

# NCERT/CBSE MATHEMATICS CLASS 12 textbook

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MISCELLANEOUS EXERCISES

Answers to NCERT/CBSE MATH (Class XII) textbook

Chapter 4

DETERMINANTS

18. If  $x, y, z$  are nonzero real numbers, then the inverse of matrix  $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$  is

(A)  $\begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

(B)  $xyz \begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

(C)  $\frac{1}{xyz} \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

(D)  $\frac{1}{xyz} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

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$$18. |A| = \begin{vmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{vmatrix} = xyz$$

$$\Rightarrow |A| \neq 0$$

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

$$\text{Cofactor matrix (A)} = \begin{bmatrix} yz & 0 & 0 \\ 0 & zx & 0 \\ 0 & 0 & xy \end{bmatrix}$$

$$\text{adj}(A) = \begin{bmatrix} yz & 0 & 0 \\ 0 & zx & 0 \\ 0 & 0 & xy \end{bmatrix}' = \begin{bmatrix} yz & 0 & 0 \\ 0 & zx & 0 \\ 0 & 0 & xy \end{bmatrix}$$

$$\Rightarrow A^{-1} = \frac{\text{adj}(A)}{|A|} = \frac{\begin{bmatrix} yz & 0 & 0 \\ 0 & zx & 0 \\ 0 & 0 & xy \end{bmatrix}}{xyz} = \begin{bmatrix} \frac{yz}{xyz} & 0 & 0 \\ 0 & \frac{zx}{xyz} & 0 \\ 0 & 0 & \frac{xy}{xyz} \end{bmatrix} = \begin{bmatrix} \frac{1}{x} & 0 & 0 \\ 0 & \frac{1}{y} & 0 \\ 0 & 0 & \frac{1}{z} \end{bmatrix}$$

$$\Rightarrow (A)$$

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