Find dy/dx

1 . $y = x^{\log x} + (\log x)^x$

2 . If $y = A e^{mx} + Be^{nx}$, show that $\frac{d^2y}{dx^2} - (m+n)\frac{dy}{dx} + mny = 0$

3 . If $y = 3\cos(\log x) + 4\sin(\log x)$, show that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$

4 . If $(\cos x)^y = (\sin y)^x$, find dy/dx

5 . If $x\sqrt{1-y^2} + y\sqrt{1-x^2} = a$, then prove that $\frac{dy}{dx} = -\sqrt{\frac{1-y^2}{1-x^2}}$

6 . Differentiate : $\sqrt{\tan\sqrt{x}}$ w.r.t.x .

7 . If $y = (\log x)^{\cos x} + \frac{x^2+1}{x^2-1}$, find dy/dx

8 . If $x = a(\theta - \sin\theta), y = a(1+\cos\theta),$ *find* $\frac{d^2y}{dx^2}$

9 . If $y = \tan^{-1}\sqrt{\frac{1-\cos x}{1+\cos x}}$, *find* $\frac{dy}{dx}$

10.If $y = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, *find* $\frac{dy}{dx}$

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

12. If $y = \tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)$, *find* $\frac{dy}{dx}$

13. If x = a (cosθ +θ sinθ) , y = a (sinθ – θ cosθ) find dy/dx

14 . If e^x (x + 1) = 1 , show that $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$

15. Verify Rolle's theorem for the function $f(x) = x^2 + 2x - 8$, $x \in [-4, 2]$

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

17. Find the value of K so that the function is continuous at x = 5 , $f(x)=\begin{cases} kx+1 & if\ , x\le 5 \\ 3x-5 & if\ , x\rangle 5 \end{cases}$

18. Find the value of a and b if the function $f(x)=\begin{cases} 3ax+b & if \quad x\rangle 1 \\ 11 & if \quad x=1 \\ 5ax-2b & if \quad x\langle 1 \end{cases}$ is continuous at x=1

20. For what value of λ is the function defined by $f(x)=\begin{cases} \lambda\left(x^2-2x\right) & if\ , x\le 3 \\ 4x+1 & if\ , x=0 \end{cases}$,continuous at x =0 .

21. Find the value of a and b such that the function is continuous $f(x)=\begin{cases} 5 & if \quad x\le 2 \\ ax+b & if \quad 2\langle x\langle 10 \\ 21 & if \quad x\ge 10 \end{cases}$

22. Find all the points of discontinuity of f defined by f(x) = lxl – l x + 1 l .

23. Find the value of K for a continuous function , $f(x)=\begin{cases} \dfrac{k\cos x}{\pi-2x} & if\ , x\ne \dfrac{\pi}{2} \\ 3 & if\ , x=\dfrac{\pi}{2} \end{cases}$ at x =π/2

MATRICES AND DETERMINANTS

24. If $A=\begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$ **, find A $^{-1}$**

25. If $\begin{bmatrix} x+3y & y \\ 7-x & 4 \end{bmatrix}=\begin{bmatrix} 4 & -1 \\ 0 & 4 \end{bmatrix}$, **find the value of x and y .**

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

27. Using matrices, solve the system of equations, 2x+8y+5z=5 , x+y+z=-2 , x+2y-z=2 .

28. If $A=\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ **, prove that $A^3 – 6A^2 + 7A + 2I = 0$.**

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

30. Using elementary transformations find inverse of a matrices,

(1) $\begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$ (2) $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

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

32. Prove that : $\begin{vmatrix} b+c & c+a & a+b \\ q+r & r+p & p+q \\ y+z & z+x & x+y \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$

Last date of submission 25th June 2016

Do it on the A-4 size ruled sheet

Attach one cover page showing Name, class ,subject and Title as assignment.