



THE GURUKUL INSTITUTE

PLOT 5C, 2ND FLOOR, GANAPATI COMPLEX, SEC-13, OPP. JAIPURIA SCHOOL, VASUNDHARA, GHAZIABAD (U.P)

TEST PAPER Maths XII

1. Prove that $\cot^{-1} \left[\frac{\cos x - \sin x}{\cos x + \sin x} \right] = \frac{\pi}{4} + x$

2. If $f(x) = \frac{3x-2}{2x-3}$ prove that $f(f(x)) = x$

3. If $\cos^{-1} \frac{x^2 - y^2}{x^2 + y^2} = \tan^{-1} a$ prove that $\frac{dy}{dx} = \frac{y}{x}$

4. Find value of x if $[1 \times 1] \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$

5. Let * be a binary operation of $N \times N$ defined by $(a, b) * (c, d) = (a+b+c+d)$. show that the operation * is commutative as well as associative. Find the identity element for the operation * on $N \times N$, if any.

6. If $y = \frac{\sin x}{1 + \cos x} \cdot \frac{1 + \sin x}{1 + \cos x} \cdot \frac{1 + \sin x}{1 + \cos x} \dots \infty$ find $\frac{dy}{dx}$

7. Differentiate $\sec^{-1} \frac{1}{2x^2 - 1}$ with respect to $\sqrt{1-x^2}$ at $x = \frac{1}{2}$.

8. Using mathematical induction prove that if $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ then $A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$