

## Differentiability

(d) Does not exist

#### Basic Level

(a) 1

(b) o

1.	If $f(x) = \begin{cases} 1 & x < 0 \end{cases}$	then at $x = 0$ , the va	lue of $f'(x)$ is equal to	[Rajasth:	an PET 1	1990]
	$\left(1 + \sin x  ,  0 \le x\right)$	$\leq \pi/2$	1	- 3		
	(a) 1	(b) 0	(c) ∞	(d) Derivative	does	not
exist	If $f(x) =  x - 3 $ , then $f'(3)$	equals				
	(a) O	(b) 1	(c) -1	(d) Does not ex	ist	
3.	If $f(x) = \begin{cases} x \sin(1/x), & x \neq 0 \\ 0, & x = 0 \end{cases}$	then at $x = 0$ , the function	ı is			
	(a) Discontinuous		(b) Continuous but not differe	entiable		
	(c) Both continuous and	differentiable	(d) None of these			
4.	If $f(x) =  x - 3 $ , then f is			[Rajasth	an PET 1	1994]
	(a) Discontinuous at $x =$	2	(b)	Not differential	ole at <i>x</i>	= 2
	(c) Differentiable at $x =$	3	(d)	Continuous	but	not
diffe	rentiable at $x = 3$					
5.	If $f(x) = \begin{cases} x+1 & \text{when } x < 2 \\ 2x-1 & \text{when } x \ge 2 \end{cases}$	$\begin{cases} 2 \\ 2 \end{cases}$ , then $f'(x)$ at $x = 2$ equals	[Rajasthan	PET 1992; Karnatal	ka CET 2	2002]
	(a) 0	(b) 1	(c) 2	(d) Does not ex	ist	
6.	If $f(x) = \begin{cases} x^2 \sin(1/x), & \text{when} \\ 0, & \text{when} \end{cases}$	$x \neq 0$ , then at $x = 0$ , value $x = 0$	of $f'(x)$ equals	[Rajasth	an PET :	1991]
	(a) 1	(b) o	(c) ∞	(d) Does not ex	ist	
7•	If $\lim_{x \to c} \frac{f(x) - f(c)}{x - c}$ exists fir					
	(a) $\lim_{x \to c} f(x) = f(c)$	(b) $\lim_{x \to c} f'(x) = f'(c)$	(c) $\lim_{x \to c} f(x)$ does not exist	(d) $\lim_{x \to c} f(x)$ may	or may	y not
exist						
8.	If $f(x) = \frac{ x-1 }{ x-1 }, x \ne 1$ and	f(1) = 1. Then which of the f	ollowing statement is true			
9.		(b) Discontinuous at $x = 1$ $x, y \in R$ . If $f'(1) = 2$ and $f(4) = 1$		(d) Discontinuo	ous for a	x >1
	(a) 4	(b) 1	(c) $\frac{1}{2}$	(d) 2		
10.	The derivative of $f(x) \neq x$	$x \mid \text{ at } x = 0 \text{ is }$				

