

MATHEMATICS WORK SHEET - (1)

DATE: 24 /06 /17

TIME: 1 HRS

Q1. If $y = \tan^{-1}\left(\frac{1+\sin x}{\cos x}\right)$

Q2. Find the value of a and b such that the function is continuous $f(x) = \begin{cases} 5 & \text{if } x \leq 2 \\ ax+b & \text{if } 2 < x < 10 \\ 21 & \text{if } x \geq 10 \end{cases}$

Q3. Using properties of determinant show that $\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix} = 2(x+y+z)^3$

Q4. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$, Prove that $A^n = \begin{bmatrix} 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \end{bmatrix}$

Q5. Show that $\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{vmatrix} = 4a^2b^2c^2$

Q6. A ladder 5m long is leaning against the wall. The bottom of the ladder is pulled along the ground, away from the wall at the rate of 2cm/s. How fast is its height on the wall decreasing when the foot of the ladder is 4m away from the wall?

Q7. Differentiate $\cos x \cdot \cos 2x \cdot \cos 3x$

Q8. If $y = \sin^{-1} x$, show that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$

Q9. If $x\sqrt{1+y} + y\sqrt{1+x} = 0$, prove that $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$

Q10. Solve system of equation by matrix method, $2x + y + z = 1$, $2x - 4y - 2z = 3$, $3y - 5z = 9$.

Q11. Prove that; $\begin{vmatrix} a^2+1 & ab & -2b \\ 2ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = (1+a^2+b^2+c^2)$

Q12. Find dy/dx $xy = e^{(x-y)}$.

Q13. A particle moves along the curve $6y = x^3 + 2$. Find the points on the curve at which the y-coordinate is changing 8 times as fast as the x coordinates.

Q14. If $y^x = e^{y-x}$, prove that $\frac{dy}{dx} = \frac{(1+\log y)^2}{\log y}$

Q15. Differentiate w.r.t.x, $f(x) = \sin^{-1}\left(\frac{2^{x+1}}{1+4^x}\right)$
