

Q- $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$ & $f(x)$ is defined

as $f(x) = \det. (A^T A^{-1})$ then the

value of $\underbrace{f(f(f(\dots f(x))))}_{n \text{ times}}$ is — $(n \geq 2)$

Soln- let $y = \underbrace{f(f(f(\dots f(x))))}_{(n-1) \text{ times}}$

$$\begin{aligned} \text{Now, } f(x) &= |A^T \cdot A^{-1}| \\ &= |A^T| |A^{-1}| \\ &= |A| \cdot \frac{1}{|A|} \end{aligned}$$

$$\boxed{f(x) = 1} \quad \forall x$$

As value of $f(x)$ is independent of x , so we can use any variable in place of x . If we use 'y' variable in place of x

Then, $\boxed{f(y) = 1} \rightarrow \textcircled{1}$

$$\underbrace{f(f(f(\dots f(x))))}_{n \text{ times}} = f(y)$$

$$= \boxed{1} \quad \text{Ans}$$