Continuity and Differentiability

SSR

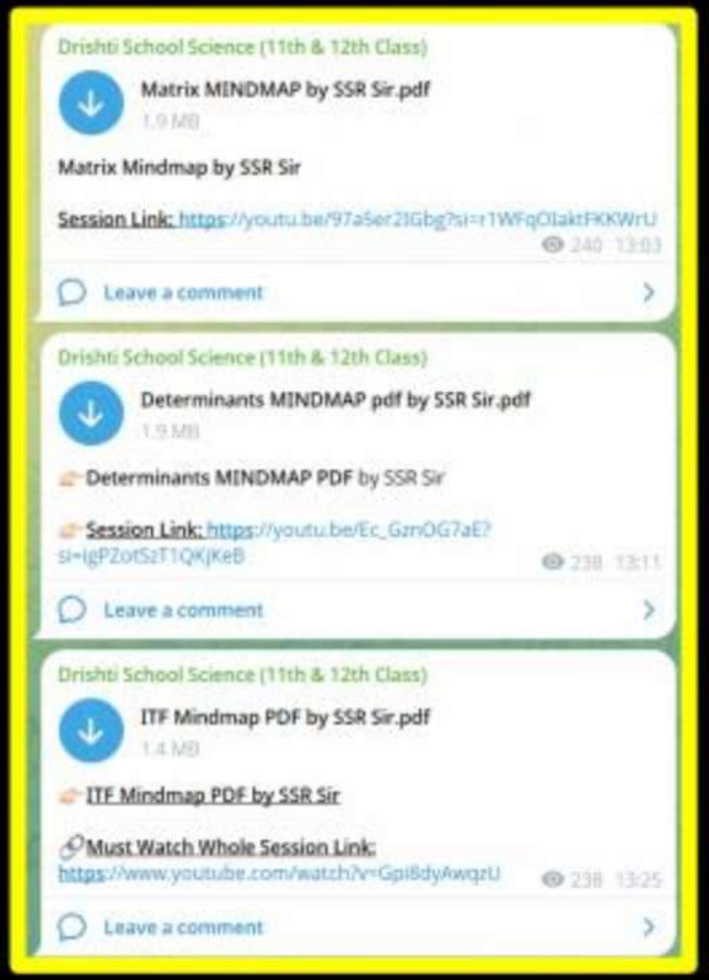
ONE SHOT

FULL CHAPTER

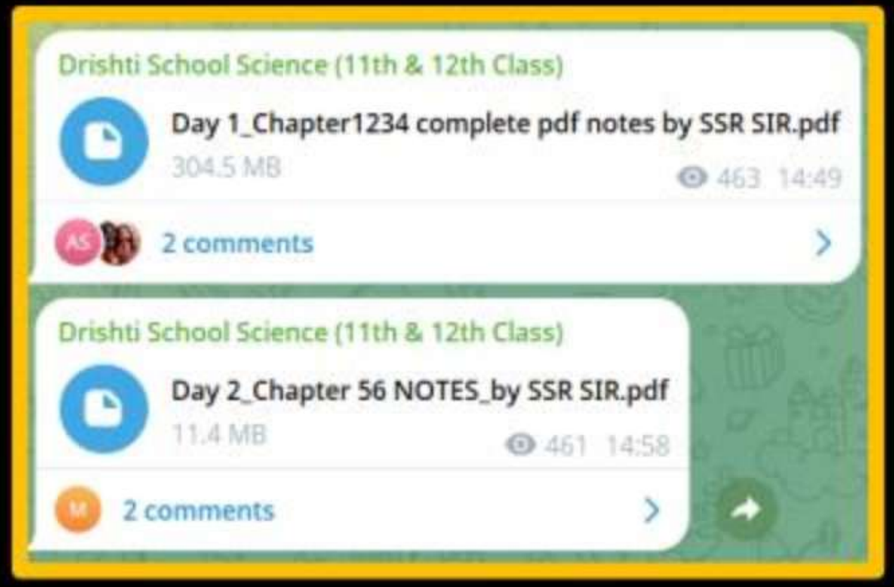
100% Yahi Se Paper Banega



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Syllabus Covered

Chapter	Chapter Name	Syllabus	Deleted Syllabus
Chapter 5	Continuity and differentiability	1. Continuity and differentiability of basic functions 2. Properties of continuous functions 3. Continuity at a point 4. Differentiability 5. Differentiation basic formulas 6. Addition, Multiplication, Division theorem 7. Chain rule 8. Use of Logarithm in differentiations 9. Parametric form of the differentiation 10. Differentiation of a function WRT to another functions 11. Differentiation of Implicit functions 12. Substitution Method 13. Higher order derivatives 14. Infinite series types of questions	→ Technically nothing is deleted

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ABOUT CND

- Weightage in CUET: 15 -20 marks – 25
- Weightage in Class 12th (5-7)

2026 X

Board → CUET

- What resources you should follow:
- BPPT 6.0 only
- This PPT Content

- **Importance of Chapter:**
  - Backbone of calculus
  - Without this chapter you cant understand Chapter 6,7,8,9 = 40% Maths barbaad

By- SSR Sir

Topics *to be covered*

1. Graphical Continuity & Differentiability
2. Continuity of a function at a point
3. Differentiation - Basic
4. Chain Rule
1. USE of Logarithmm in the differentiation
2. Parametric form of the differentiation
3. Implicit Differentiation
4. Derivative of a function WRT to another function
2. Substitutions
3. Higher order derivatives
4. Infinite Series Types Questions
4. Miscellaneous Types of Questions

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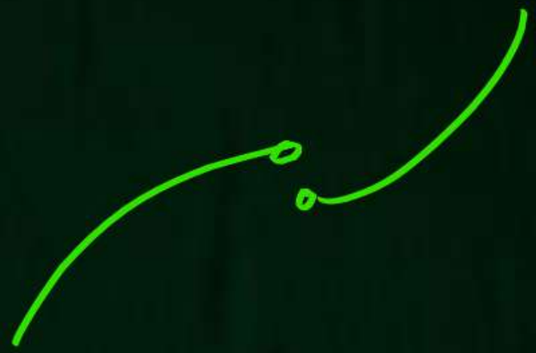


Continuity & Differentiability Meaning

Cont



Discont



Graph Break

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Differentiable function

↳ (I) fun should be Cont

(II) fun should be Smooth





No sharp turn Allowed

Non-Differentiable function

↳ (I) fun should be discont

OR



(II) Sharp turn





Continuity & Differentiability of Some Basic Functions

99-1% 2022-26

All Cases

(I) Trigo

(II) Expo

(III) Log

(IV) Sign

(V) G.I.F

(V) Modulus

(VI) fractional

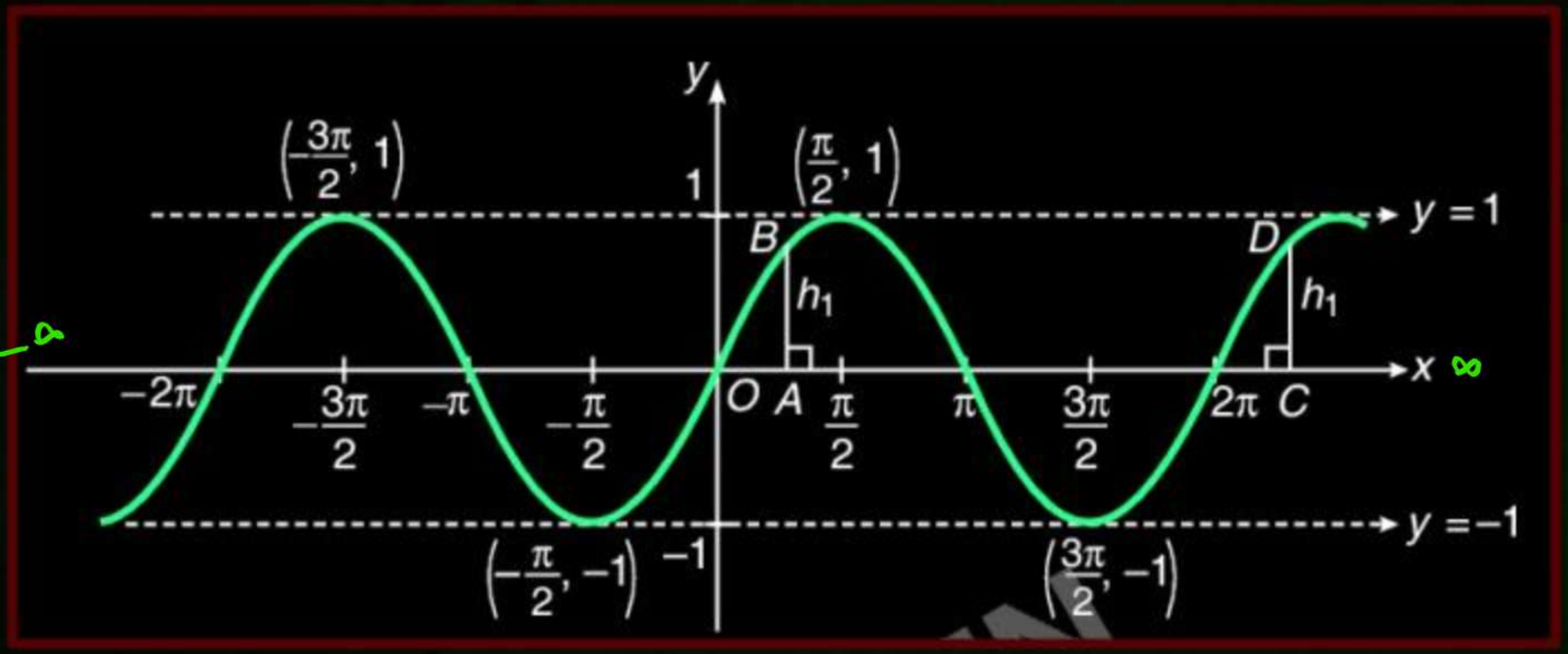
Algebr

1. Trigonometric Functions

- **Continuity:** $x \in R$
- **Differentiability:** $x \in R$

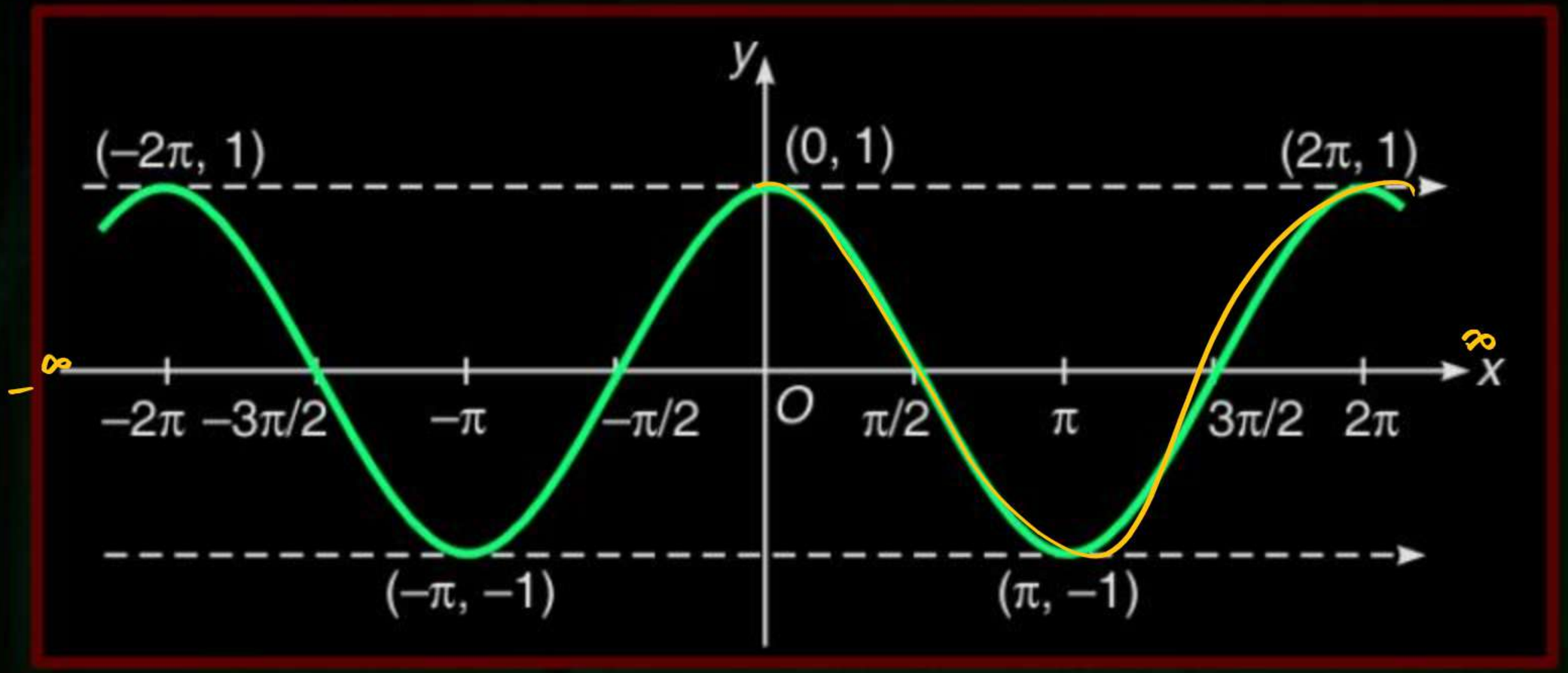
} In Its Domain

$$y = \sin(x)$$



By- SSR Sir

$y = cos(x)$



- **Continuity:** $x \in R$
- **Differentiability:** $x \in R$

] In its Domain.