(c) -1

11.	If $f(x) = \begin{cases} e^x + ax, & x < 0 \\ b(x-1)^2, & x \ge 0 \end{cases}$ i	s differentiable at $x = 0$ the	en (a	, <i>b</i> ) is			
	(a) (-3,-1)	(b) (-3,1)	(c)	(3,1)	(d) $(3,-1)$		
12.	At the point $x = 1$ , the fundamental $x = 1$ and $x = 1$ .	nction $f(x) = \begin{cases} x^3 - 1; & 1 < x < \\ x - 1; & -\infty < x \end{cases}$	∞ ≤ 1				
diffe	(a) Continuous and differentiable	rentiable		(b)	Continuous	and	not
	(c) Discontinuous and di	ifferentiable	(d)	Discontinuous and not diff	erentiable		
13.	The function $ x^3 $ is						
11.66	(a) Differentiable every	where		(b)	Continuous	but	not
diffe	rentiable at $x = 0$ (c) Not a continuous fun	ction		(d)	A function v	ith range	[0
∞]	(c) Not a continuous fun	ection		(u)	A function v	itii Taiige	ιο,
14.	For the function $f(x) \neq x$	$ x^2 - 5x + 6 $ the derivative fr	om	the right $f'(2+)$ ; and the de	erivative from	left f'(2-)	are
respe	ectively						
	(a) 1, -1	(b) -1, 1	(c)	0, 2	(d) None of t	hese	
15.	Let $f(x)$ be an even funct	- · · · ·					
16.	(a) Is an even function Let $f(x)$ be an odd functi		(c)	May be even or odd	(d) None of t	hese	
	(a) Is an even function	(b) Is an odd function	(c)	May be even or odd	(d) None of t	hese	
17.	Let $g(x)$ be the inverse of	f the function $f(x)$ and $f'(x)$	=	$\frac{1}{(x)^3}$ . Then $g'(x)$ is equal to			
	(a) $\frac{1}{1+(g(x))^3}$	(b) $\frac{1}{1+(f(x))^3}$	(c)	$1 + (g(x))^3$	(d) $1 + (f(x))^3$		
18.	Let $g(x)$ be the inverse of	f an invertible function $f(x)$	whi	ich is differentiable at $x = c$	, then $g'(f(c))$ e	quals	
	(a) f'(c)	(b) $\frac{1}{f'(c)}$	(c)	f(c)	(d) None of t	hese	
19.	If $f(x) = \begin{cases} x+2 & , -1 < x \\ 5 & , x = 3 \\ 8-x & , x > 3 \end{cases}$	< 3 then at $x = 3, f'(x) =$				[MP PET 2	001]
	(a) 1		(c)	0	(d) Does not	exist	
20.	If $f(x) = (x - x_0) g(x)$ , when	e $g(x)$ is continous at $x_0$ , the					
	(a) 0	(b) $x_0$	(c)	$g(x_0)$	(d) None of t	hese	
21.	Function $f(x) =  x  +  x-x $	l   is not differentiable at			[Rajas	than PET 19	996]
	(a) $x = 1, -1$	(b) $x = 0, -1$	(c)	x = 0, 1	(d) $x = 1, 2$		
22.	If $f(x) = \begin{cases} e^x & ; x \le 0 \\  1-x  & ; x > 0 \end{cases}$ , then	nen				[Roorkee 1	995]
	(a) $f(x)$ is differentiable	at $x = 0$		(b)	f(x) is contin	uous at x =	= 0
	(c) $f(x)$ is differentiable	at $x = 1$		(d)	f(x) is contin	uous at x =	= 1
23.	The function which is co	ntinuous for all real values	of x	and differentiable at $x = 0$ ,	is		
	(a)   x	(b) log <i>x</i>	(c)	$\sin x$	(d) $x^{1/2}$		

