PARISHRAM 2026

Mathematics

Determinants

DPP: 3

Q1 If matrix A is invertible then

(A) $|A| \neq 0$ (B) $|A| = 0$
(C) $|A| = 1$ (D) $|A| = -1$

Q2 If $A=\begin{bmatrix}2 & \lambda & -3\\ 0 & 2 & 5\\ 1 & 1 & 3\end{bmatrix}$, then A^{-1} exists, if

(A) $\lambda = 2$
(B) $\lambda \neq 2$
(C) $\lambda \neq -2$
(D) None of these

Q3 Find k for which matrix

$A=\begin{bmatrix}k & 2 & 3\\ -1 & 0 & 5\\ 3 & 1 & 1\end{bmatrix}$ is invertible?

(A) $k \neq \frac{29}{5}$
(B) $k \neq \frac{27}{5}$
(C) $k \neq \frac{23}{5}$
(D) $k \neq \frac{21}{5}$

Q4 The inverse of $\begin{bmatrix}-4 & 3\\ 7 & -5\end{bmatrix}$ is

(A) $\begin{bmatrix}-5 & 3\\ 7 & -4\end{bmatrix}$
(B) $\begin{bmatrix}5 & 3\\ 7 & 4\end{bmatrix}$
(C) $\begin{bmatrix}-5 & 7\\ 3 & -4\end{bmatrix}$
(D) $\begin{bmatrix}-5 & -3\\ -7 & -4\end{bmatrix}$

Q5 If $\begin{bmatrix}1 & -\tan\theta\\ \tan\theta & 1\end{bmatrix}\begin{bmatrix}1 & \tan\theta\\ -\tan\theta & 1\end{bmatrix}^{-1}$
$=\begin{bmatrix}a & -b\\ b & a\end{bmatrix}$,
then

(A) a = 1 = b
(B) a = cos 2θ, b = sin 2θ
(C) a = sin 2θ, b = cos θ
(D) a = cos θ, b = sin θ

Q6 If $A=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 59 & 69 & -1\end{bmatrix}$, then A^{-1}

(A) is A (B) is (–A)
(C) is A2 (D) does not exist

Q7 If $A=\begin{bmatrix}1 & -2 & 4\\ 2 & -1 & 3\\ 4 & 2 & 0\end{bmatrix}$ is the adjoint of a square matrix B, then B^{-1} is equal to

(A) $\pm \mathrm{A}$
(B) $\pm\sqrt{2}A$
(C) $\pm\frac{1}{\sqrt{2}}B$
(D) $\pm\frac{1}{\sqrt{2}}\ \mathrm{A}$

Q8 If A and B are invertible matrices, then which of the following is not correct?

(A) $\operatorname{adj}A = |A| \cdot A^{-1}$
(B) $\det(A)^{-1} = [\det(A)]^{-1}$
(C) $(AB)^{-1} = B^{-1}A^{-1}$
(D) $(A+B)^{-1} = B^{-1} + A^{-1}$

Q9 If A is an invertible matrix of order 2, then $\det(A^{-1})$ is equal to

(A) det(A)

(B) $\frac{1}{\det(A)}$

(C) 1

(D) 0

Q10 If $|A| = 2$, where A is a 2×2 matrix, then $|4A^{-1}|$ equals:

(A) 4

(B) 2

(C) 8

(D) $\frac{1}{32}$

Answer Key

Q1	A
Q2	D
Q3	A
Q4	B
Q5	B
Q6	A
Q7	D
Q8	D
Q9	B
Q10	C

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

A matrix is invertible if it is a non-singular matrix i.e. |A| ≠ 0.

Video Solution:

Q2 Text Solution:

A^{-1} exists if and only if |A| ≠ 0

$$\Rightarrow \begin{vmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{vmatrix} \neq 0$$

$$\Rightarrow 2(6-5)-\lambda(0-5)-3(0-2) \neq 0$$

$$\Rightarrow 2+5\lambda+6 \neq 0$$

$$\Rightarrow \lambda \neq \frac{-8}{5}$$

Video Solution:

Q3 Text Solution:

A matrix is invertible if its determinant is not equal to zero.

$$\therefore \begin{vmatrix} k & 2 & 3 \\ -1 & 0 & 5 \\ 3 & 1 & 1 \end{vmatrix} \neq 0$$

$$\Rightarrow k(0-5)-2(-1-15)+3(-1) \neq 0$$

$$\Rightarrow -5k+32-3 \neq 0$$

$$\Rightarrow \ -5k+29 \neq 0$$

$$\Rightarrow k \neq \frac{29}{5}$$

Video Solution:

