17286724.27551 15090505.408451 31207858.019608 93683625.142857 50751244746 13805417.869565 4363290384 37977658.584906 14642167.011364 15736260.926471

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Colegio Gimnasio Campestre San Sebastián

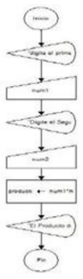
Ejercicios Diagramas De Flujo

Ejercicios secuenciales

A continuación deberán resolver los siguientes algoritmos, mediante diagramas de flujo. El ejercicio lo deben resolver en el cuaderno usando los simbolos usados en diagramación, y luego lo deberán resolver en el programa Dfd.

1-Leer 2 números, multiplicarlos y mostrar su resultado por pantalla.

Ejercicio Resuelto.



"digite el primer numero"
num1
"digite el segundo numero"
num2
producto ← num1*num2
"El producto de los 2 números es ",producto

7-Realizar el diagrama de flujo que nos solicite el precio del artículo comprado, la cantidad de dinero entregada por el consumidor, y los vueltos a entregar

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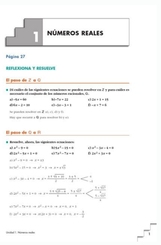
Nombre: _____

Fecha de Nac. _____	Motivo de la apl. _____
Edad: Años ____ Meses ____ Grado ____	Fecha de hoy _____
Escuela _____	Hora de Inic. _____ Duración _____
Localidad _____	Hora de término _____

A		B		C		D		E	
1		1		1		1		1	
2		2		2		2		2	
3		3		3		3		3	
4		4		4		4		4	
5		5		5		5		5	
6		6		6		6		6	
7		7		7		7		7	
8		8		8		8		8	
9		9		9		9		9	
10		10		10		10		10	
11		11		11		11		11	
12		12		12		12		12	
Punt. Parc.		Punt. Parc.		Punt. Parc.		Punt. Parc.		Punt. Parc.	

ACTITUD DEL SUJETO		CALIFICACION DEL TEST		
FORMA DE TRABAJO		Edad Cronológica		Puntaje Directo
REFLEXIVA	INTUITIVA	T.Minutos		Percentil
RAPIDA	LENTA	Discrepancia		Rango
INTELIGENTE	TORPE	Diagnóstico		
CONCENTRADA	DISTRAIDA			
DISPOSICION				
DISPUESTA	FATIGADA			
INTERESADA	DESINTERESADA			
TRANQUILA	INTRANQUILA			
SEGURA	VACILANTE			
PERSEVERANCIA				
UNIFORME	IRREGULAR	Examinador		



MATRICES DE DIAGONAL ESTRICTAMENTE DOMINANTE

Se dice que una matriz cuadrada es de diagonal estrictamente dominante o que es estrictamente dominante diagonalmente(EDD) por Klee, n y sólo si:

$|a_{ii}| > \sum_{j=1, j\neq i}^{n} |a_{ij}|$ para cada $i=1,2,\ldots,n$(n dimensión de la matriz)

Es decir una matriz es estrictamente dominante diagonalmente cuando los elementos de la diagonal principal son mayores en valor absoluto, que la suma de los valores absolutos de los demás elementos de la fila correspondiente

EJEMPLO

Sea $A=\begin{bmatrix} -4 & 2 & 1 \\ 2 & -8 & 4 \\ 1 & -4 & 6 \end{bmatrix}$

$|-4| > |2|+|1|$; $|-8| > |2|+|4|$; $|6| > |1|+|-4|$

Por lo tanto, la matriz A es estrictamente dominante diagonalmente

Sea $B=\begin{bmatrix} 2 & 4 & 1 \\ 4 & 8 & 1 \\ 2 & 4 & 6 \end{bmatrix}$

$|2| < |4|+|1|$; $|8| < |4|+|1|$; $|6| < |2|+|4|$

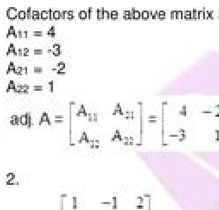
Como b_{22} es valor absoluto es menor que la suma de los otros elementos de la fila en valor absoluto, entonces se concluye que la matriz B no es estrictamente dominante diagonalmente
Observe que con un mal caso que no se verifique, es suficiente para afirma que una matriz no es estrictamente dominante diagonalmente