24.	The number of points interval (0,2) is	at which the function $f(x)$	$\Rightarrow x - 0.5 +  x - 1  + \tan x$ does 1	not have a derivative in the						
				[UP SEAT 1995]						
	(a) 1	(b) 2	(c) 3	(d) 4						
25.	If $f(x) = \begin{cases} ax^2 + b, & b \neq b \\ bx^2 + ax + c, \end{cases}$	$0, x \le 1$ .Then $f(x)$ is continuous $x > 1$	uous and differentiable at $x = 1$	if						
	(a) $c = 0, a = 2b$	(b) $a = b, c \in R$	(c) $a = b, c = 0$	(d) $a = b, c \neq 0$						
26.	If $f(x) = \begin{cases} ax^2 - b,  x  < 1 \\ \frac{1}{ x },  x  \ge 1 \end{cases}$ i	(b) $a = b, c \in R$ is differentiable at $x = 1$ , the	en							
	(a) $a = \frac{1}{2}, b = -\frac{1}{2}$	(b) $a = -\frac{1}{2}, b = -\frac{3}{2}$	(c) $a = b = \frac{1}{2}$	(d) $a = b = -\frac{1}{2}$						
27.	The set of points where	the function $f(x) =  x-1  e^x$	is differentiable is							
	(a) R		(c) $R - \{-1\}$	(d) $R - \{0\}$						
28.		2 such that $f(1) = 2, f(2) = 8$ are	and $f(u+v) = f(u) + kuv - 2v^2$ for all	$u, v \in R$ and $u \neq v$ (k is a fixed						
	constant). Then (a) $f'(x) = 8x$	<b>(b)</b> $f(x) = 8x$	(c) $f'(x) = x$	(d) None of these						
29.		-	$\{x^3\}$ . The set of all points where							
_	·		,	[IIT Screening 2001]						
	(a) {-1,1}	(b) $\{-1,0\}$	(c) {0,1}	(d) $\{-1,0,1\}$						
30.	Let $f(x) = \begin{cases} 0, & x < 0 \\ x^2, & x \ge 0 \end{cases}$ then	hen for all values of $x$		[MP PET 2002]						
	(a) f is continuous but r	not differentiable	(b) $f$ is differentiable but not continuous (d) $f'$ is continuous and differentiable							
			(d) $f'$ is continuous and diffe	erentiable						
	$u(x) = \sin x$ 1 for x									
31.	If $\begin{cases} 0 \text{ for } x \end{cases}$	x = 0 then $u(x).v(x)$ has a de	rivative at $x = 1$ is							
	$v(x) = \operatorname{sgn}(x) = 0$ $\left[ -1 \text{ for } \right]$	x < 0								
	(a) cos 1	(b) sin 1	(c) Not continuous at $x = 1$							
32.	The coefficient $a$ and $b$	that make the function $f$	$f(x) = \begin{cases} \frac{1}{ x } & \text{for }  x  \ge 1\\ ax^2 + b & \text{for }  x  < 1 \end{cases}$ continuo	ous and differentiable at any						
point	t are given by									
	(a) $a = -1/2, b = 3/2$	(b) $a = 1/2, b = -3/2$	(c) $a=1, b=-1$	(d) None of these						
33.	If $f(x) = \int_{-1}^{x} t   dt$ , $x \ge -1$ ,	then		[UPSEAT 1994]						
	(a) $f$ and $f'$ are continu		(b) $f$ is continuous but $f'$ is not for $x+1>0$							
	(c) $f$ and $f'$ are continu		(d) $f$ is continuous at $x = 0$ but $f'$ is not so							
34.	Let $f(x) = \begin{cases} x^n \sin \frac{1}{x}; x \neq 0 \\ 0 ; x = 0 \end{cases}$	, then $f(x)$ is continuous by	ut not differentiable at $x = 0$ if							
	(a) $n \in (0,1]$	(b) $n \in [1, \infty)$	(c) $n \in (-\infty, \infty)$	(d) $n = 0$						
35.	-	is differentiable at $x = 0$	(-X (1 - X - 1 - 1	[IIT Screening 2001]						
26	(a) $\cos( x ) +  x $ If $x + 4 y  = 6y$ , then y as	(b) $\cos( x ) -  x $	(c) $\sin( x ) +  x $	(d) $\sin( x ) -  x $						
36.	x + y = 0y, then y as	5 a ranction of A 15								

(d) None of these

(d) Neither x = 0 nor x = 1

(c)  $\frac{dy}{dx} = \frac{1}{2}$  for all x

(a) Continuous at x = 0 (b) Derivable at x = 0

37.