By- SSR Sir

$$y = tan(x)$$

$= \frac{\sin x}{\cos x}$

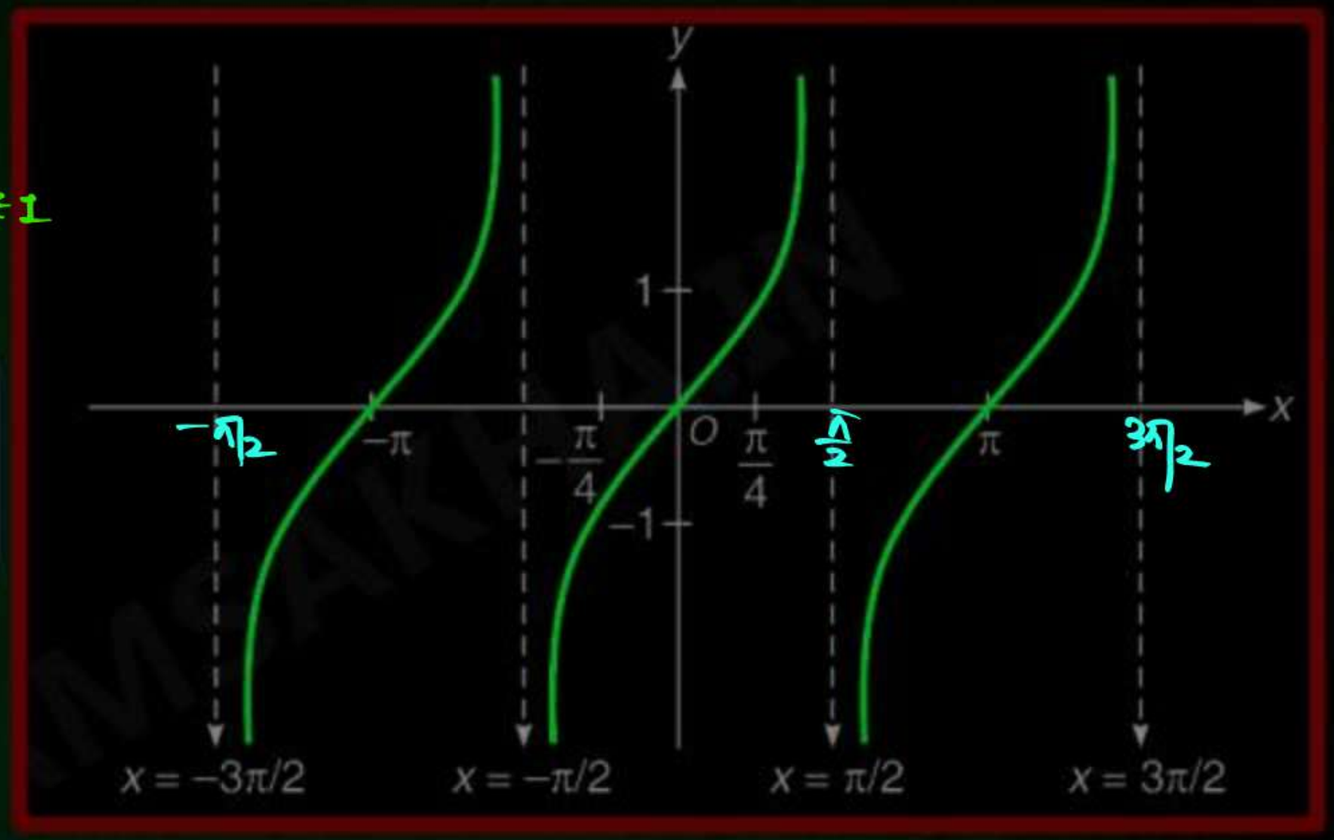
$(2n+1)$

$\tan x = 0; \quad \sin x = 0 \Rightarrow x \in n\pi$

$= \infty; \quad \cos x = 0 \Rightarrow x \in (2n+1)\pi/2 \quad \Big] \; n \in I$

- **Continuity:** $x \in R - \{(2n+1)\pi/2\} \; n \in Z$
- **Differentiability:** $x \in R - \{(2n+1)\pi/2\} \; n \in Z$

↳ In Its Domain



By- SSR Sir

$y = cot(x)$

$\Rightarrow \frac{\cos x}{\sin x}$

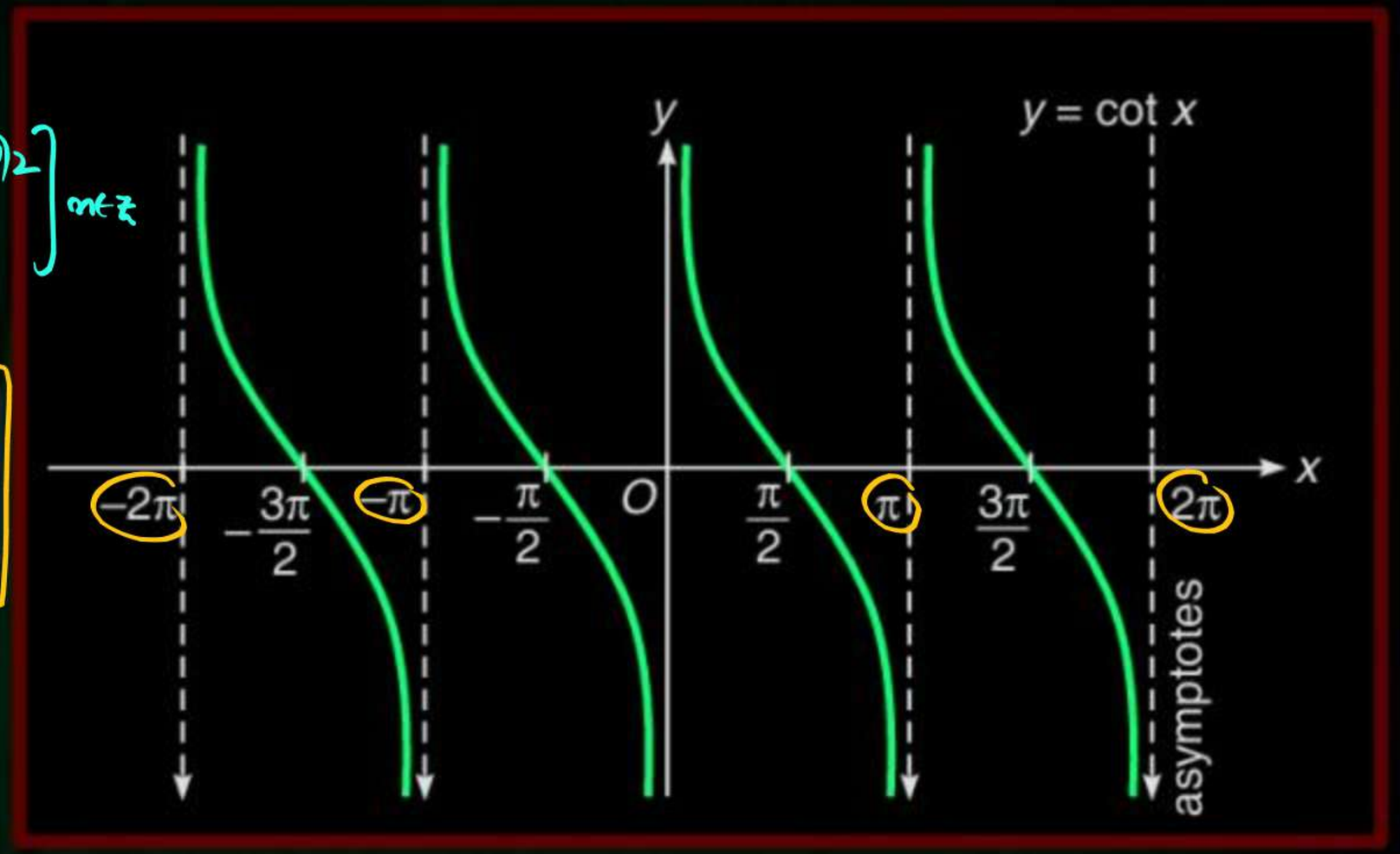
$\cot x = 0 \Rightarrow \cos x = 0 \Rightarrow x \in (2n+1)\frac{\pi}{2}$

$\Rightarrow \infty \Rightarrow \sin x = 0 \Rightarrow x \in n\pi$

$n \in Z$

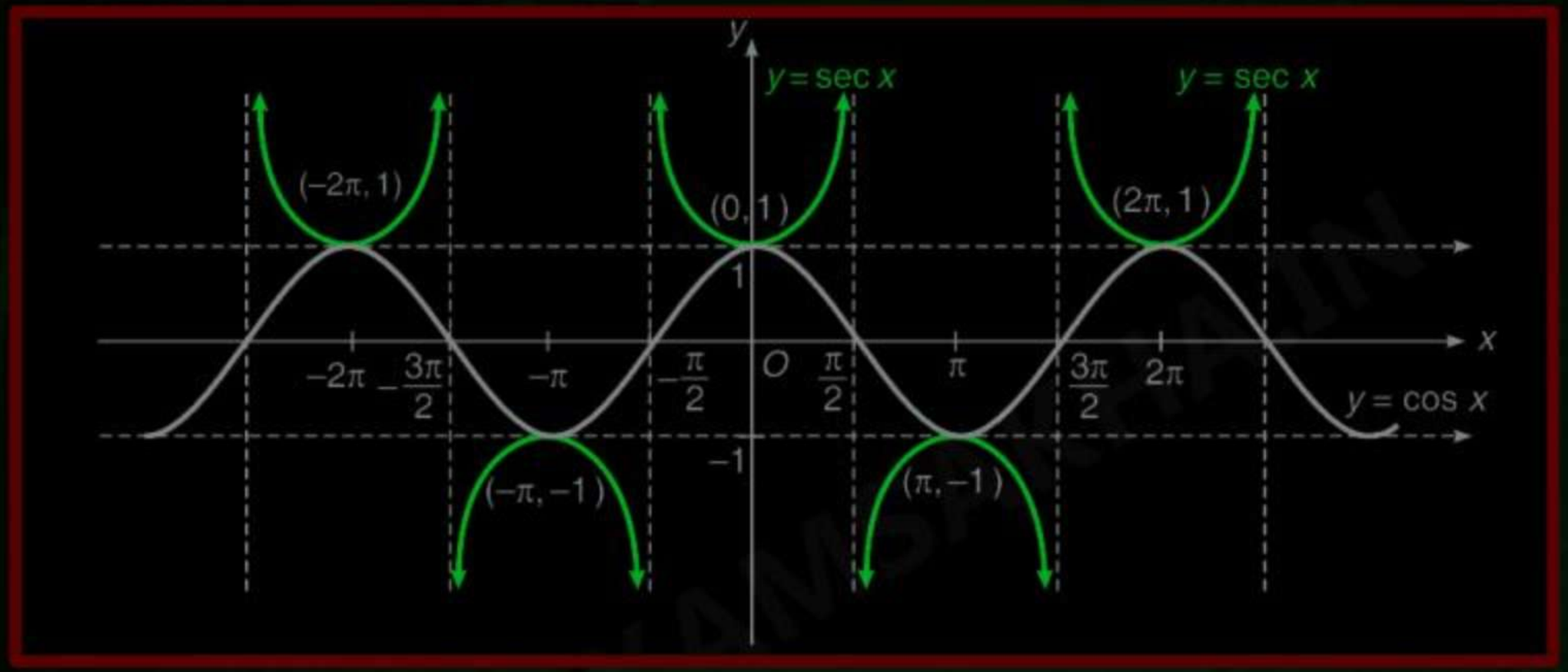
- **Continuity:** $x \in R - \{n\pi\}$ $n \in Z$
- **Differentiability:** $x \in R - \{n\pi\}$; $n \in Z$

↳ In Its Domain



By- SSR Sir

$y = sec(x) = \frac{1}{\cos x}$ $\Rightarrow$ $\sec x = \infty$; $x \in (2n+1)\frac{\pi}{2}$; $n \in \mathbb{Z}$