MATRIZ REAL, SIMÉTRICA Y DEFINIDA POSITIVA

Una matriz $A \in R_{n\times n}$ simetrica, se dice que es definida positiva, si satisface una cualquiera de las siguientes condiciones(que son equivalentes)
a) $x^T Ax > 0$, $\forall x \in R^n, x \neq 0$ (Por definición)
b)Todos los valores de A son positivos
c)Todos los pivotes obtenidos en la eliminación gaussiana sobre A, son estrictamente de filas, son positivos
d)Todas las submatrices principales de A tiene determinante positivo[1]

Ejemplo

[1] Las submatrices principales de una matriz $A=(a_{ij})_{n\times n}$ son las matrices



NCERT Solutions for Class 12 Maths Chapter 4 Determinants

Exercise 4.5 Page No: 131

Find adjoint of each of the matrices in Exercises 1 and 2.

1.

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

2.

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

Solution:

1. Let A =

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

Cofactors of the above matrix are

$A_{11} = 4$

$A_{12} = -3$

$A_{21} = -2$

$A_{22} = 1$

$$\text{adj. } A = \begin{bmatrix} A_{11} & A_{21} \\ A_{12} & A_{22} \end{bmatrix} = \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$$

2.

Let A =

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

Cofactors of the above matrix are

$$A_{11} = +\begin{vmatrix} 3 & 5 \\ 0 & 1 \end{vmatrix} = 3 \quad A_{21} = -\begin{vmatrix} -1 & 2 \\ 0 & 1 \end{vmatrix} = 1 \quad A_{31} = +\begin{vmatrix} -1 & 2 \\ 3 & 5 \end{vmatrix} = -11$$

$$A_{12} = -\begin{vmatrix} 2 & 5 \\ -2 & 1 \end{vmatrix} = -12 \quad A_{22} = +\begin{vmatrix} 1 & 2 \\ -2 & 1 \end{vmatrix} = 5 \quad A_{32} = -\begin{vmatrix} 1 & 2 \\ 2 & 5 \end{vmatrix} = -1$$

$$A_{13} = +\begin{vmatrix} 2 & 3 \\ -2 & 0 \end{vmatrix} = 6 \quad A_{23} = -\begin{vmatrix} 1 & -1 \\ -2 & 0 \end{vmatrix} = 2 \quad A_{33} = +\begin{vmatrix} 1 & -1 \\ 2 & 3 \end{vmatrix} = 5$$