The set of point where the function f(x) = x |x| is differentiable is

40. The function $f(x) = \sin^{-1}(\cos x)$ is  (a) Discontinuous at $x = 0$ (b) Continuous at $x = 0$ (c) Differe 41. Let $f(x) = (x+ x )  x $ . Then for all $x$ (a) $f$ is continuous (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous (c) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = \frac{x}{2}$ is  (b) $f(x) = \frac{x}{2}$ is  (c) $f(x) = \frac{x}{2}$ is  (d) $f(x) = \frac{x}{2}$ is  (e) $f(x) = \frac{x}{2}$ is differentiable function on $f(x) = \frac{x}{2}$ is differentiable at $f(x) = \frac{x}{2}$ and if $f(x) = \frac{x}{2}$ is differentiable at $f(x) = \frac{x}{2}$ and if $f(x) = \frac{x}{2}$ is differentiable at $f(x) = \frac{x}{2}$ and if $f(x) = \frac{x}{2}$ is differentiable at $f(x) = \frac{x}{2}$ and $f(x) = \frac{x}{2}$ and if	
39. Let $f(x) =  x $ and $g(x) \neq x^3 $ , then  (a) $f(x)$ and $g(x)$ both are continuous at $x = 0$ (b) $f(x)$ and $g(x)$ both are differentiable at $(c)$ $f(x)$ is differentiable but $g(x)$ is not differentiable at $x = 0$ 40. The function $f(x) = \sin^{-1}(\cos x)$ is  (a) Discontinuous at $x = 0$ (b) Continuous at $x = 0$ (c) Differe 1. Let $f(x) = (x +  x ) x $ . Then for all $x$ (a) $f(x) = (x +  x ) x $ . Then for all $x$ (a) $f(x) = (x +  x ) x $ . Then for all $x$ (a) $f(x) = (x +  x ) x $ . Then for all $x$ (b) $f(x) = (x +  x ) x $ is differentiable, is  (a) $f(x) = (x +  x ) x $ . Then for all $x$ (b) $f(x) = (x +  x ) x $ . Then for all $x$ (c) $f(x) = (x +  x ) x $ . The set of all those points, where the function $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = (x +  x ) x $ . The set of all those points, where the function on $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = (x +  x ) x $ . The set of all those points, where the function on $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(x) = (x +  x ) x $ . The set of all those points, where the function on $f(x) = \frac{x}{1+ x }$ is differentiable for some $x$ . (c) $f(x) = (x +  x ) x $ . The set of all those points, where the function of $f(x) = \frac{x}{1+ x }$ is differentiable for some $x$ . (c) $f(x) = (x +  x ) x $ . The set of all those points, where the function of $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points, where the function of $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points, where the function $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points, where the function $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points, where the function $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points, where the function $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points of the function $f(x) = (x +  x ) x $ is $f(x) = (x +  x ) x $ . The set of all those points of the function $f(x) = (x +  x ) x $	
(a) $f(x)$ and $g(x)$ both are continuous at $x=0$ (b) $f(x)$ and $g(x)$ both are differentiable at $(c)$ $f(x)$ is differentiable but $g(x)$ is not differentiable at $x=0$ (d) $f(x)$ and $g(x)$ differentiable at $x=0$ (d) $f(x)$ and $g(x)$ differentiable at $x=0$ (e) $f(x)$ and $g(x)$ differentiable at $x=0$ (for $f(x)=\sin^{-1}(\cos x)$ is (a) Discontinuous at $x=0$ (b) Continuous at $x=0$ (c) Differentiable $f(x)=(x+ x )$ and $f(x)=(x+ x )$ is differentiable, is (a) $f(x)=(x+ x )$ and $f(x)=(x+ x )$ is differentiable function on $f(x)=\frac{x}{1+ x }$ is differentiable, is (a) $f(x)=(x+ x )$ and $f(x)$	of these
(c) $f(x)$ is differentiable but $g(x)$ is not differentiable at $x=0$ (d)  40. The function $f(x) = \sin^{-1}(\cos x)$ is  (a) Discontinuous at $x=0$ (b)  Continuous at $x=0$ (c) Differentiable for some $x$ (c) Differentiable, is  (a) $f$ is continuous (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous.  (a) $f$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (a) $f$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (a) $f$ is differentiable, is  (a) $f(x) = x$ is differentiable, is  (a) $f(x) = x$ is differentiable. (c) $f(x) = x$ is differentiable, is  (a) $f(x) = x$ is differentiable. (c) $f(x) = x$ is differentiable. (d) $f(x) = x$ is differentiable. (e) $f(x) = x$ is differentiable. (for $f(x) = x$ is differentiable. (for $f(x) = x$ is differentiable. (g) $f(x) = x$ is differentiable. (here, $f(x) = x$ is differentiable. (in $f(x) = x$ is differentiabl	