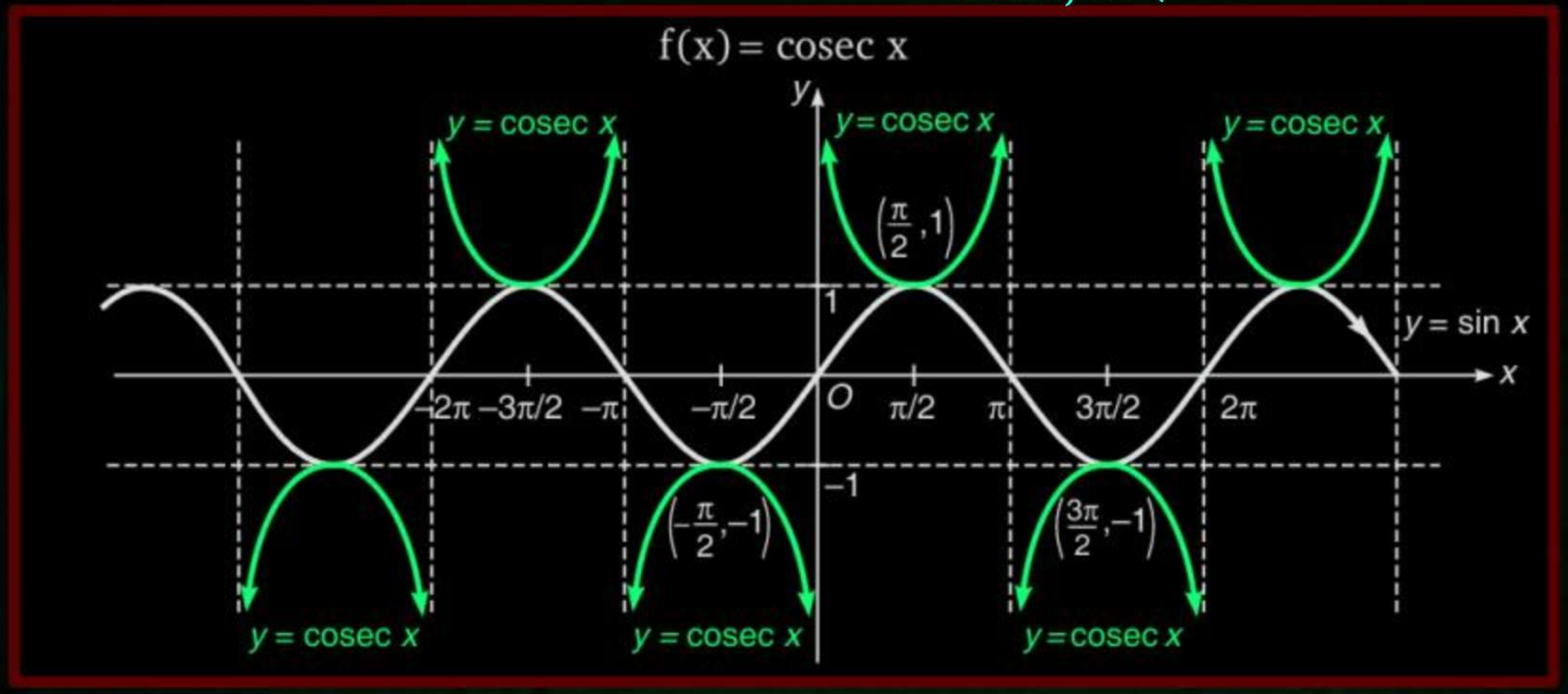
- **Continuity:** $x \in R - \{(2n+1)\frac{\pi}{2}\}$ $n \in \mathbb{Z}$
- **Differentiability:** $x \in R - \{(2n+1)\frac{\pi}{2}\}$ $n \in \mathbb{Z}$

} In The Domain.

By- SSR Sir

$y = cosec(x) = \frac{1}{\sin x}$ → $\text{Cosec}\, x = \infty$; $\sin x = 0$

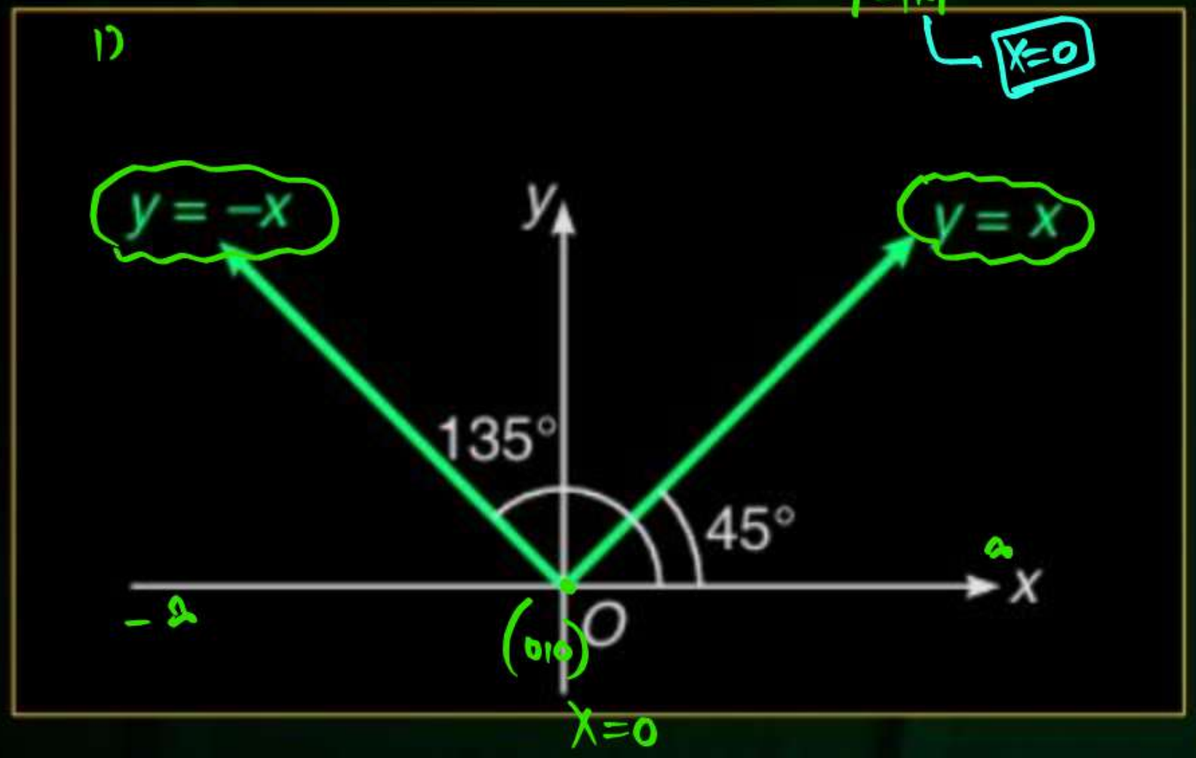
$x \in n\pi$; $n \in \mathbb{Z}$



- **Continuity:** $x \in R - \{n\pi\}$ $n \in \mathbb{Z}$] In Its Domain
- **Differentiability:**

By- SSR Sir

Modulus Function



Properties of modulus functions

(i) $|x| \le a \Rightarrow -a \le x \le a \; ; \; (a \ge 0)$

(ii) $|x| \ge a \Rightarrow x \le -a \quad \text{or} \quad x \ge a \; ; \; (a \ge 0)$

(iii) $|x \pm y| \le |x| + |y|$

(iv) $|x \pm y| \ge \big||x| - |y|\big|$.

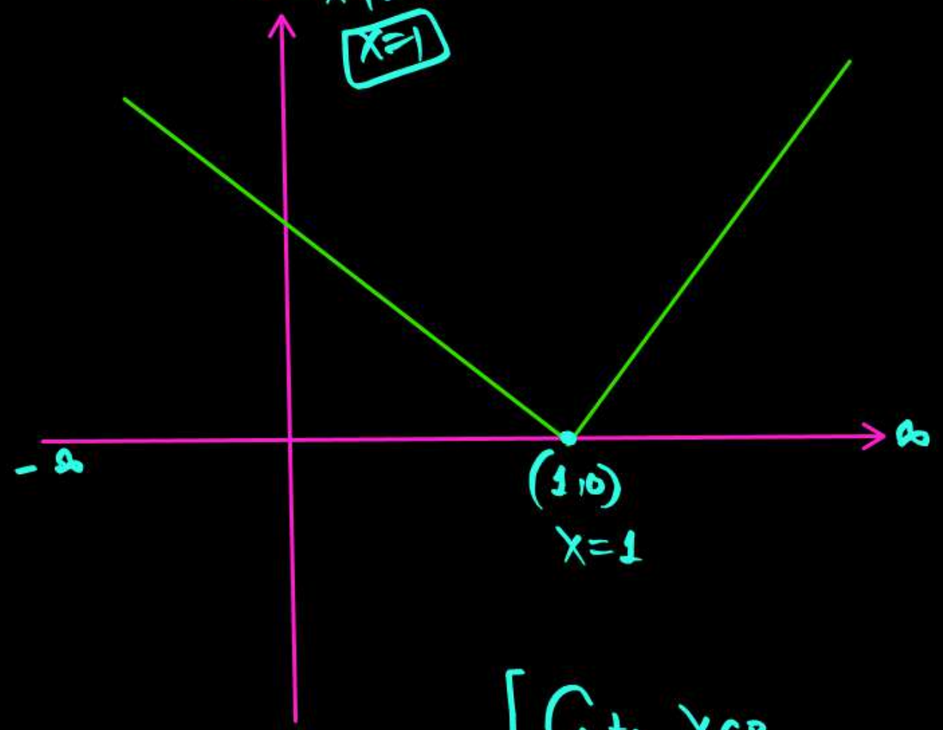
- **Continuity:** $x \in R$
- **Differentiability:** $x \in R - \{0\}$

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(11) $y=|x-1|$

$x-1=0$

$x=1$



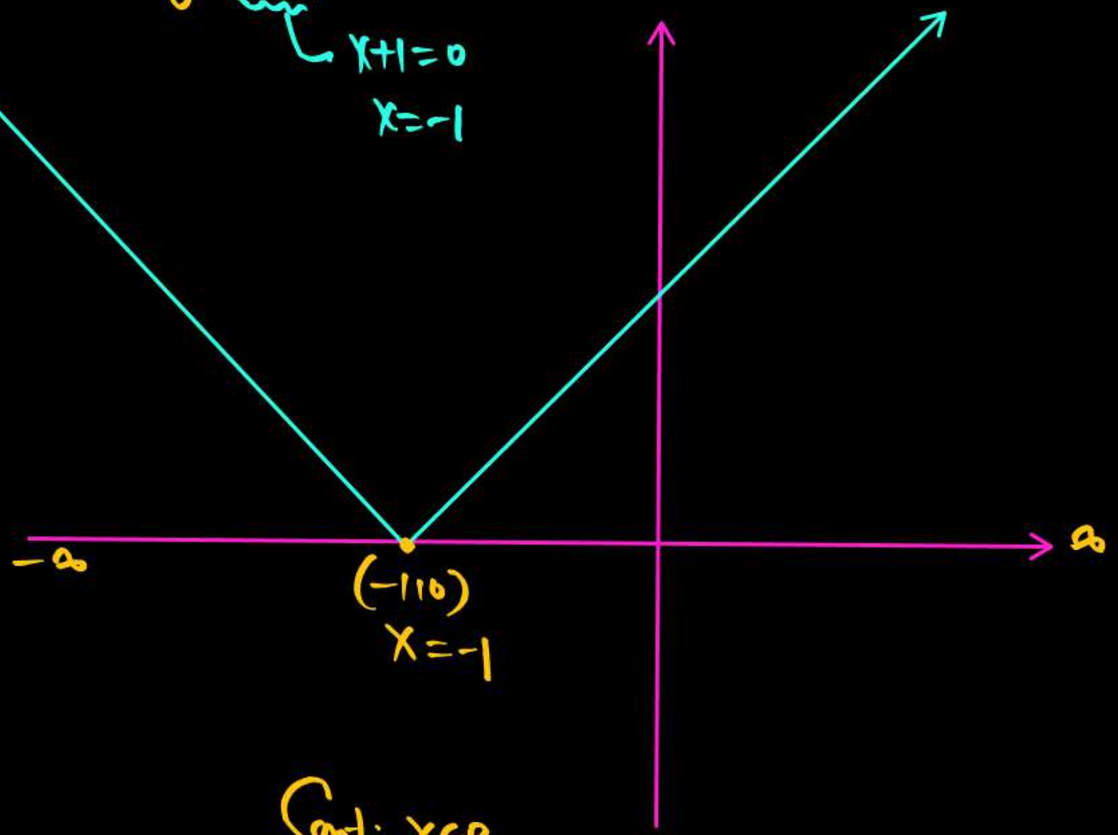
[Cont: $x \in R$

Diff: $x \in R - \{1\}$]

