INDIAN SCHOOL DARSAIT

Class XII — **Mathematics Worksheet**

Worksheet # 8 Differentiability # 2

(Chapter – 5: Continuity & Differentiability)

CLASS WORK

	Differentiate the following with respect to x
1.	i) $(\sin x)^{\cos x}+x^{\sin x}$ ii) $x^{\cos x}+(\cos x)^{x}$ iii) $x^{\sin x-\cos x}+\frac{x^2-1}{x^2+1}$ iv) $\left(x+\frac{1}{x}\right)^{x}+x^{\left(1+\frac{1}{x}\right)}$ v) $(\log x)^{\cos x}+\frac{x^2+1}{x^2-1}$ vi) $x^{x}+a^{x}+x^{a}+a^{a}$
2.	i) $\sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$ ii) $(x+3)^2(x+4)^3(x+5)^4$ iii) $\cos x.\cos 2x.\cos 3x$ iv) $(x\cos x)^{x}+(x\sin x)^{1/x}$
3.	If $x^{y}=y^{x}$, find $\frac{dy}{dx}$
4.	If $x^{y}.y^{x}=1$, prove that $\frac{dy}{dx}=\frac{y(y+x\log y)}{x(y\log x+x)}$
5.	If $e^{y}=y^{x}$, prove that $\frac{dy}{dx}=\frac{(\log y)^2}{\log y-1}$
6.	If $(\cos y)^{y}=(\sin y)^{x}$, prove that $\frac{dy}{dx}=\frac{\log\sin y+y\tan x}{\log\cos x-x\cot y}$
7.	If $x^{y}=e^{x-y}$, prove that $\frac{dy}{dx}=\frac{\log x}{(\log(xe))^2}$
8.	If $x^{p}y^{q}=(x+y)^{p+q}$, , prove that $\frac{dy}{dx}=\frac{y}{x}$
9.	If $x^{16}y^{9}=(x^2+y)^{17}$, prove that $x\frac{dy}{dx}=2y$
10.	Find $\frac{dy}{dx}$ if $x^{y}+y^{x}=\log a$
11.	If $x^{y}+y^{x}=(x+y)^{x+y}$, find $\frac{dy}{dx}$
12.	If $y=\sqrt{\text{Sin}\,x+\sqrt{\text{Sin}\,x+\sqrt{\text{Sin}\,x=.....\infty}}}$, prove that $\frac{dy}{dx}=\frac{\text{Cos}\,x}{2y-1}$
13.	If $y=\text{Sin}\,x^{\text{Sin}\,x^{\text{Sin}\,x.....\infty}}$, prove that $\frac{dy}{dx}=\frac{y^2Cotx}{1-y\log\text{Sin}\,x}$
14.	If $y=a^{x^{a^{x}.....\infty}}$, prove that $\frac{dy}{dx}=\frac{y^2\log y}{x(1-y\log x\log y)}$
15.	If $y=\cfrac{\text{Sin}\,x}{1+\cfrac{\text{Cos}\,x}{1+\cfrac{\text{Sin}\,x}{1+\cfrac{\text{Cos}\,x}{1+.....\infty}}}}$, prove that $\frac{dy}{dx}=\frac{(1+y)\cos x+y\sin x}{1+2y+\cos x-\sin x}$

HOME WORK

	Differentiate the following with respect to x :-

INDIAN SCHOOL DARSAIT

Class XII **Mathematics Worksheet**

Worksheet # 8 Differentiability # 2

(Chapter – 5: Continuity & Differentiability)

16.	$(\cos x)^x + (\sin x)^{1/x}\ x^{\sin^{-1}x}\ x^{\cos x} + \sin x^{\tan x}\ (\sin x)^x + \sin^{-1}\sqrt{x}\ (\sin x - \cos x)^{\sin x - \cos x}\ x^{x^2-3} + (x-3)^{x^2}$ $x^{\cos x} + \frac{x^2+1}{x^2-1}\ 10^{10^x}\ \sin(x^x),$
17.	If $y = a^x + e^x + x^x + x^a$,find $\frac{dy}{dx}$
18.	If $x^m.y^n = 1$, prove that $\frac{dy}{dx} = \frac{-my}{nx}$
19.	Find $\frac{dy}{dx}$ if $(\cos x)^y = (\cos y)^x$
20.	If $(\cos x)^y = (\tan x)^y$, prove that $\frac{dy}{dx} = \frac{\log\tan y + y\tan x}{\log\cos x - x\sec y\cos ecy}$
21.	If $x^{13}y^7 = (x+y)^{20}$, prove that $\frac{dy}{dx} = \frac{y}{x}$
22.	If $e^x + e^y = e^{x+y}$, prove that $\frac{dy}{dx} = -e^{y-x}$
23.	Given $y = \cos\left(\frac{x}{2}\right).\cos\left(\frac{x}{4}\right).\cos\left(\frac{x}{8}\right)..... = \frac{\sin x}{x}$, prove that $\frac{1}{2^2}\sec^2 x/2 + \frac{1}{2^4}\sec^2 x/4 + \frac{1}{2^8}\sec^2 x/8 + ... = \cos ec^2 x - \frac{1}{x^2}$
24.	Find $\frac{dy}{dx}$ if $x^y + y^x + x^x = a^b$
25.	Differentiate $\log\left(x^x + \text{Cos}ec^2 x\right)$
26.	If $x^y.y^x = 1$, prove that $\frac{dy}{dx} = \frac{y(y + x\log y)}{x(x + y\log x)}$
27.	If $y = e^{x+e^{x+e^{x+.....\infty}}}$, prove that $\frac{dy}{dx} = \frac{y}{1-y}$
28.	If $y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}.....\infty}}$, prove that $\frac{dy}{dx} = \frac{y^2}{x(2 - y\log x)}$
	SELF STUDY
29.	If $x^y = y^x$, find $\frac{dy}{dx}$
30.	Find $\frac{dy}{dx}$ if $y = x^x - 2^{\text{Sin}x}$
31.	If $y = \text{Tan}\, x^{\tan x^{\tan x.....\infty}}$, prove that $\frac{dy}{dx} = 2$ at $x = \frac{\pi}{4}$
32.	Find $\frac{dy}{dx}$ if $y = 10^{x^{10^x}}$