40. The function $f(x) = \sin^{-1}(\cos x)$ is  (a) Discontinuous at $x = 0$ (b) Continuous at $x = 0$ (c) Differe  41. Let $f(x) = (x+ x ) x $ . Then for all $x$ (a) $f$ is continuous (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous.  42. The set of all those points, where the function $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $(-\infty,\infty)$ (b) $[0,\infty]$ (c) $(-\infty,0) \cup (0,\infty)$ (d) $(0,\infty)$ 43. $f(x)$ and $g(x)$ are two differentiable function on $[0,2]$ such that $f''(x) - g'(x) = 0$ , $f'(1) = 2$ , $g'(1) = 4$ then $f(x) - g(x)$ at $x = \frac{3}{2}$ is  (a) 0 (b) 2 (c) 10 (d) $-5$ 44. The set of points of differentiability of the $f(x) = \left(\frac{\sqrt{x+1}-1}{\sqrt{x}}, \text{ for } x \neq 0\right)$ is  (a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R - \{0\}$ 45. If $f(x) = a   \sin x   + b e^{ x } + c  x ^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0, b = 0, c \in R$ (c) $b = c = 0, a \in R$ (d) $c = 0, a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not some analysis of the foliation of $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where (c)  Every when $f(x) = \frac{x}{2}$ (d) Not differentiable at $x = 0$ , 1	at $x = 0$
40. The function $f(x) = \sin^{-1}(\cos x)$ is  (a) Discontinuous at $x = 0$ (b) Continuous at $x = 0$ (c) Differe Let $f(x) = (x +  x )   x $ . Then for all $x$ (a) $f$ is continuous (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous. (c) $f(x) = \frac{x}{1 +  x }$ is differentiable, is  (a) $f(x) = x = x$ (b) $f(x) = x = x$ (c) $f(x) = x = x$ (d) $f(x) = x = x$ (e) $f(x) = x = x$ (for $f(x) = x = x$ (d) $f(x) = x = x$ (e) $f(x) = x = x$ (for $f(x) = x = x$ (d) $f(x) = x = x$ (e) $f(x) = x = x$ (for $f(x)$	g(x) both are not
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41. Let $f(x) = (x+ x )  x $ . Then for all $x$ (a) $f$ is continuous (b) $f$ is differentiable for some $x$ (c) $f'$ is continuous (d) $f$ is differentiable for some $x$ (e) $f'$ is continuous (f) $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $f(-\infty,\infty)$ (b) $f(-\infty,\infty)$ (c) $f'$ is continuous (d) $f(-\infty,\infty)$ (d) $f(-\infty,\infty)$ (e) $f(-\infty,\infty)$ (for $f(-\infty,\infty)$ (for $f(-\infty,\infty)$ (g) are two differentiable function on $f(-\infty,\infty)$ (g) are two differentiable function on $f(-\infty,\infty)$ (g) $f(-\infty,\infty)$ (hence $f(-\infty,\infty)$ (hen	entiable at $x = 0$ (d)
42. The set of all those points, where the function $f(x) = \frac{x}{1+ x }$ is differentiable, is  (a) $(-\infty,\infty)$ (b) $[0,\infty]$ (c) $(-\infty,0) \cup (0,\infty)$ (d) $(0,\infty)$ 43. $f(x)$ and $g(x)$ are two differentiable function on $[0,2]$ such that $f''(x) - g''(x) = 0$ , $f'(1) = 2$ , $g'(1) = 4$ then $f(x) - g(x)$ at $x = \frac{3}{2}$ is  (a) 0 (b) 2 (c) 10 (d) $-5$ 44. The set of points of differentiability of the $f(x) = \begin{cases} \sqrt{x+1} - 1 \\ \sqrt{x} \end{cases}$ , for $x \neq 0$ is  (a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R = \{0\}$ 45. If $f(x) = a   \sin x   + b e^{ x } + c   x ^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0$ , $b = 0$ , $c \in R$ (c) $b = c = 0$ , $a \in R$ (d) $c = 0$ , $a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2 - 7x + 5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not seem that $f(x) = \frac{x^2}{2}$ (c) $f(x) = \frac{x^2}{2}$ (d) $f(x) = \frac{x^2}{2}$ (e) $f(x) = \frac{x^2}{2}$ (for $f(x) = \frac$	chiclasic at x o (a)