(10) $y=|x+1|$

$x+1=0$

$x=-1$

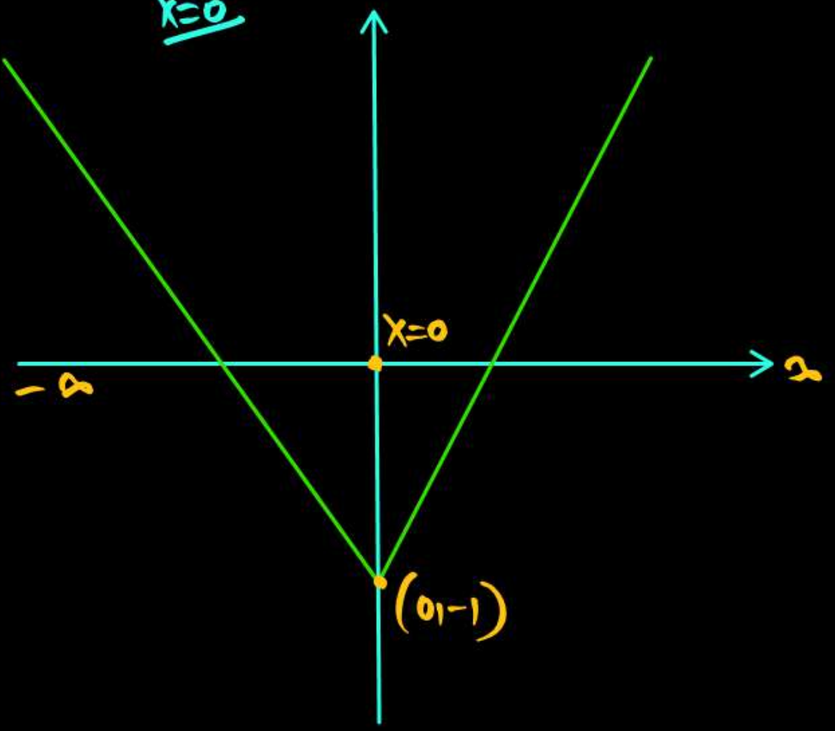


Cont: $x \in R$

Diff: $x \in R - \{-1\}$

(M) $y = |x| - 1$

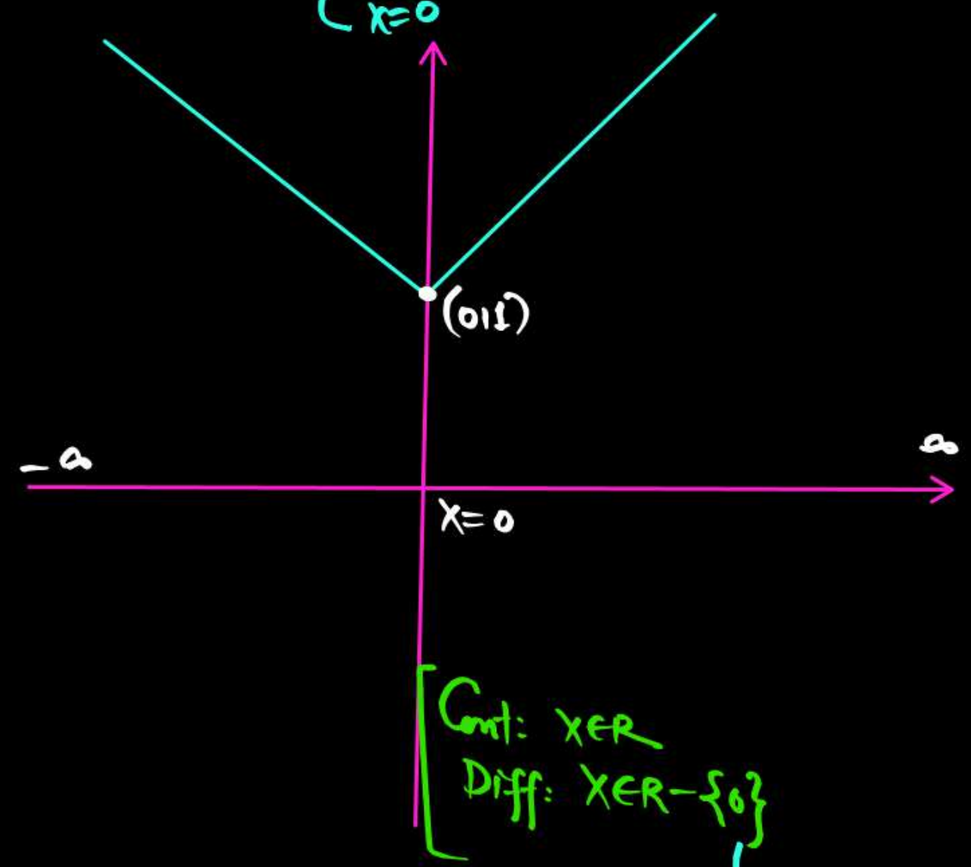
$x = 0$



[Cont: $x \in R$
Diff: $x \in R - \{0\}$]

(M) $y = |x| + 1$

$x = 0$



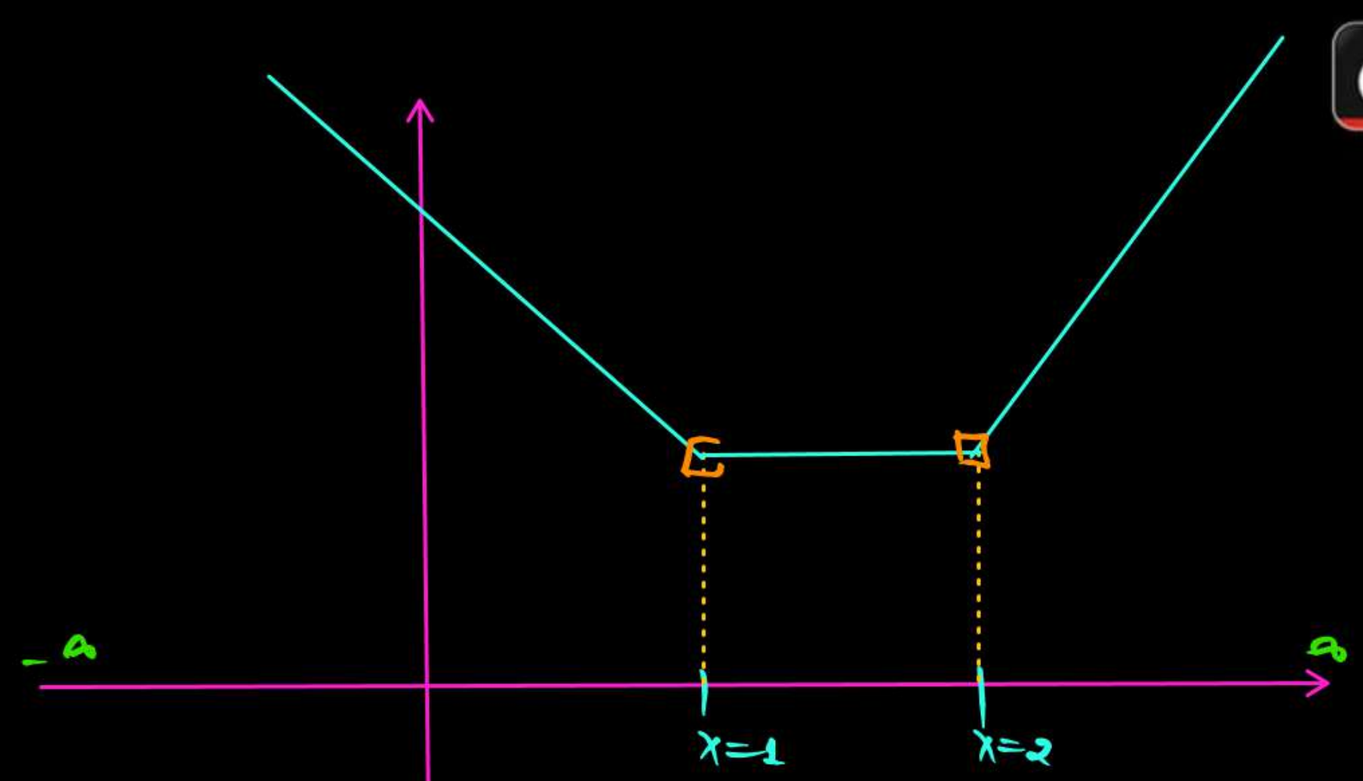
[Cont: $x \in R$
Diff: $x \in R - \{0\}$]

$x = 0$

(VIII) $y = |x-1| + |x-2|$

$x=1 \Rightarrow y(1) = |1-1| + |1-2| = 1$

$x=2 \Rightarrow y(2) = |2-1| + |2-2| = 1$



[Cont: $x \in R$
Diff: $x \in R - \{1,2\}$

Eg: $y = |2x-5|$ — $2x-5=0$, $x = 5/2$

[Cont: $x \in R$
Diff: $x \in R - \{5/2\}$

Greatest Integer Function

x	[x]
$0 \le x < 1$	0
$1 \le x < 2$	1
$2 \le x < 3$	2

Thus, $f(x) = [x]$ could be shown as;

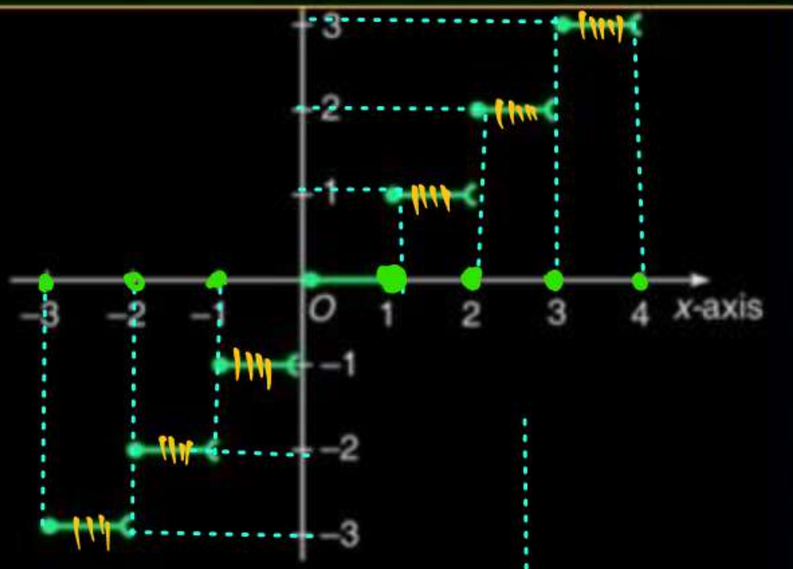


Fig. 1.17

Properties of greatest integer function

(i) $[x] = x$ holds, if x is integer.

(ii) $[x + I] = [x] + I$, if I is integer.

(iii) $[x + y] \ge [x] + [y]$

(iv) If $[\phi(x)] \ge I$, then $\phi(x) \ge I$.

(v) If $[\phi(x)] \le I$, then $\phi(x) < I + 1$.

(vi) $[-x] = -[x]$, if $x \in$ integer.

(vii) $[-x] = -[x] - 1$, if $x \notin$ integer.

"It is also known as **stepwise function/floor of x.**"

- **Continuity:** $x \in R - \{z\}$
- **Differentiability:** $x \in R - \{z\}$

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\# $[x]$ is discont & ND at $x \in z$

