Problems for AIEEE and WBJEE

1. Show that $\mu = 1$ if $\cot^{-1}\left(\sqrt{\cos\alpha}\right) + \tan^{-1}\left(\sqrt{\cos\alpha}\right) = \mu$
2. Let R be a relation on ¢ given by aRb *iff* $a = 2^k b$ for some integer k, show that R is an equivalence relation.
3. If $a^2 + b^2 + c^2 = -2$, and $f(x) = \begin{vmatrix} 1+a^2x & (1+b^2)x & (1+c^2)x \\ (1+a^2)x & 1+b^2x & (1+c^2)x \\ (1+a^2)x & (1+a^2)x & 1+c^2x \end{vmatrix}$, show that f(x) is a polynomial of degree 2.
4. Find the points on the curve $y^3 + 3x^2 = 12y$, where the tangent is vertical.
5. Let x_1 and x_2 be the solutions of the equation $\sin^{-1}\left(x^2 - 3x + \frac{5}{2}\right) = \frac{\pi}{6}$. then find the value of . $x_1^{\,2} + x_2^{\,2}$.
6. If $f(x)$ is a function such that $f'(x) + f(x) = 0$ and $g(x) = f^2(x) + f'^2(x)$ and g(3)=3 find g(8).
7. Show that the function $f(x) = x/2 + 2/x$ has a local minimum at x=2.
8. If the curves $x^2 = 9A(9-y)$ and $x^2 = A(y+1)$ intersect orthogonally, then show that $A = 4$.
9. Find the maximum value of $\frac{1}{4x^2 + 2x + 1}$.
10. If $\cot(\cos^{-1}x) = \sec\left\{\tan^{-1}\left(\frac{a}{\sqrt{b^2 - a^2}}\right)\right\}$, then show that $x = \frac{b}{\sqrt{2b^2 - a^2}}$.
11. Find the set of points where the function $f(x) = \frac{x}{1+|x|}$ is differentiable.
12. Find the equation of the tangent to the curve at the point where it crosses the y-axis. $y = be^{-\frac{x}{a}}$.
13. If $y^x . x^y = 1$, find $\frac{dy}{dx}$.
14. If $y = \frac{1}{1+x^{m-n}} + \frac{1}{1+x^{n-m}}$, find the value of $\frac{dy}{dx}$.
15. Find the value of $\tan\left\{\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right\} + \tan\left\{\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right\}$.
16. Let $A = \begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 3\alpha \\ 0 & 0 & 5 \end{bmatrix}$. If $|A^2| = 25$, then find $|\alpha|$.
17. If $f(x) = x^n$, find $f(1) - \frac{f'(1)}{1!} + \frac{f''(1)}{2!} - \frac{f'''(1)}{3!} + \ldots\ldots\ldots\ldots + (-1)^n \frac{f^{(n)}(1)}{n!}$.

Author-Vinod Singh

Education : M.Sc Pure Mathematics'09,(Calcutta University) First Class.

B.Sc Mathematics Honours'07,(St. Xavier's kolkata) First Class.

Special interest in Algebra, Algebraic and Analytical Number Theory,

Cryptography, Algebraic Topology and Geometry.

http://kolkatamaths.yolasite.com

http://facebook.com/kolkatamaths

Best of luck!

☺

Call us on +91-9038126497

Mail-maths.kolkata@gmail.com/maths.vinu@gmail.com

Tags: MCQ, Short, answer, type, question, solved, problems, IIT, AIEEE, WBJEE, relation, functions, derivative, matrices, determinants, trigonometry, inverse, circular Co-ordinate, geometry, two-dimension, tangent, normal