(a) $(-\infty,\infty)$ (b) $[0,\infty]$ (c) $(-\infty,0) \cup (0,\infty)$ (d) $(0,\infty)$ 43. $f(x)$ and $g(x)$ are two differentiable function on $[0,2]$ such that $f''(x) - g''(x) = 0$ , $f'(1) = 2$ , $g'(1) = 4$ then $f(x) - g(x)$ at $x = \frac{3}{2}$ is  (a) 0 (b) 2 (c) 10 (d) $-5$ 44. The set of points of differentiability of the $f(x) = \begin{cases} \frac{\sqrt{x+1}-1}{\sqrt{x}} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$ (a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R - \{0\}$ 45. If $f(x) = a \mid \sin x \mid + b e^{ x } + c \mid x \mid^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0$ , $b = 0$ , $c \in R$ (c) $b = c = 0$ , $a \in R$ (d) $c = 0$ , $a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not seem that $f(x) = \frac{x^2}{2}$ (c) $f(x) = \frac{x^2}{2}$ (d) Differentiable nowhere $f(x) = \frac{x^2}{2}$ (e) Differentiable at $f(x) = \frac{x^2}{2}$ (for $f(x) = \frac{x^2}{2}$ (g) Differentiable at $f($	ontinuous (d)
43. $f(x)$ and $g(x)$ are two differentiable function on $[0,2]$ such that $f''(x) - g''(x) = 0$ , $f'(1) = 2$ , $g'(1) = 4$ then $f(x) - g(x)$ at $x = \frac{3}{2}$ is  (a) 0 (b) 2 (c) 10 (d) -5  44. The set of points of differentiability of the $f(x) = \begin{cases} \frac{\sqrt{x+1}-1}{\sqrt{x}} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$ (a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R - \{0\}$ 45. If $f(x) = a \mid \sin x \mid + be^{ x } + c \mid x \mid^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0$ , $b = 0$ , $c \in R$ (c) $b = c = 0$ , $a \in R$ (d) $c = 0$ , $a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not formulate the following interpolation of $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where  (b) Differentiable at $f(x) = \frac{x^2}{1+x}, & x \neq 0 \\ 1, & 0 < x \leq 1 \text{ is } \\ 1/x, & x > 1 \text{ (a) Differentiable only at } x = 0 \text{ (c) Differentiable at } x = 0, 1 \text{ (b)}$ Differentiable at $x = 0, 1$ (c) Differentiable at $x = 0, 1$ (d) Not differentiable at $x = 0, 1$	
then $f(x) - g(x)$ at $x = \frac{3}{2}$ is  (a) 0 (b) 2 (c) 10 (d) -5  44. The set of points of differentiability of the $f(x) = \begin{cases} \frac{\sqrt{x+1}-1}{\sqrt{x}} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$ (a) $R$ (b) $[0, \infty)$ (c) $(0, \infty)$ (d) $R - \{0\}$ 45. If $f(x) = a \mid \sin x \mid + b e^{ x } + c \mid x \mid^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0, b = 0, c \in R$ (c) $b = c = 0, a \in R$ (d) $c = 0, a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not also function $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where  (c) Every when $f(x) = \frac{x^2}{4}, & x \leq 0 \\ 1, & 0 < x \leq 1 \text{ is } \\ 1/x, & x > 1 \end{cases}$ (a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable at $x = 0, 1$ (d) Not differentiable at $x = 0, 1$	
(a) 0 (b) 2 (c) 10 (d) -5  44. The set of points of differentiability of the $f(x) = \begin{cases} \frac{\sqrt{x+1}-1}{\sqrt{x}}, & \text{for } x \neq 0 \\ 0, & \text{for } x = 0 \end{cases}$ (a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R = \{0\}$ 45. If $f(x) = a \mid \sin x \mid + b e^{ x } + c \mid x \mid^3 \text{ and if } f(x) \text{ is differentiable at } x = 0, \text{ then } \{0\} = a = b = c = 0 \text{ (b) } a = 0, b = 0, c \in R \text{ (c) } b = c = 0, a \in R \text{ (d) } c = 0, a$	4,  f(2) = 3, g(2) = 9,
44. The set of points of differentiability of the $f(x) = \begin{cases} \frac{\sqrt{x+1}-1}{\sqrt{x}} & \text{, for } x \neq 0 \\ 0 & \text{, for } x = 0 \end{cases}$ is  (a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R-\{0\}$ 45. If $f(x) = a \mid \sin x \mid + b e^{\mid x \mid} + c \mid x \mid^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0, b = 0, c \in R$ (c) $b = c = 0, a \in R$ (d) $c = 0, a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) $0$ (d) Does not also function $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where (c)  Every when $f(x) = \frac{x^2}{1+x^2}, & x \leq 0 \\ 1 = \frac{x^2}{1+x^2}, & x \leq 0 \\ 1 = \frac{x^2}{1+x^2}, & x \leq 0 \end{cases}$ (a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable at $x = 0, 1$ (d) Not differentiable at $x = 0, 1$	