	C	D
$x=2 \in z$	X	X
$x=2.5 \notin z$	✓	✓
$x=3 \in z$	X	X
$x=0.5 \notin z$	✓	✓

$x=100.05 \notin z \rightarrow C \checkmark \quad D \checkmark$

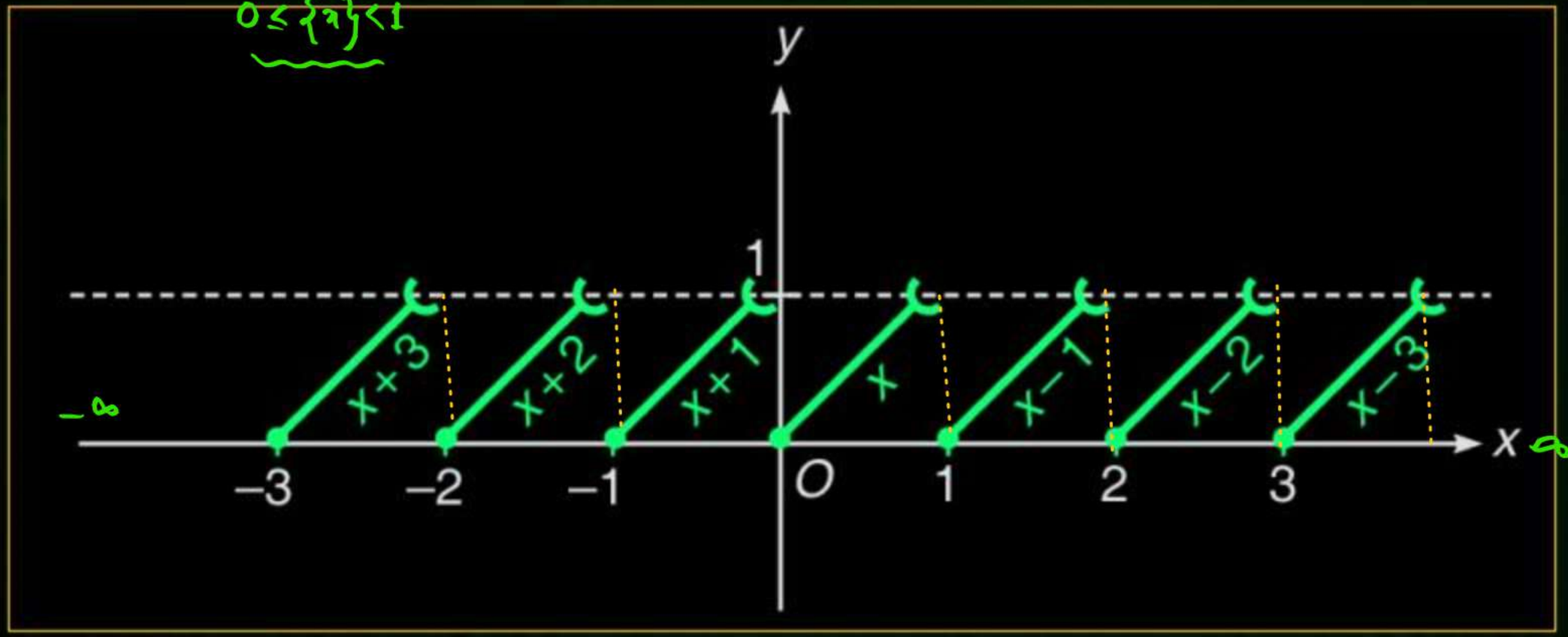
$x=500 \in z \rightarrow Cx \quad Dx$

Fractional Part of x {x}

$\{x\} = x - [x]$

$0 \le \{x\} < 1$

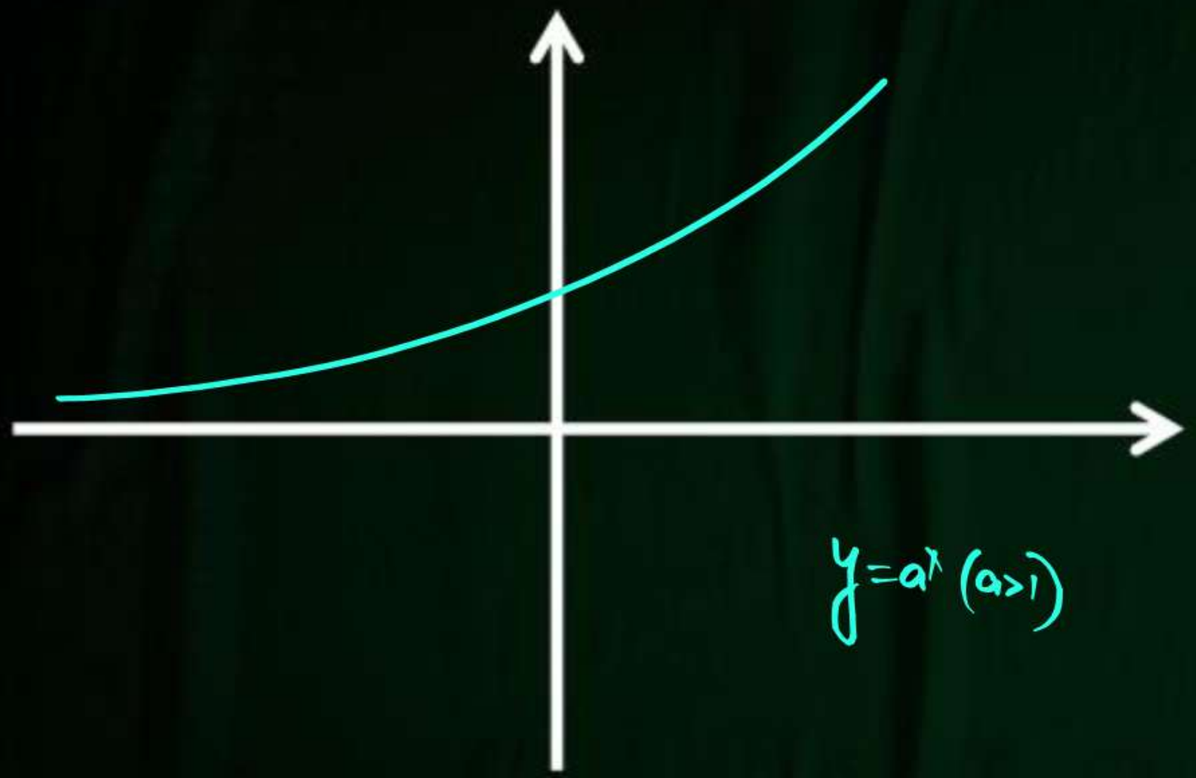
- **Continuity:** $x \in R - \{z\}$
- **Differentiability:** $x \in R - \{z\}$



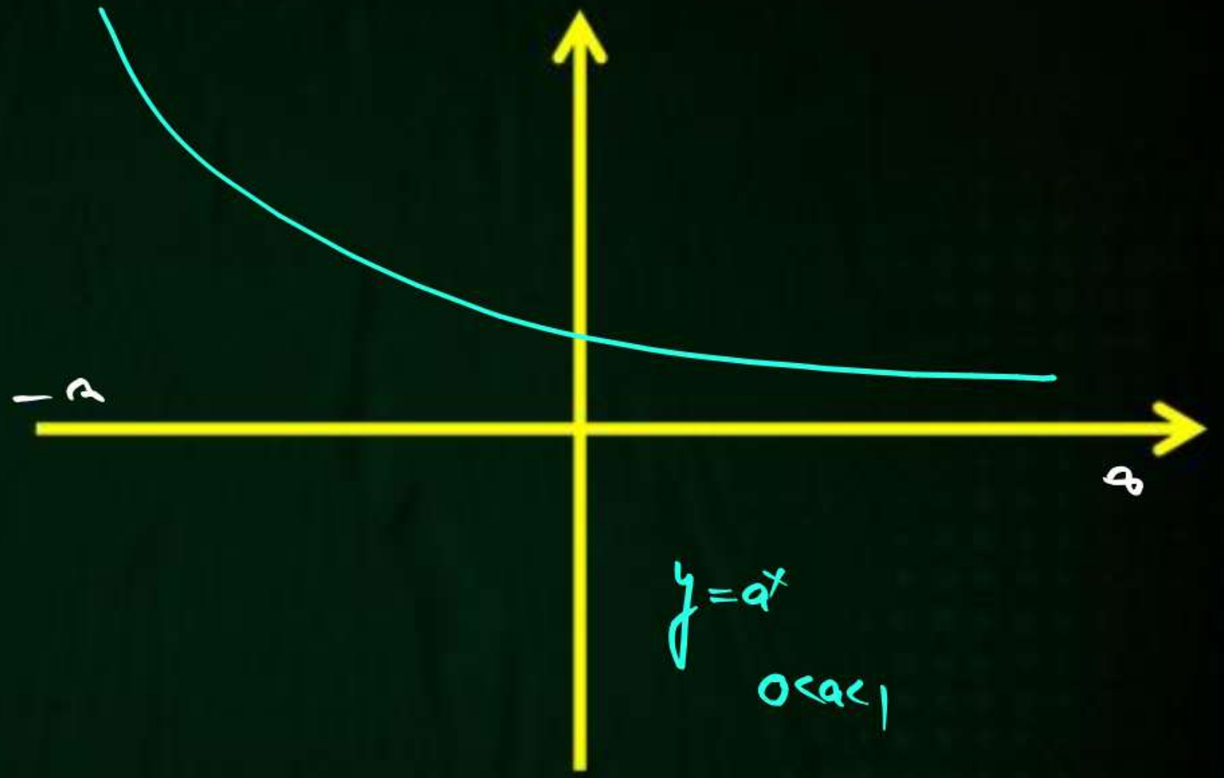
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Exponential Function

- **Continuity:** $x \in R$
- **Differentiability:** $x \in R$



$y = a^x \ (a > 1)$



$y = a^x$

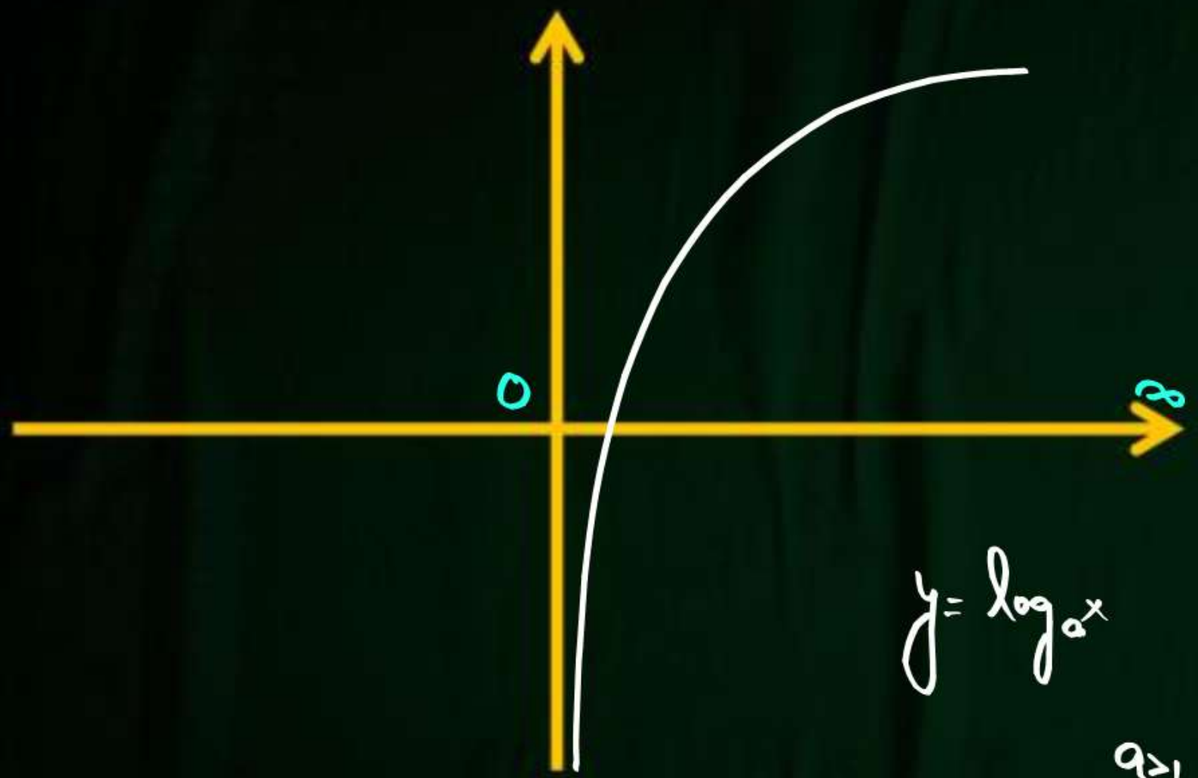
$0 < a < 1$

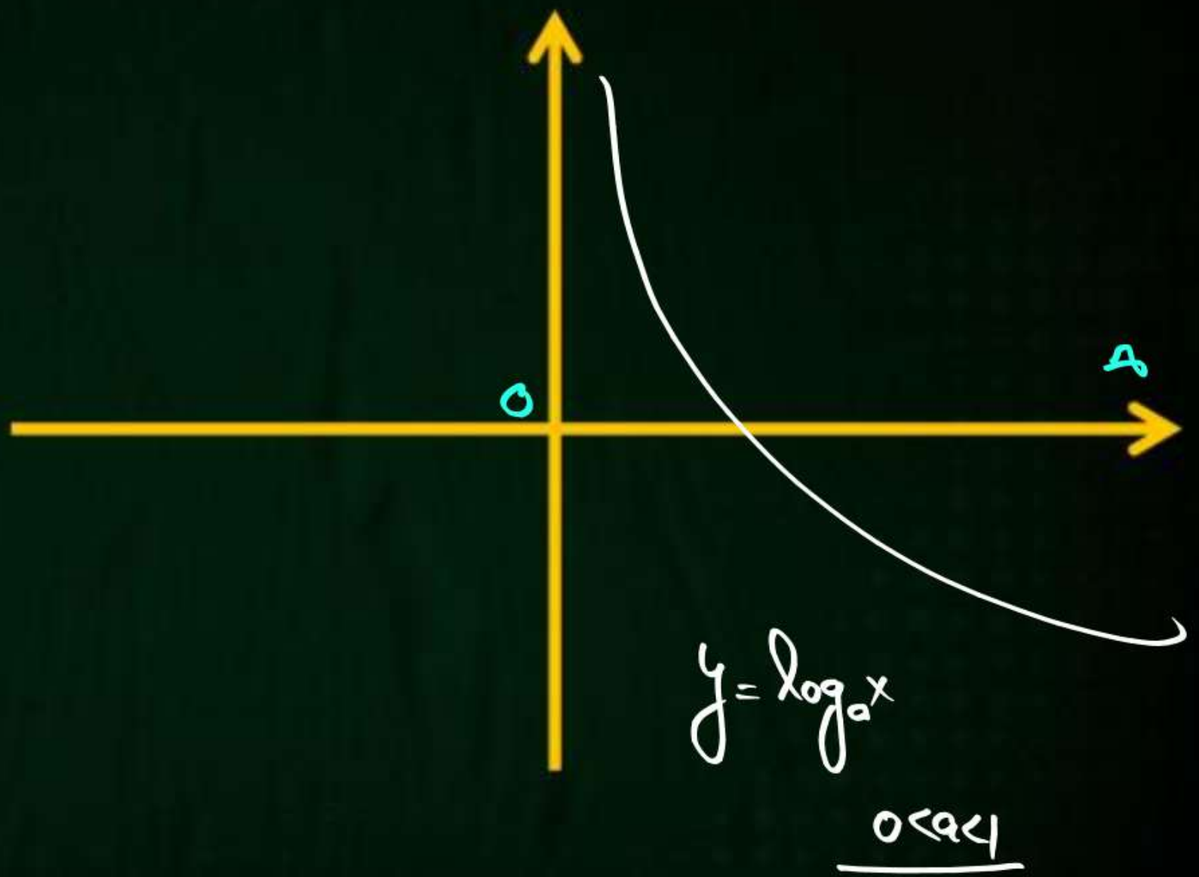
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Logarithm Function