Q4 Text Solution:

Given, $A = \begin{bmatrix} -4 & 3 \\ 7 & -5 \end{bmatrix}$

$$\therefore \ |A| = 20-21 = -1$$

$$\text{And adj } A = \begin{bmatrix} -5 & -7 \\ -3 & -4 \end{bmatrix}^T = \begin{bmatrix} -5 & -3 \\ -7 & -4 \end{bmatrix}$$

$$\therefore \ A^{-1} = \frac{1}{|A|}(\text{adj}A) = \begin{bmatrix} 5 & 3 \\ 7 & 4 \end{bmatrix}$$

Video Solution:

Q5 Text Solution:

We have,

$$\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1}$$

$$= \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$$

$$\text{Now, } \begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1}$$

$$= \frac{1}{\sec^2\theta} \begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \cos^2\theta & -\tan\theta\cos^2\theta \\ \cos^2\theta\tan\theta & \cos^2\theta \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix} \begin{bmatrix} \cos^2\theta & -\tan\theta\cos^2\theta \\ \cos^2\theta\tan\theta & \cos^2\theta \end{bmatrix} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} \cos^2\theta - \cos^2\theta\tan^2\theta & -2\tan\theta\cos^2\theta \\ 2\tan\theta\cos^2\theta & \cos^2\theta - \cos^2\theta\tan^2\theta \end{bmatrix}$$

$$= \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$$

$\therefore\ a = \cos^2\theta - \cos^2\theta\tan^2\theta$ and b

$= 2\tan\theta\cos^2\theta$

$\Rightarrow a = \cos^2\theta\left(1 - \frac{\sin^2\theta}{\cos^2\theta}\right)$ and $b = \frac{2\sin\theta}{\cos\theta}$

$\cdot \cos^2\theta$

$\Rightarrow a = \cos^2\theta - \sin^2\theta = \cos 2\theta$ and

$b = 2\sin\theta\cos\theta = \sin 2\theta$

Video Solution:

Q6 Text Solution:

Given, $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 59 & 69 & -1 \end{bmatrix}$

Here, |A| = –1 and

$$adjA = \begin{bmatrix} -1 & 0 & -59 \\ 0 & -1 & -69 \\ 0 & 0 & 1 \end{bmatrix}^T$$

$$= \begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ -59 & -69 & 1 \end{bmatrix}$$

$$\therefore A^{-1} = \frac{1}{|A|}(\text{adj}A) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 59 & 69 & -1 \end{bmatrix}$$

$= A$

Video Solution:

Q7 Text Solution:

$$|A| = \begin{vmatrix} 1 & -2 & 4 \\ 2 & -1 & 3 \\ 4 & 2 & 0 \end{vmatrix}$$

= 1(0 – 6) + 2(0 – 12) + 4(4 + 4) = 2 ....(i)

Given, A = adjB

|A| = |adj B|

|adj B| = 2 (Using (i))

$|B|^2 = 2$ [$|adj\ B| = |B|^{3-1}$, where B is 3 × 3 matrix]

$\Rightarrow |B| = \pm\sqrt{2}$

$\therefore B^{-1} = \pm\frac{1}{\sqrt{2}}A\left[\because B^{-1} = \frac{1}{|B|}(\text{adj}B)\right]$

Video Solution:

Q8 Text Solution:

Since, A and B are invertible matrices. So, we can say that

$(AB)^{-1} = B^{-1}A^{-1}$ ......(i)

We know that

$A^{-1} = \frac{1}{|A|}(\text{adj}A)$

adj A = |A| A^{-1} ......(ii)

Also, $\det(A)^{-1} = [\det(A)]^{-1}$

$\Rightarrow \det(A)^{-1} = \frac{1}{[\det(A)]}$

$\det(A)\ \det(A)^{-1} = 1$ ...... (iii)

which is true.

Video Solution:

Q9 Text Solution:

We know, $AA^{-1} = I$

$\therefore |AA^{-1}| = |I|$

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

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

Video Solution:

Q10 Text Solution:

$|4A^{-1}|$

$= 4^2 |A^{-1}|$ $(\because |kA| = k^n |A|, n$ is order of $A)$

$\Rightarrow |4A^{-1}| = 4^2 \times \frac{1}{|A|}$ $\left(\because |A^{-1}| = \frac{1}{|A|}\right)$

$\Rightarrow |4A^{-1}| = 4^2 \times \frac{1}{2}$

$\Rightarrow |4A^{-1}| = 8$

Video Solution:

Android App | iOS App | PW Website