(a) $R$ (b) $[0,\infty)$ (c) $(0,\infty)$ (d) $R-\{0\}$ 45. If $f(x)=a \mid \sin x \mid + b e^{ x } + c \mid x \mid^3$ and if $f(x)$ is differentiable at $x=0$ , then  (a) $a=b=c=0$ (b) $a=0$ , $b=0$ , $c\in R$ (c) $b=c=0$ , $a\in R$ (d) $c=0$ , $a\in R$ 46. If $f(x)=\begin{cases} \frac{x-1}{2x^2-7x+5}, & x\neq 1\\ -\frac{1}{3}, & x=1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0  (d) Does not a function $f(x)=1+ \sin x $ is  (a) Continuous no where (b) Differentiable no where (c)  Every when $f(x)=1$ is $f(x)=1$ (d) Not differentiable at $f(x)=1$ (c) Differentiable only at $f(x)=1$ (d) Not differentiable at $f(x)=1$ (e) Differentiable at $f(x)=1$ (for $f(x)=1$ ) is $f(x)=1$ if $f(x)=1$ is $f(x)=1$ if $f(x)=1$ i	
45. If $f(x) = a   \sin x   + be^{ x } + c  x ^3$ and if $f(x)$ is differentiable at $x = 0$ , then  (a) $a = b = c = 0$ (b) $a = 0, b = 0, c \in R$ (c) $b = c = 0, a \in R$ (d) $c = 0, a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2 - 7x + 5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not a function $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where (c)  Every when $f(x) = \frac{x^2}{1 + (x + 1)^2}, & x \neq 0$ 1, $0 < x \le 1$ is  1/x, $x > 1$ (a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable at $x = 0$ (d) Not differentiable at $x = 0, 1$	
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(a) $a = b = c = 0$ (b) $a = 0, b = 0, c \in R$ (c) $b = c = 0, a \in R$ (d) $c = 0, a \in R$ 46. If $f(x) = \begin{cases} \frac{x-1}{2x^2 - 7x + 5}, & x \neq 1 \\ -\frac{1}{3}, & x = 1 \end{cases}$ , then $f'(1)$ equals  (a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not at a continuous nowhere (b) Differentiable nowhere (c)  47. Function $f(x) = 1 +  \sin x $ is  (a) Continuous nowhere (b) Differentiable nowhere (c)  48. Function $f(x) = \begin{cases} x^2, & x \leq 0 \\ 1, & 0 < x \leq 1 \\ 1/x, & x > 1 \end{cases}$ (a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable at $x = 0, 1$ (d) Not differentiable at $x = 0, 1$	
(a) $\frac{2}{9}$ (b) $\frac{-2}{9}$ (c) 0 (d) Does not the function $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where (c)  Every when $f(x) = \begin{cases} x^2, & x \le 0 \\ 1, & 0 < x \le 1 \\ 1/x, & x > 1 \end{cases}$ (a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable $x = 1$ (d) Not differentiable at $x = 0, 1$	$a=0, b\in R$
47. Function $f(x) = 1 +  \sin x $ is  (a) Continuous no where (b) Differentiable no where (c)  Every when $f(x) = \begin{cases} x^2, & x \le 0 \\ 1, & 0 < x \le 1 \\ 1/x, & x > 1 \end{cases}$ (a) Differentiable at $x = 0, 1$ (b)  Differentiable only at $x = 0$ (c) Differentiable at $x = 1$ (d) Not differentiable at $x = 0, 1$	[IIT 1979]
(a) Continuous no where (b) Differentiable no where (c) Every when $f(x) = \begin{cases} x^2, & x \le 0 \\ 1, & 0 < x \le 1 \\ 1/x, & x > 1 \end{cases}$ (a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable $x = 1$ (d) Not differentiable at $x = 0, 1$	not exist
<b>48.</b> Function $f(x) = \begin{cases} x^2, & x \le 0 \\ 1, & 0 < x \le 1 \text{ is } \\ 1/x, & x > 1 \end{cases}$ (a) Differentiable at $x = 0$ , 1 (b) Differentiable only at $x = 0$ (c) Differentiable $x = 1$ (d) Not differentiable at $x = 0$ , 1	
(a) Differentiable at $x = 0, 1$ (b) Differentiable only at $x = 0$ (c) Differentiable $x = 1$ (d) Not differentiable at $x = 0, 1$	ere continuous (d)
(a) Differentiable at $x = 0$ , 1 (b) Differentiable only at $x = 0$ (c) Differentiable $x = 1$ (d) Not differentiable at $x = 0$ , 1	
x = 1 (d) Not differentiable at $x = 0, 1$	
	entiable at only
<b>49.</b> Function $f(x) = \begin{cases} -x, & \text{if } x < 0 \\ x^2, & \text{if } 0 \le x \le 1 \end{cases}$ , is differentiable at	
$\begin{pmatrix} x & -x+1, & 11 & x > 1 \end{pmatrix}$	