- **Continuity:** $x > 0$
- **Differentiability:** $x > 0$

] In Its Domain



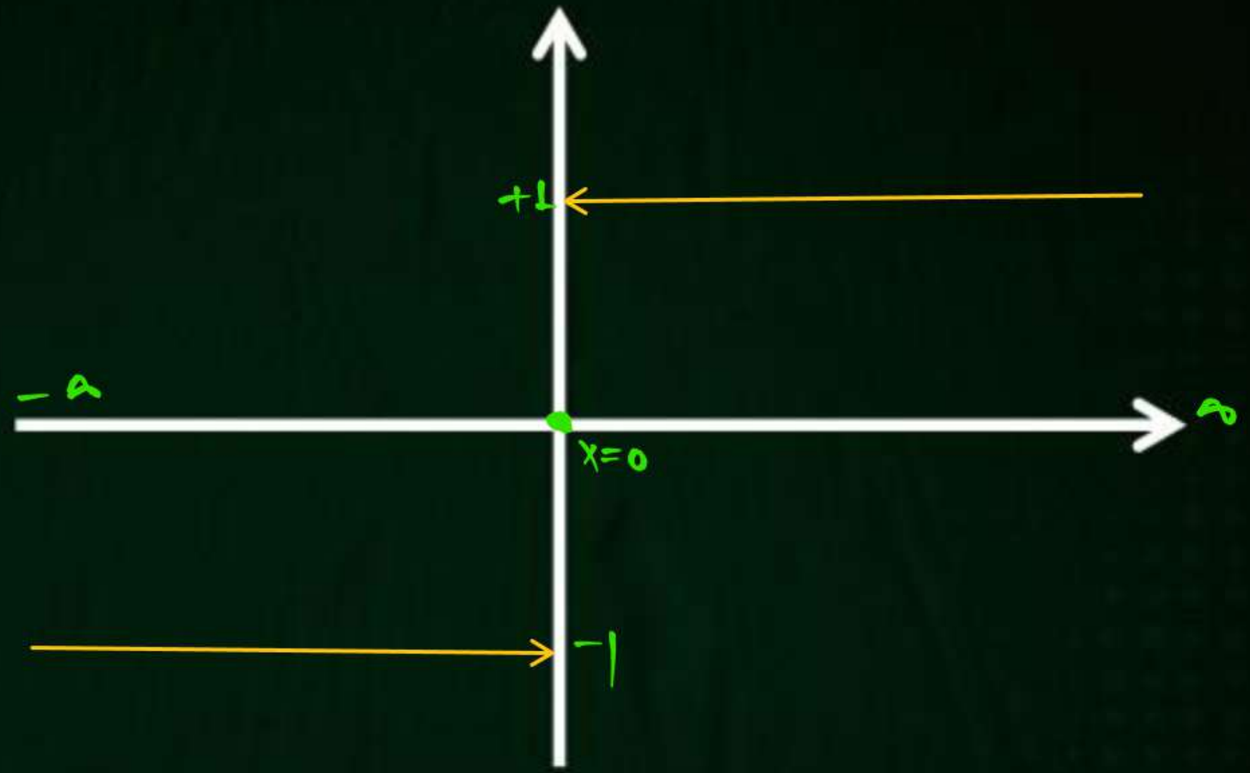


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Signum Function

- **Continuity:** $x \in R - \{0\}$
- **Differentiability:** $x \in R - \{0\}$

$$Sgn(x) = \begin{cases} +1; & x > 0 \\ 0; & x = 0 \\ -1; & x < 0 \end{cases}$$

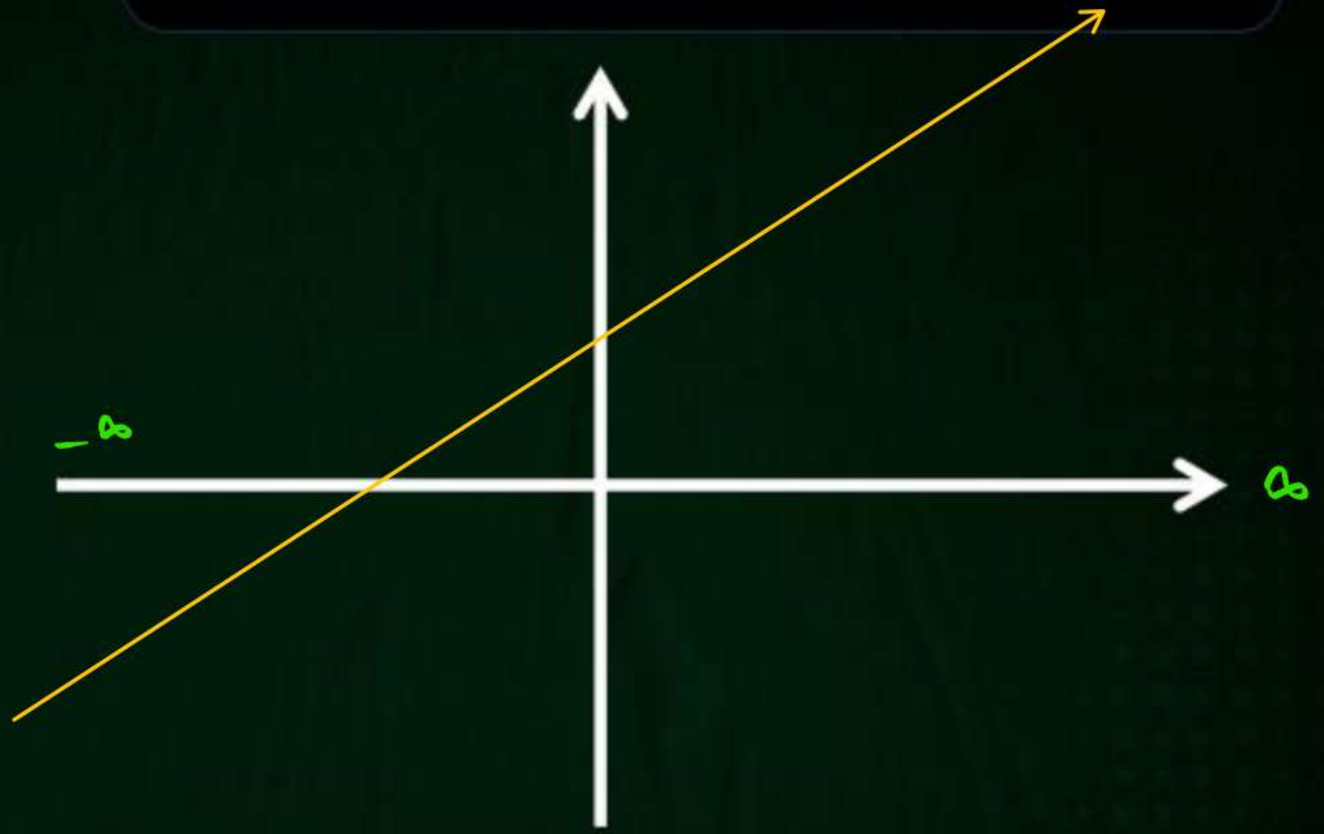


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Algebraic Function - Line

- **Continuity:** $x \in R$
- **Differentiability:** $x \in R$

$$y = mx + c$$

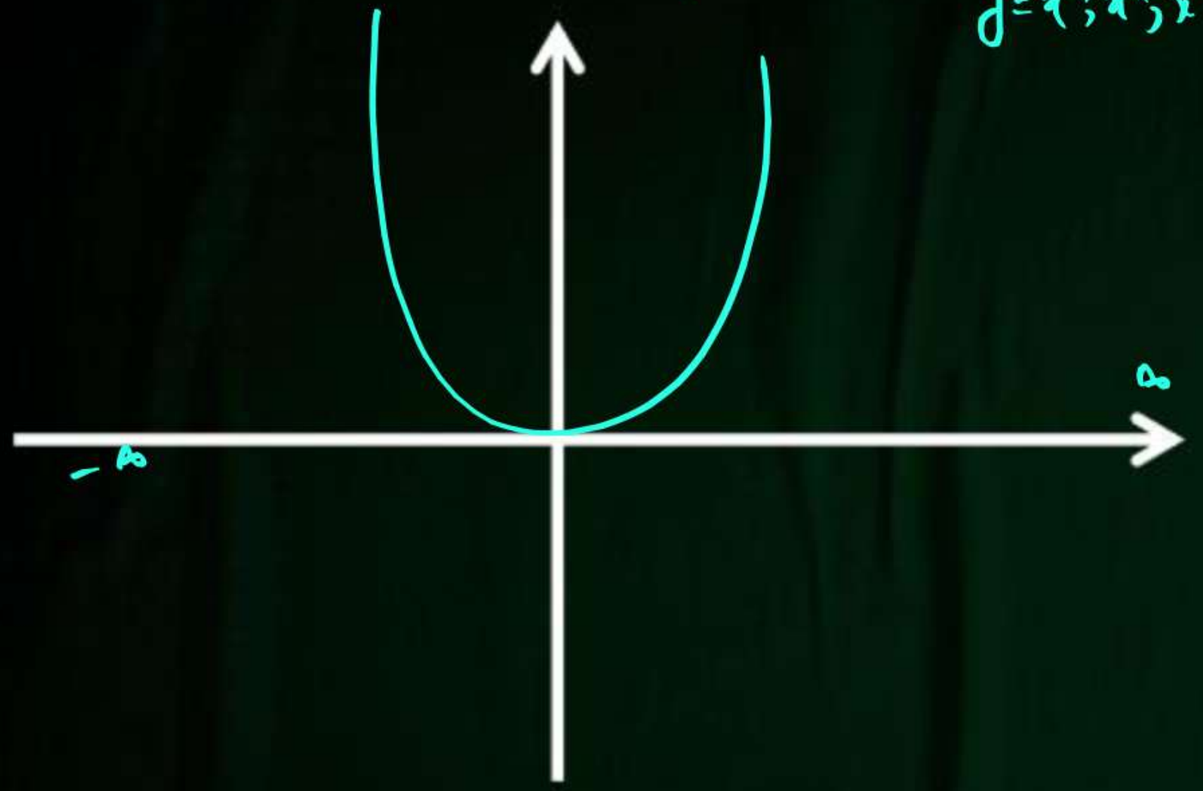


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Algebraic Function - Polynomial

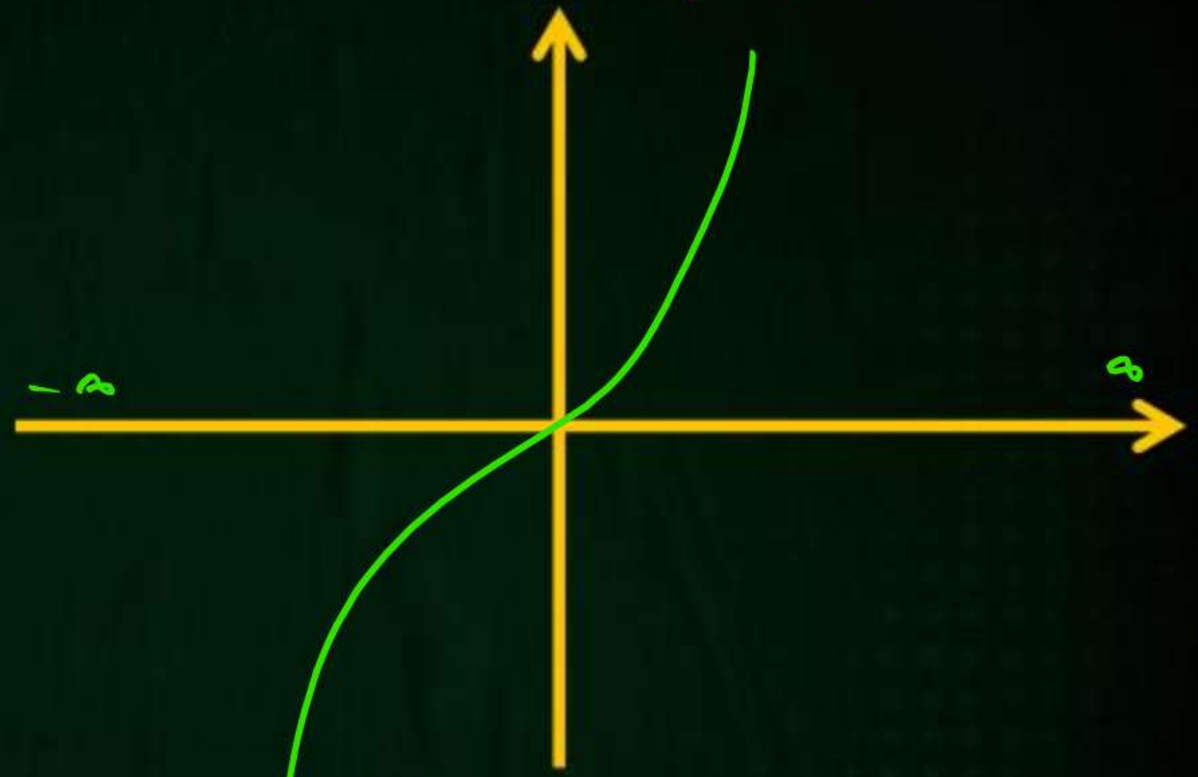
$y = x^n$ [$n \geq 2$; n: EVEN]

$y = x^2; x^4; x^6 \ldots$



$y = x^n$ [$n \geq 3$; n: ODD]

