Related Questions with Solutions

Questions

Quetion: 01

The value of the determinant

$$\begin{vmatrix} -(2^5+1)^2 & 2^{10}-1 & \frac{1}{2^5-1} \\ 2^{10}-1 & -(2^5-1)^2 & \frac{1}{2^5+1} \\ \frac{1}{2^5-1} & \frac{1}{2^5+1} & -\frac{1}{(2^{10}-1)^2} \end{vmatrix}$$

is -
A. 0
B. 1
C. 2
D. 4

Solutions

Solution: 01

Taking $2^5+1=a$ and $2^5-1=b$, then $2^{10}-1=(2^5+1)(2^5-1)=ab$, therefore the given determinant equals.

$$\Delta = \begin{vmatrix} -a^2 & ab & \frac{1}{b} \\ ab & -b^2 & \frac{1}{a} \\ \frac{1}{b} & \frac{1}{a} & -\frac{1}{a^2b^2} \end{vmatrix}$$

Multiplying R_1 with b, R_2 with a and R_3 with a^2 b^2

$$\Delta = \frac{1}{a^3b^3} \begin{vmatrix} -ba^2 & ab^2 & 1 \\ ba^2 & -ab^2 & 1 \\ ba^2 & ab^2 & -1 \end{vmatrix}$$

$R_1 \to R_1 + R_2$

$$= \frac{1}{a^3b^3} \begin{vmatrix} 0 & 0 & 2 \\ ba^2 & -ab^2 & 1 \\ ba^2 & ab^2 & -1 \end{vmatrix}$$

Expanding along R_1

$$= \frac{2}{a^3b^3} \cdot \begin{vmatrix} ba^2 & -ab^2 \\ ba^2 & ab^2 \end{vmatrix}$$

$$= \frac{2}{a^3b^3} (a^3b^3) \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix} = 4$$

Correct Options

Answer:01
Correct Options: D