(a) x=0 but not at x=1 (b) x=1 but not at x=0 (c) x=0 and x=1

#### 126 Functions, Limits, Continuity and

- **50.** If g(x) = x f(x) where  $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$  then at x = 0
  - (a) g is differentiable but g' is discontinuous function (b) differentiable

Both f and g are

(c) g is differentiable and g' is continuous function (d)

None of these

**51.** The set of points where  $f(x) = x \mid x \mid$  is differentiable two times is

(a)  $R_0$ 

(b)  $R_{+}$ 

(c) R

(d) None of these

52. If  $f(x) = \begin{cases} \frac{x(3e^{1/x} + 4)}{2 - e^{1/x}}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ , then

[Roorkee 1995]

(a)  $\lim_{x \to 0} f(x) =$ 

(b) f(x) is continuous at x = 0 (c)

f(x) is differentiable at

x = 0

(d) f'(0+0)=3

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# **Answer Sheet**

### Assignment (Basic and Advance Level)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
d	d	b	d	d	b	a	b	d	d	b	b	a,d	a	b	a	c	b	d	c
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
С	b,d	С	С	a	b	b	d	d	С	a	a	a	a	d	a	a	b	a	b
41	42	43	44	45	46	47	48	49	50	51	52								
a,c	a	d	С	b	b	d	b	b	b	a	b								