$y = x^3; x^5; x^7 \ldots$



- **Continuity:** XER
- **Differentiability:** XER

SSR SIR

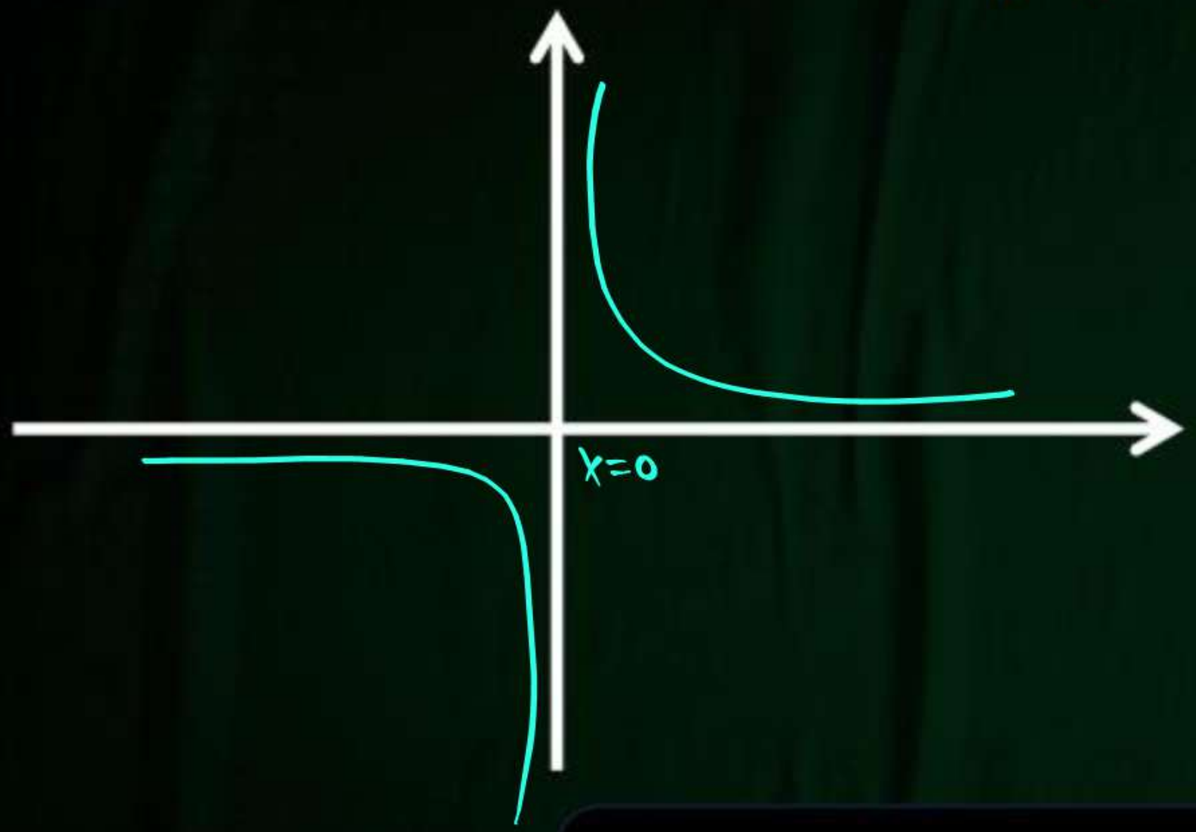
Algebraic Function – Rectangular Hyperbola

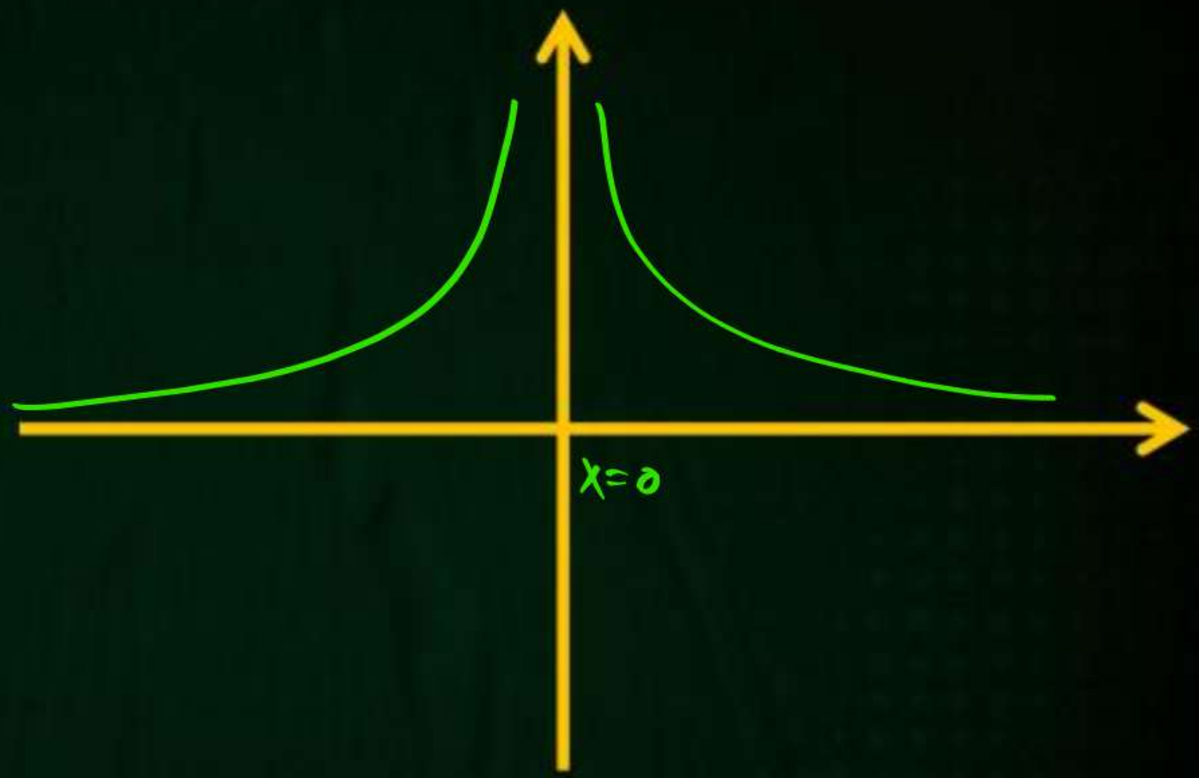
$y = \frac{1}{x^n}$; $(n \neq 1 ; n : \text{odd})$

$y = \frac{1}{x}, \frac{1}{x^3}, \frac{1}{x^5} \cdots$

$y = \frac{1}{x^n}$ $[n \neq 2 ; n : \text{even}]$

$\frac{1}{x^2}, \frac{1}{x^4}$





- **Continuity:** $x \in R - \{0\}$
- **Differentiability:** $x \in R - \{0\}$

SSR SIR

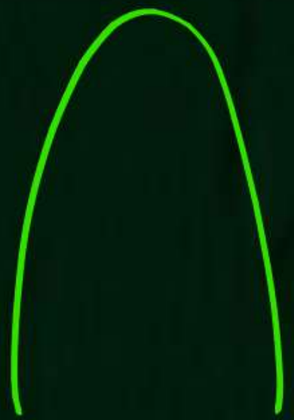
Algebraic Function – Quadratic Equations

$y = ax^2 + bx + c$; $x \in R$

$a > 0$



$a < 0$



- **Continuity:** $x \in R$
- **Differentiability:** $x \in R$

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Question: CUET 2026 PYQs

Observe the graph of a function $y = f(x)$ and identify the correct statements (s):

A. Function is continuous but not differentiable at $x = a$

B. Function is not defined at $x = a$

C. Function is defined at $x = a$ but not differentiable.

D. Given that at $x = a, y = b$.

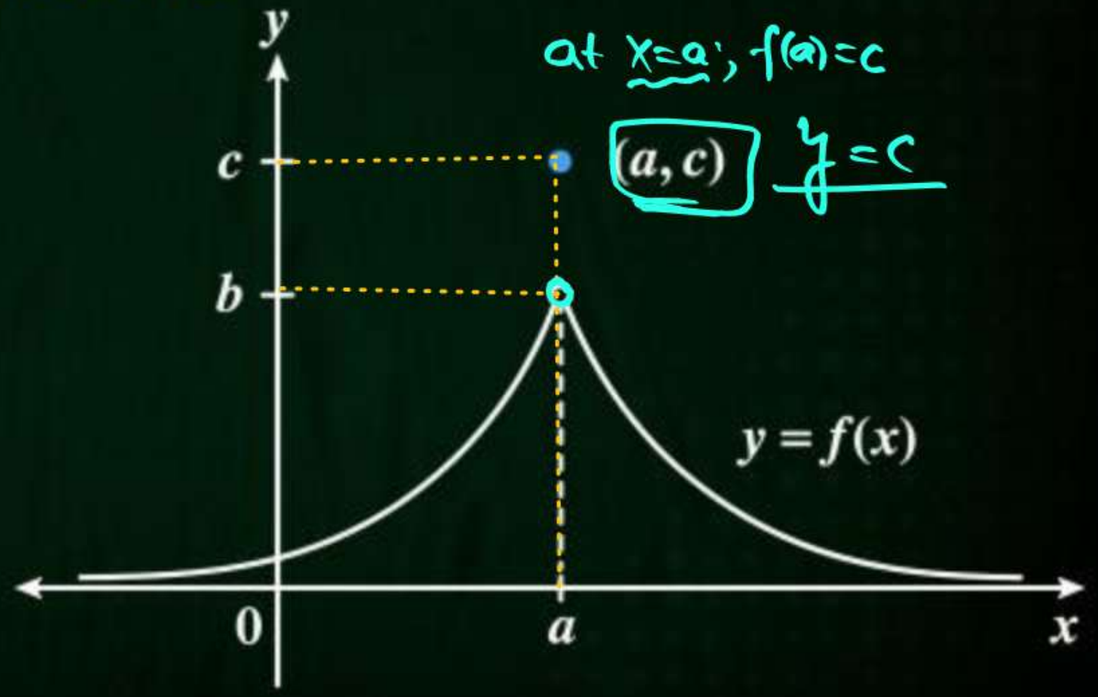
Choose the correct answer from the options given below:

(A) A and D only

(B) A and C only

(C) C only

(D) B and C only



at $x=a$, $f(a)=c$

$y=c$

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Question: CUET 2026 PYQs

If $f(x+y) = f(x) + f(y)$ for all $x, y \in R$ (set of real numbers) and $f(x)$ is continuous at $x = 0$, then identify the correct statement ?

If $f(x+y) = f(x) + f(y)$

$f(x) = kx$ $k \in R$

$y = mx$



(A) $f(x)$ is continuous for all x

(B) $f(x)$ is discontinuous at all x except $\{0\}$.

(C) $f(x)$ is continuous only at R^+ (set of positive real numbers)

(D) $f(x)$ is continuous only at R^- (set of negative real numbers)

$$f(x+y) = f(x) + f(y)$$

Let $x = 0$

$$f(0) = f(0) + f(0)$$

$$\boxed{f(0) = 0}$$

For $f(1)$

$x = 1$
$y = 0$

$$\Rightarrow f(1) = f(1) + f(0)$$

$$\boxed{f(1) = 1}$$

$$f(2) = 2$$

$$f(3) = 3$$

$$\boxed{f(x) = x}$$

Question: CUET 2026 PYQs

For the function $f(x) = |\cos x|$, which of the following statements are correct?

(A) $f(x)$ is continuous for all $x \in R$
(B) $f(x)$ is differentiable for all $x \in R$ ✗
(C) $f(x)$ is not differentiable at $x = (2n+1)\frac{\pi}{2}, n \in Z$
(D) $f(x)$ is not differentiable at $x = n\pi, n \in Z$

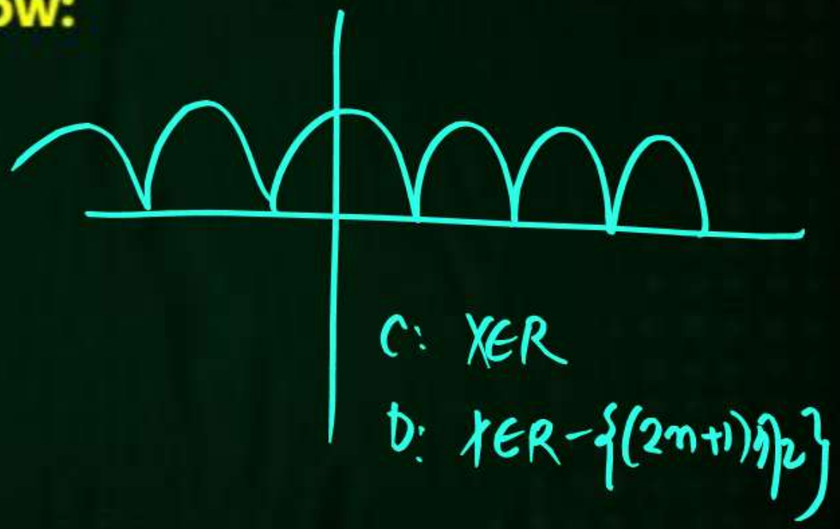
Choose the correct answer from the options given below:

A (A) and (C) only

B (A) and (B) only

C (C) only

D (B) and (D) only



Question: CUET 2026 PYQs

Let $f(x) = |x-2| + |x-3|$, $x \in R$ (Set of real numbers). Then which one of the following is TRUE?

C: $x \in R$
D: $x \in R - \{2,3\}$

(A) f(x) is discontinuous at $x = 2$ and $x = 3$ ✗

(B) f(x) is differentiable everywhere ✗

(C) f(x) is not differentiable at both $x = 2$ and $x = 3$ ✓

(D) f(x) is nowhere continuous ✗

Question: CUET 2026 PYQs

$x-3=0 \Rightarrow x=3$ | $x+4=0 \Rightarrow x=-4$

For the function $f: R \to R$ given by $f(x) = |x-3| + |x+4|$, where R is set of real numbers, which of the following statements are correct?