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|A-1| = -15 Therefore, from equation (3) k = \(\rm -\frac1{15}\). \(\rm 28\over 3\)\(\rm 32\over 3\)\(\rm 34\over 3\)10 Option 2 : \(\rm 32\over 3\) Concept: A × A-1 = I, where I is an identity matrix |A| = \(\rm 1\over {|A^{-1}|}\) Calculation: Given: \(\rm A=\begin{bmatrix} x & 2 \\\ 4 & 3 \end{bmatrix}\) and \(\rm A ^{-1}=\begin{bmatrix} {1\over8} & {-1\over 12} \\\ {-1\over 6}& {4\over 9} \end{bmatrix}\) |A-1| = \(\rm {4\over 72} - {1\over 72} = {3\over 72} = {1\over 24}\) |A| = \(\rm {1 \over {|A^{-1}|}}\) = 24 ⇒ 3x - 8 = 24 ∴ x = \(\rm 32\over 3\) India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: If the matrix A is a square matrix of order n, then |Adj A| = | A|n - 1 Calculations: Given, |A| = 8, where A is a square matrix of order 3. i.e. A × A-1 ≠ I. Cofactor of \(1 = {A_{11}} = \left| {\begin{array}{*{20}{c}} 2&0\\ 6&1 \end{array}} \right| = 2\) Cofactor of \(0 = {A_{12}} = - \left| {\begin{array}{*{20}{c}} 5&0\\ { - 1}&1 \end{array}} \right| = - 5\) Cofactor of \(0 = {A_{13}} = \left| {\begin{array}{*{20}{c}} 5&2\\ { - 1}&6 \end{array}} \right| = 32\) Cofactor of \(5 = {A_{21}} = - \left| {\begin{array}{*{20}{c}} 0&0\\ 6&1 \end{array}} \right| = 0\) Cofactor of \(2 = {A_{22}} = \left| {\begin{array}{*{20}{c}} 1&0\\ { - 1}&1 \end{array}} \right| = 1\) Cofactor of \(0 = {A_{23}} = \left| {\begin{array}{*{20}{c}} 1&0\\ { - 1}&6 \end{array}} \right| = - 6\) Cofactor of \(- 1 = {A_{31}} = \left| {\begin{array}{*{20}{c}} 0&0\\ 2&0 \end{array}} \right| = 0\) Cofactor of \(6 = {A_{32}} = - \left| {\begin{array}{*{20}{c}} 1&0\\ 5&0 \end{array}} \right| = 0\) Cofactor of \(1 = {A_{33}} = \left| {\begin{array}{*{20}{c}} 1&0\\ 5&2 \end{array}} \right| = 2\) ∴ Cofactor matrix \(= \left[{\begin{array}{*{20}{c}} 2& { - 5}&{32}\\ 0&1&{ - 6}\\ 0&0&2 \end{array}} \right]\) Adj (A) \(= \left[{\begin{array}{*{20}{c}} 2&0&0\\ { - 5}&1&0\\ {32}&{ - 6}&2 \end{array}} \right]\) India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: For an invertible matrix A: A-1 = \(\rm \frac{adj(A)}{|A|}\). A matrix is singular if and only if its determinant is zero. Calculation: Let A = \(\left({\begin{array}{*{20}{c}} 2&4\\ { - 8}&{\rm{x}} \end{array}} \right)\) Given Matrix A does not have an inverse. Let's discuss the concepts related to Matrices and Adjoint and Inverse of a Square Matrix. Now, |A × adj(A)| = |A × |A|n - 1| = |A|n. India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Properties of Matrices Inverse: If A and B are the non-singular matrices, then the inverse matrix should have the following properties (AB) - 1 = B - 1 A - 1 (A - 1) - 1 = A (AT) - 1 = (A - 1)T (KA - 1) = \(\rm \frac{1}{k}\;{A^{ - 1}}\) for any K ≠ 0 (An) - 1 = (A - 1)n AA - 1 = A - 1A = I Calculation: Given: A2 - 2A - I = 0 ⇒ A.A - 2A = I Post multiply by A-1, we get ⇒ AAA-1 - 2AA-1 = IA-1 ⇒ AI - 2I = A-1 [∵ AA - 1 = A - 1A = I] ∴ A-1 = A - 2 the inverse of A is A - 2 India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Let A is an invertible matrix As we know, AA-1 = I \(= {\rm{A}} × \left({\frac{{{\rm{Adj\;A}}}}{{\det {\rm{A}}}}} \right) = {\rm{I}}\) ⇒ A (Adj A) = det A × I = |A|I Calculation: Given: A(adj A) \(=\begin{bmatrix} 10 & 0 \\\ 0 & 10 \end{bmatrix}\) ⇒ A(adj A) \(= 10\begin{bmatrix} 1 & 0 \\\ 0 & 1 \end{bmatrix} = 10\rm I\) As we know A (Adj A) = det A × I ∴ det A = |A| = 10 India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Any square matrix say A, is said to be invertible if determinant of A i.e |A| ≠ 0 else it is said to be a singular matrix. India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: If A is not an invertible matrix then |A| = 0 If A is a singular matrix then |A| = 0 Calculation: Given A = \(\begin{bmatrix} 1 & -4 & 3 \\\ 0 & 6 & -7 \\\ 2 & 4 & λ \end{bmatrix}\) is not an invertible matrix. Mistake PointsNote that, we have A-1 matrix, not an A matrix. Calculation: We know that |adj(A)| = |A|n - 1, where n is the order of the square matrix A. ⇒ If det (A) = 0, so inverse of matrix is not exist. It is denoted by A'or AT Steps for obtaining adjoint of the matrix: Let \(\rm A\; = \;\left[{{a_{ij}}} \right]\) be a square matrix. Transpose of cofactor is called adjoint of the