INDIAN SCHOOL DARSAIT

Class XII — **Mathematics Worksheet**

Worksheet # 6 Continuity & Differentiability

(Chapter – 5: Continuity & Differentiability)

	CLASS WORK
1.	Show that the function $f(x)=\|x\|$ is continuous but not differentiable at x = 0.
2.	Show that the function f(x) = |x – 2|; x ∈ R is continuous but not differentiable at x = 2
3.	Show that the function f(x) = 2x - |x| is continuous but not differentiable at x = 0
4.	Discuss the differentiability of $f(x)=x\|x\|$ at x = 0.
5.	Write an example of a function which is continuous everywhere but not differentiable exactly at 5 points.
6.	Show that the function f defined as $f(x)=\begin{cases}3x-2, 0<x\le 1\\ 2x^2-x, 1<x\le 2\\ 5x-4, x>2\end{cases}$ is continuous at x = 2 but not differentiable at x = 2
7.	Check the differentiability of the function $f(x)=\begin{cases}x[x], 0\le x<2\\ (x-1), 2\le x<3\end{cases}$ at x = 2
8.	Examine the differentiability of the function f defined by $f(x)=\begin{cases}2x+3, -3\le x<-2\\ x+1, -2\le x<0\\ x+2, 0\le x\le 1\end{cases}$ at x = –2 and x = 0
9.	Find whether the following function is differentiable at x = 1 and x = 2 or not $f(x)=\begin{cases}x, x\le 1\\ 2-x, 1<x\le 2\\ -2+3x-x^2, x>2\end{cases}$
10.	Show that the function f(x) = |x + 1| + |x – 1|, x ∈ R , is not differentiable at x = -1 and x = 1.
11.	Find the value of p and q so that $f(x)=\begin{cases}x^2+3x+p, x\le 1\\ qx+2, x>1\end{cases}$ is differentiable at x = 1
	HOME WORK
12.	Show that the function f(x) = |x – 3|; x ∈ R is continuous but not differentiable at x = 3
13.	Show that the function f(x) = |x +1|; x ∈ R is continuous but not differentiable at x = – 1
14.	Check the differentiability of the function $f(x)=\begin{cases}1+x, x\le 2\\ 5-x, x>2\end{cases}$ at x = 2

15.	Show that $f(x)=\begin{cases}12x-13, x\le 3\\ 2x^2+5, x>3\end{cases}$ is differentiable at x = 3. Also find f$^{\prime}$(3)
16.	Show that the function f defined by $f(x)=\begin{cases}3x-2, 0<x\le 1\\ 2x^2-x, 1<x\le 2\\ 5x-4, x>2\end{cases}$ is continuous but not differentiable at x = 2
17.	Prove that the greatest integer function $f(x)=[x]$, $0<x<3$ is not differentiable at x = 1 and x = 2.
18.	Show that the function $f(x)=\lvert x-1\rvert+\lvert x+1\rvert$ for all x $\in$ R is not differentiable at x = 1 and x = –1.
	SELF STUDY
19.	A function $f:R\to R$ satisfy the equation f(x + y) = f(x).f(y)for all x,y $\in$R, $f(x)\neq 0$. Suppose that the function is differentiable at x = 0 and $f'(0)=2$. Prove that $f'(x)=2f(x)$.
20.	For what choice of a and b is the function $f(x)=\begin{cases}x^2, x\le c\\ ax+b, x>c\end{cases}$ differentiable at x = c.