matrix ⇒ Adj (A) = CT Calculation: The adjoint of matrix A is the transpose of the cofactor matrix of A. India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students \(8\over7\)\(\rm 4 5\)\(7\over9\)\(5\over7\) Concept: Consider a matrix A and let its inverse be A-1 \(\rm {A^{ - 1}} = \frac{{{\rm{adj\;}}\left({\rm{A}} \right){\rm{\;}}}}{{{\rm{det\;}}\left({\rm{A}} \right)}}\) Here; adj (A) is adjoint of matrix A and det (A) is determinant of matrix A. Calculation: Given: A is a singular matrix. The order of the given matrix A is n = 3 and |A| = 4. |A-1| = |A|-1 = \(\rm \frac{1}{|A|}\). If |A| = 0 and [adj (A)] B ≠ 0, then the system of equations is inconsistent and has no solution. Calculation: For the matrix to be singular, its determinant should be zero. It is given that the order of the matrix A is n = 3 and |A| = 3. If \(A = \left[{\begin{array}{*{20}{c}} {{a_{11}}}&{{a_{12}}}\\ {{a_{21}}}&{{a_{22}}} \end{array}} \right]\) then determinant of A is given by: |A| = (a11 × a22) - (a12 - a21). ∴ |A × adj(A)| = |A|n = 43 = 64. India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students k ≠ 1 and k ≠ -2k ≠ 1 and k ≠ 2k ≠ -1 and k ≠ -2k ≠ -1 and k ≠ 2 Option 1 : k ≠ 1 and k ≠ -2 Concept: Let A X = B be a system of n linear equation with n variables I. Learn now! Concept: If the matrix A is not an invertible matrix then | A | = 0 If the matrix A is the non-singular matrix then | A | ≠ 0 Calculations: Given, A = \(\begin{bmatrix} 1 & -3 & 2 \\\ 2 & -8 & 5 \\\ 4 & 2 & λ \end{bmatrix}\)is not an invertible matrix As we know, If the matrix A is non invertible matrix then | A | = 0 ⇒ \(\begin{vmatrix} 1 & -3 & 2 \\\ 2 & -8 & 5 \\\ 4 & 2 & λ \end{vmatrix}\) = 0 ⇒ 1\(\rm (-8\lambda - 10)+3(2\lambda-20)+2(4+32)\) = 0 ⇒ \(\rm -8\lambda - 10+6\lambda-60+72 = 0\) ⇒\(\rm -2\lambda +2 = 0\) ⇒\(\rm \lambda = 1\) Hence, If \(\begin{bmatrix} 1 & -3 & 2 \\\ 2 & -8 & 5 \\\ 4 & 2 & λ \end{bmatrix}\) is not an invertible matrix, then the value of λ is 1. ⇒ If det (A) = 0, so inverse of a matrix does not exist. Calculation: Given: The system of linear equations kx + y + z = 1, x + ky + z = 1 and x + y + kz = 1. If |A| = 0 and [adj (A)] B = 0, then the system of equations is consistent and infinitely many solutions. \(\Rightarrow A = \left[{\begin{array}{*{20}{c}} k&1&1\\ 1&k&1\\ 1&1&k \end{array}} \right],\;X = \left[{\begin{array}{*{20}{c}} x\\ y\\ z \end{array}} \right]\;and\;B = \left[{\begin{array}{*{20}{c}} 1\\ 1\\ 1 \end{array}} \right]\) As we know that the system A X = B will have unique solution if |A|≠ 0. Let A = \(\left({\begin{array}{*{20}{c}} {\rm{a}}&b\\ {\rm{c}}&{\rm{d}} \end{array}} \right)\) adj A = \(\left({\begin{array}{*{20}{c}} {\rm{d}}&{ - b}\\ { - {\rm{c}}}&{\rm{a}} \end{array}} \right)\) Calculation: Let A = \(\rm \begin{bmatrix} a & b\\ c & d \end{bmatrix}\) adj A = \(\rm \begin{bmatrix} d & -b\\ -c & a \end{bmatrix}\) Now, AT = \(\rm \begin{bmatrix} a & c\\ b & d \end{bmatrix}\) adj AT = \(\rm \begin{bmatrix} d & -c\\ -b & a \end{bmatrix}\) Now transpose of adj A = (adj (A))T = \(\rm \begin{bmatrix} d & -c\\ -b & a \end{bmatrix}\) Therefore, adj AT = (adj (A))T India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students ⇒ If det (A) ≠ 0, so the inverse of a matrix exists. i.e. |A| = 0. ∴ |adj(adj(A))| = |adj(A)|n - 1 = (|A|n-1)n - 1. Calculation: \(\rm A^{-1}=\begin{bmatrix} 1& 2& 3\\ 2& 4& 3\\ 3& 1& 6\end{bmatrix}=\frac{adj(A)}{k}\) -----(1) From the definition of the inverse of a matrix, A-1 = \(\rm \frac{adj(A)}{|A|}\) -----(2) Comparing equation (1) & (2), we get k = |A| Using the properties of the determinant of inverse of a matrix, we have: k = |A| = \(\rm \frac{1}{|A^{-1}|}\) ----(3) Now, |A-1| = 1(24 - 3) + 2(9 - 12) + 3(2 - 12) = 21 - 6 - 30 = - 15. Find the minors of the matrix: Find the co-factor of matrix formed: C = [cij]3 × 3 = (-1)(i + j) × mij Take the transpose of the matrix i.e., CT: it gives Adj of matrix Swapping the (ij)th element with (ji)th element. If |A|≠ 0, then the system of equation is consistent and has a unique solution given by X = A-1 B. So, det (A) = 0 |A| = (2x) - (4 × - 8) = 0 ⇒ 2x - (- 32) = 0 ⇒ 2x = - 32 ∴ x = - 16 India's #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question

Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students \(\left({\begin{array}{*{20}{c}} \cos \theta }&{ - \sin \theta }&0\\ \sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right)\)\(\left({\begin{array}{*{20}{c}} \cos \theta }&0&{ - \sin \theta }\\ 0&1&0\\ {\sin \theta }&0&{\cos \theta } \end{array}} \right)\)\(\left({\begin{array}{*{20}{c}} 1&0&0\\ 0&{\cos \theta }&{ - \sin \theta }\\ 0&{\sin \theta }&{\cos \theta } \end{array}} \right)\)\(\left({\begin{array}{*{20}{c}} {\cos \theta }&{\sin \theta }&0\\ { - \sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right)\) Option 1 : \(\left({\begin{array}{*{20}{c}} {\cos \theta }&{ - \sin \theta }&0\\ {\sin \theta }&0\\ 0&0&1 \end{array}} \right)\) Concept: Let A be a non-singular 3 × 3 matrix, then inverse of A is given as: \({{\rm{A}}^{ - 1}} = \frac{1}{{\left| {\rm{A}} \right|}} \times {\rm{adj}}}\left({\rm{A}} \right)\) Steps for calculating inverse of a matrix: Find the determinant of given matrix. |A-1| = |A|-1 = \(\rm \frac{1}{|A|}\). Steps for obtaining adjoint of the matrix 1. II. India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students - 25- 15\(\rm - \frac1{15}\)None of these. ∴ |adj(adj(A))| = (33 - 1)3 - 1 = (32)2 = 81. We need to calculate cofactors of all elements = \(\rm {C_{ij}}\;or\;{A_{ij}} = {\left({ - 1} \right)^{i + j}}\;{M_{ij}}\), Where, \({M_{ij}}\) = Minor of matrix A Transpose of the cofactor is called adjoint of the matrix ⇒ adj (A) = CT Shortcut Method to finding adjoint of the matrix: Interchange the diagonal elements and change the sign of remaining elements. |adj(A)| = |A|n - 1, where n is the order of the square matrix A. III. Calculation: Given: A = \(\begin{bmatrix}3 & 1 & 2 \\ 4&2 & 1\\ 2 & \rm a & 1 \end{bmatrix}\) is a singular matrix Therefore, |A| = 0 |A| = \(\begin{vmatrix}3 & 1 & 2 \\ 4&2 & 1\\ 2 & a & 1 \end{vmatrix}\) = 0 |A| = 3(2 - a) - 1(4 - 2) + 2(4a - 4) |A| = 6 - 3a - 2 + 8a - 8 |A| = 5a - 4 |A| = 0 5a - 4 = 0 ∴ a = \(\frac 4 5\) India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students |A|I (where I is identity matrix)A|0|A|2 Concept: Singular Matrix: A square matrix that is not invertible is called a singular matrix. Multiplying both sides by A, we get: A(A-1) = \(\rm \frac{A[adj(A)]}{|A|}\) ⇒ |A| I = A[adj(A)] But it is given that A is a singular matrix, i.e. |A| = 0. ⇒ |A| = α × (0 + 4) – 2 × (-3 - 4) + 2 × (3 - 0) = 4α + 20 ⇒ |A| = 4α + 20 = 0 ⇒ α = -5. We need to calculate cofactors of all elements \(\Rightarrow {C_{ij}}\;or\;{A_{ij}} = {\left({ - 1} \right)^{i + j}}\;{M_{ij}}\) Here, \({M_{ij}}\) = Minor of matrix A 2. Calculation: From the definition of the inverse of a matrix, \({{\rm{A}}^{ - 1}} = \frac{{{\rm{adj}}\left({\rm{A}} \right)}}{{\left| {\rm{A}} \right|}}\). ⇒ If det (A) ≠ 0, so inverse of matrix is exist. ⇒ |A| = 0 ⇒ \(\begin{vmatrix} 1 & -4 & 3 \\ 0 & 6 & -7 \\ 2 & 4 & λ \end{vmatrix}\) = 0 ⇒ 1(\(\rm 6\lambda + 28 \)) + 4 (0 + 14) + 3 (0 - 12) = 0 ⇒ \(\rm 6\lambda + 28 + 56 - 36 = 0\) ⇒ \(\rm 6\lambda + 48 = 0\) ⇒ \(\rm \lambda = - 8\) Hence, if \(\begin{bmatrix} 1 & -4 & 3 \\ 0 & 6 & -7 \\ 2 & 4 & λ \end{bmatrix}\) is not an invertible matrix, then the value of λ = - 8 India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students \(8\over7)\(\frac 4 5)\(7\over9)\(5\over7) Concept: Consider a matrix A and let its inverse be A-1 \(\rm {A^{ - 1}} = \frac{{{\rm{adj}\;}}\left({\rm{A}} \right)}{\rm{\;}}}{{{\rm{det}\;}}\left({\rm{A}} \right)}\) If matrix is said to be singular then its determinant is zero. ⇒ A is a singular matrix. If \(A = \left[{\begin{array}{*{20}{c}} {{a_{11}}}&{{a_{12}}}&{{a_{13}}}\\ {{a_{21}}}&{{a_{22}}}&{{a_{23}}}\\ {{a_{31}}}&{{a_{32}}}&{{a_{33}}} \end{array}} \right]\) then determinant of A is given by: |A| = a11 × {(a22 × a33) – (a23 × a32)} - a12 × {(a21 × a33) – (a23 × a31)} + a13 × {(a21 × a32) – (a22 × a31)} Calculation: Given: \(\left[{\begin{array}{*{20}{c}} \alpha &2&1\\ { - 3}&0&4\\ 1&{ - 1}&1 \end{array}} \right]\) is not invertible ⇒ The given matrix is singular. A square matrix is singular if and only if its determinant is 0. Let, \(A = \left[{\begin{array}{*{20}{c}} \alpha &2&1\\ { - 3}&0&4\\ 1&{ - 1}&1 \end{array}} \right]\) and |A|= 0. Calculation: Given A = \(\begin{bmatrix}3 & 1 & 2 \\ 4&2 & 1\\ 2 & a & 1 \end{bmatrix}\) For A-1 does not exist the |A| = 0 |A| = \(\begin{vmatrix}3 & 1 & 2 \\ 4&2 & 1\\ 2 & a & 1 \end{vmatrix}\) = 0 |A| = 3(2 - a) - 1(4 - 2) + 2(4a - 4) |A| = 6 - 3a - 2 + 8a - 8 |A| = 5a - 4 |A| = 0 5a - 4 = 0 ∴ a = \(\frac 4 5\) India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Singular Matrix: A Singular Matrix is a matrix whose 'Multiplicative Inverse' does not exist. If \(A = \left[{\begin{array}{*{20}{c}} {{a_{11}}}&{{a_{12}}}\\ {{a_{21}}}&{{a_{22}}} \end{array}} \right]\) then determinant of A is given by: |A| = (a11 × a22) – (a12 – a21). If |A| ≠ 0, then inverse exists. We know that, if the matrix A is a square matrix of order n, then |Adj A| = | A|n - 1 Here n = 3 and |A| = 8 |Adj A| = 83 - 1 ⇒|Adj A| = 82 ⇒|Adj A| = 64 India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Determinants: For two invertible matrices A and B, we have: det(A × B) = det(A) × det(B), which can also be written as |A × B| = |A| × |B|. Therefore, det A = 0 As we know, AA-1 = I \(\Rightarrow {\rm{A}} \times \left({\frac{{{\rm{Adj}\;A}}}{{\det {\rm{A}}}}} \right) = {\rm{I}}\) ⇒ A (Adj A) = det A × I For singular matrix, det A = 0 ∴ A (Adj A) = 0 India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Consider a matrix A and let its inverse be A - 1 \({A^{ - 1}} = \frac{{{\rm{adj}\;}}\left({\rm{A}} \right)}{\rm{\;}}}{{{\rm{det}\;}}\left({\rm{A}} \right)}\) Here; adj (A) is adjoint of matrix A and det (A) is determinant of matrix A. Calculation: Given: \(A = \left({\begin{array}{*{20}{c}} {\cos \theta }&{\sin \theta }&0\\ { - \sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right)\) Determinant of A: |A| = cos θ {cos θ × 1 – 0} – sin θ {-sin θ × 1 – 0} + 0 = cos2 θ + sin2 θ = 1 Finding minors of the matrix: m11 = cos θ × 1 – 0 = cos θ m12 = - sin θ × 1 – 0 = -sin θ m13 = 0 m21 = sin θ × 1 – 0 = sin θ m22 = cos θ × 1 – 0 = cos θ m23 = 0 m31 = sin θ × 0 – 0 × cos θ = 0 m32 = sin θ × 0 – 0 × cos θ = 0 m33 = cos θ × cos θ – (-sin θ) × sin θ = 1 Finding co-factors: \(C = \left[{\begin{array}{*{20}{c}} {\cos \theta }&{\sin \theta }&0\\ { - \sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right]\) Now, adj (A) = CT \(\Rightarrow adj\;\left(A \right) = \left[{\begin{array}{*{20}{c}} {\cos \theta }&{ - \sin \theta }&0\\ {\sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right]\) ∴ \({A^{ - 1}} = \frac{1}{{\left| A \right|}} \times \left[{\begin{array}{*{20}{c}} {\cos \theta }&{ - \sin \theta }&0\\ {\sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right]\) \(\Rightarrow {A^{ - 1}} = \left[{\begin{array}{*{20}{c}} {\cos \theta }&{ - \sin \theta }&0\\ {\sin \theta }&{\cos \theta }&0\\ 0&0&1 \end{array}} \right]\) India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students adj A(adj (A))TATboth 1 and 2All of the above Concept: Transpose of a Matrix: The new matrix obtained by interchanging the rows and columns of the original matrix is called the transpose of the matrix. Calculation: We know that |adj(A)| = |A|n - 1. India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students \(\left[{\begin{array}{*{20}{c}} 2&{ - 5}&{32}\\ 0&1&{ - 6}\\ 0&0&2 \end{array}} \right]\)\(\left[{\begin{array}{*{20}{c}} { - 1}&0&0\\ 0&{ - 2}&0\\ 0&{ - 6}&1 \end{array}} \right]\)\(\left[{\begin{array}{*{20}{c}} { - 1}&0&0\\ 0&{ - 2}&0\\ 0&{ - 6}&1 \end{array}} \right]\)\(\left[{\begin{array}{*{20}{c}} 1&0&0\\ 0&{ - 2}&0\\ 0&{ - 6}&1 \end{array}} \right]\)None of these Concept: Let \(A\; = \;\left[{{a_{ij}}} \right]\) be a square matrix. So to find the value of k, don't you have to use relation |A| = 1/|A-1| India’s #1 Learning Platform Start Complete Exam Preparation Daily Live MasterClasses Practice Question Bank Mock Tests & Quizzes Get Started for Free Download App Trusted by 2,73,45,578+ Students Concept: Determinants: For two invertible matrices A and B, we have: det(A × B) = det(A) × det(B), which can also be written as |A × B| = |A| × |B|. Option 3 : \(\rm - \frac1{15}\) Concept: For an invertible matrix A: A-1 = \(\rm \frac{adj(A)}{|A|}\). ⇒ |A| = k × (k2 – 1) – 1 ×(k - 1) + 1 × (1 - k) = k × (k - 1) × (k + 1) – 2(k - 1) ≠ 0 ⇒ (k - 1)2 × (k + 2) ≠ 0 ⇒ k ≠ 1 and k ≠ -2. ∴ A[adj(A)] = 0, or A[adj(A)] is a null matrix. Explore more from Mathematics here. \(\rm |A|=\begin{vmatrix}1 & 0 & 2 \\ 5 & 1 & k \\ 1 & 1 & 1 \end{vmatrix}=0\) ⇒ 1(1 × 1 - 1 × x) + 0(1 × x - 1 × 5) + 2(5 × 1 - 1 × 1) = 0 ⇒ 1 - x + 0 + 8 = 0 ⇒ x = 9.

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