(A) $f(x)$ is continuous as well as differentiable at $x = 3$ ✗

(B) $f(x)$ is continuous but not differentiable at $x = 3$ and $x = -4$

(C) $f(x)$ is neither continuous nor differentiable at $x = 3$ ✗

(D) $f(x)$ is continuous on R

C: $x \in R$

D: $x \in R - \{3, -4\}$

Choose the correct answer from the options given below:

A (A) and (B) only

B (B), (C) and (D) only

C (B) and (D) only ✓

D (A) and (C) only

Question: CUET 2026 PYQs

For the function $f(x) = |x+1| + |x-1| + |x-2|$ which of the following are TRUE?

A. $f(x)$ is continuous on R
B. $f(x)$ is not differentiable at $x = 1$
C. $f(x)$ is differentiable on R
D. $f(x)$ has no local maxima

Choose the correct answer from the options given below:

(A) A, B and D only

(B) A, C and D only

(C) A and C only

(D) A and B only

SSR SIR

Question: CUET 2026 PYQs

For the function $f(x) = \min \{|x|, |x-2|\}$ which of the following are TRUE?

A. Function $f(x)$ is continuous on R
B. Function $f(x)$ is differentiable on R
C. Function $f(x)$ is differentiable on $R \sim \{0,1,2\}$
D. Function is continuous on R but not differentiable at $x = \frac{1}{2}$

Choose the correct answer from the options given below:

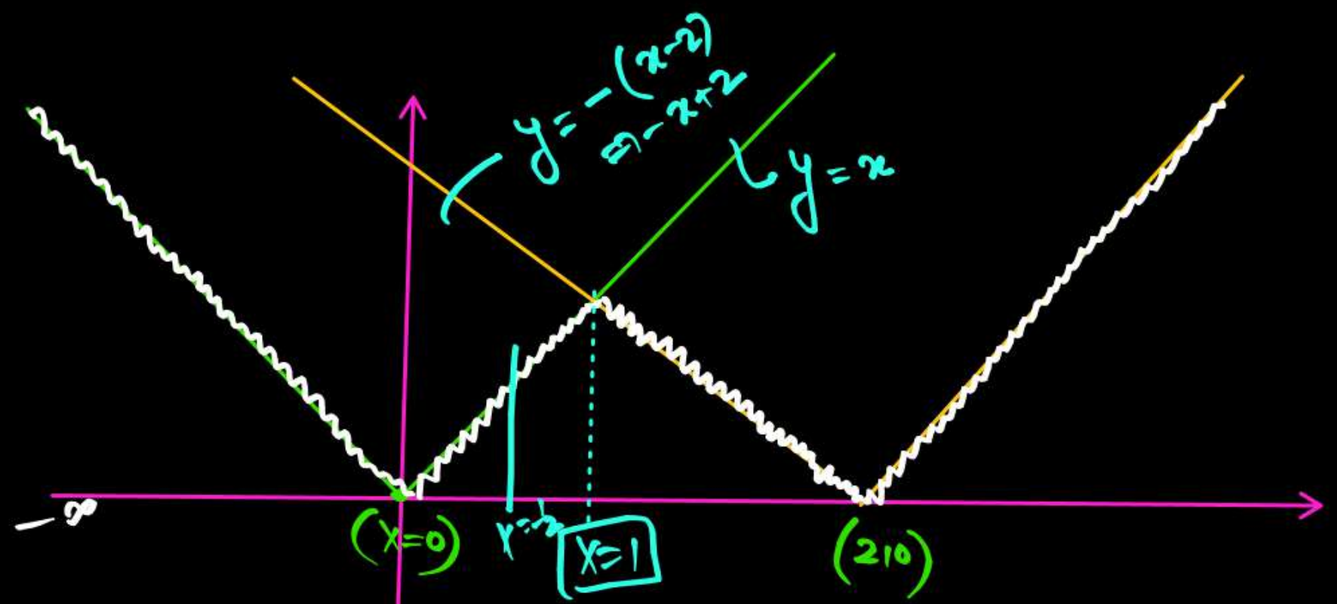
A. A and B only

B. A and C only

C. A, C and D only

D. C and D only

$$f(x) = \underbrace{\text{Min}}_{\text{Below fun Mark}} \{|x|, |x-2|\}$$



$y = \text{Max}\{\sin x, |x|\}$
$\text{Min}\{\quad\}$

$y = \text{Min}\{x^2, x^3, |x|, x\}$

$\Rightarrow$ Draw all Graph
In a Single Graph

[MAX: Mark upper portion
Min: Mark Below Portion]

$y = x$
$y = -x+2$

$x = -x+2$

$2x = 2$

$\boxed{x=1}$

Question: CUET 2026 PYQs

Let $f(x) = |x-1| + |x-2|, x \in R$. Then which of the following statements is/are TRUE?

(A) f is continuous everywhere.
(B) f is continuous everywhere except at $x = 1$ and $x = 2$
(C) f is not differentiable at $x = 1$ and $x = 2$
(D) f is differentiable at $x = 1$ and $x = 2$

Choose the correct answer from the options given below:

A (A) and (D) only

B (B) and (D) only

C (A) and (C) only

D (B) and (C) only

SSR SIR

Question: CUET 2026 PYQs

At $x = 2, f(x) = [x]$ is
[where [.] is greatest integer function]

$x=2 \in Z$

(A) Continuous but not differentiable ✗

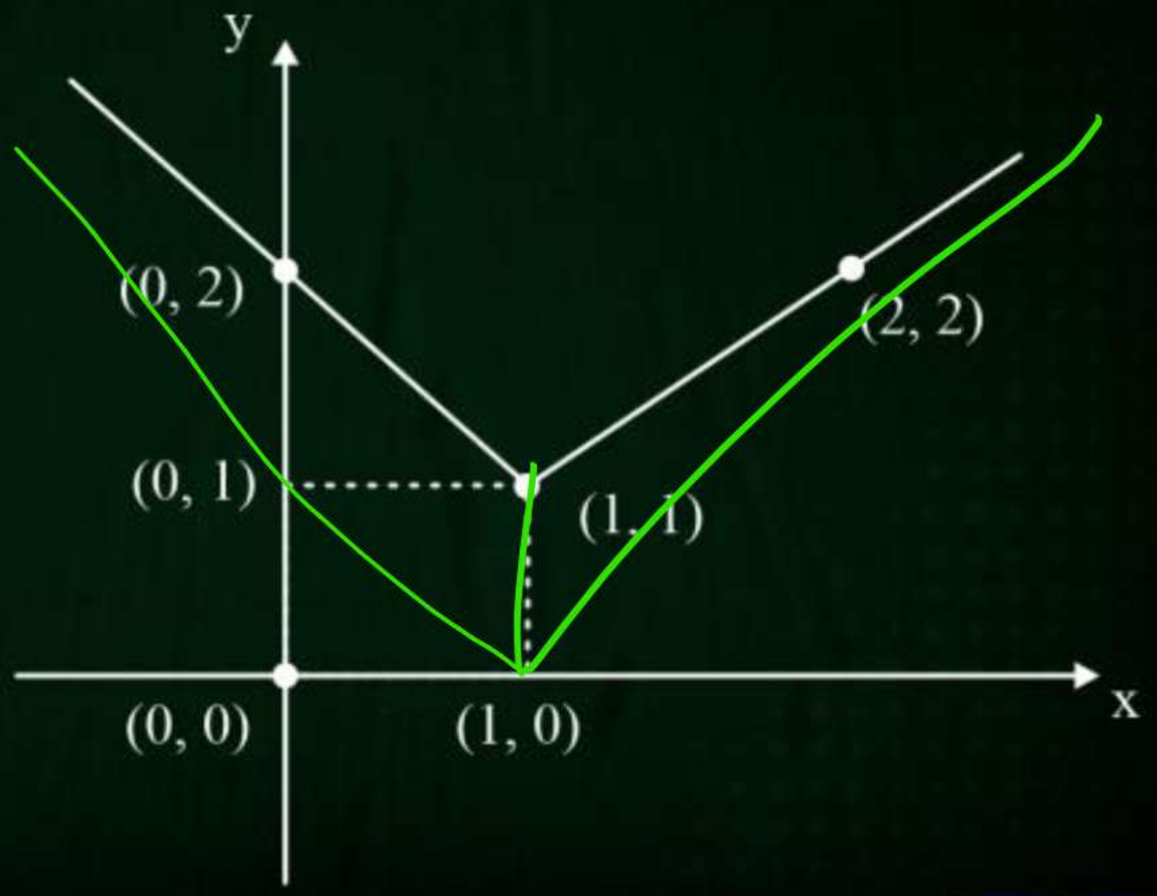
(B) Differentiable but not continuous ✗

(C) Continuous as well as differentiable ✗

(D) Neither continuous nor differentiable ✓

Question – CUET 2025 PYQs

#Q. The graph given below represents which of the following function?



A $y = |x + 1|$

B $y = |x + 1| + 1$

C $y = |x - 1| + 1$

D $y = |x + 1| - 1$

SSR SIR

Question – CUET 2025 PYQs

#Q. Which of the following functions $f(x)$ are differentiable at $x = 0$?

(A) $|x|$
(B) $|x - 1|$
(C) $|\sin x|$
(D) $|\cos x|$
(E) x^2

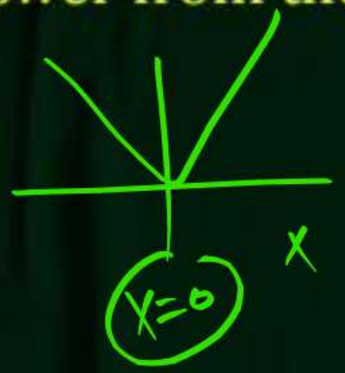
Choose the correct answer from the options given below:

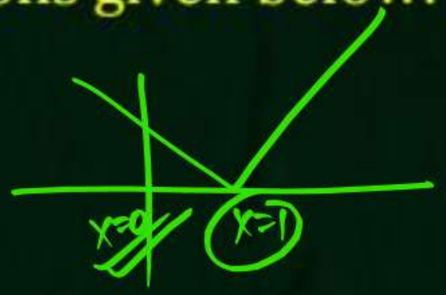
A (A), (C) and (D) only

B (B) and (E) only

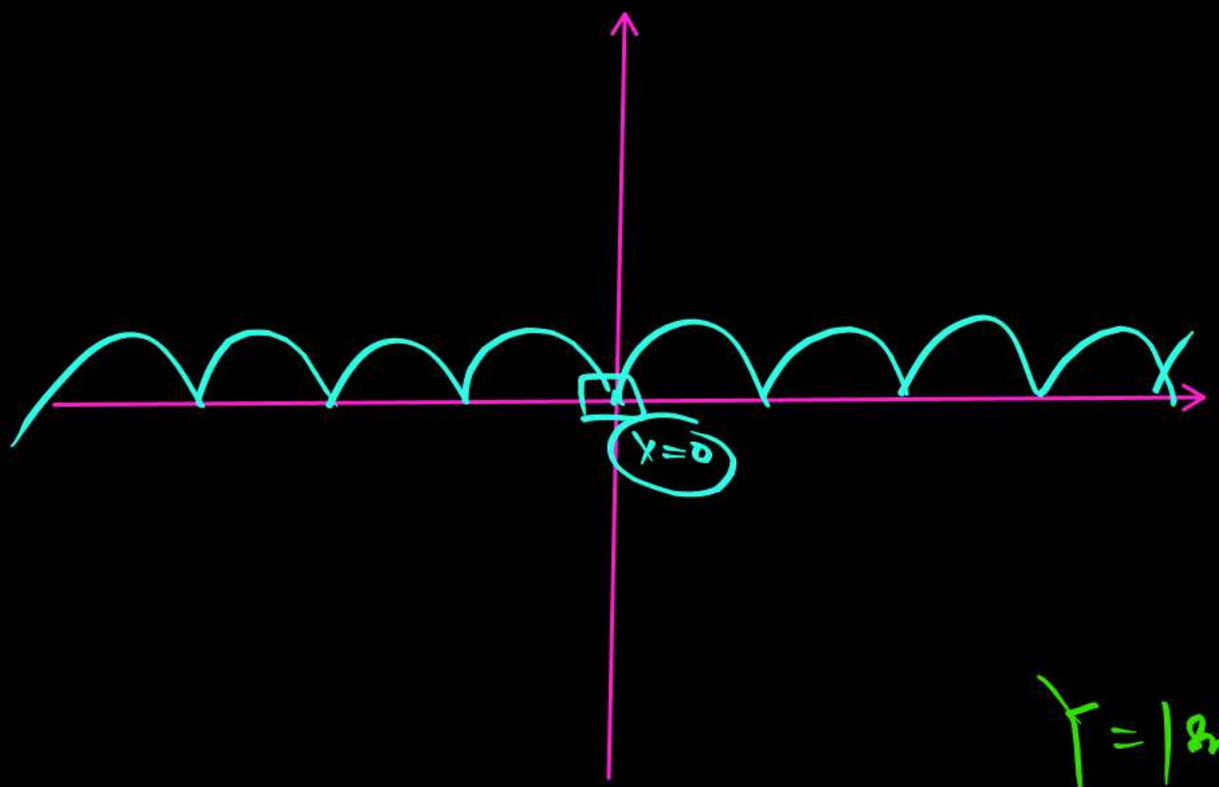
C (B), (D) and (E) only

D (A), (C) and (E) only

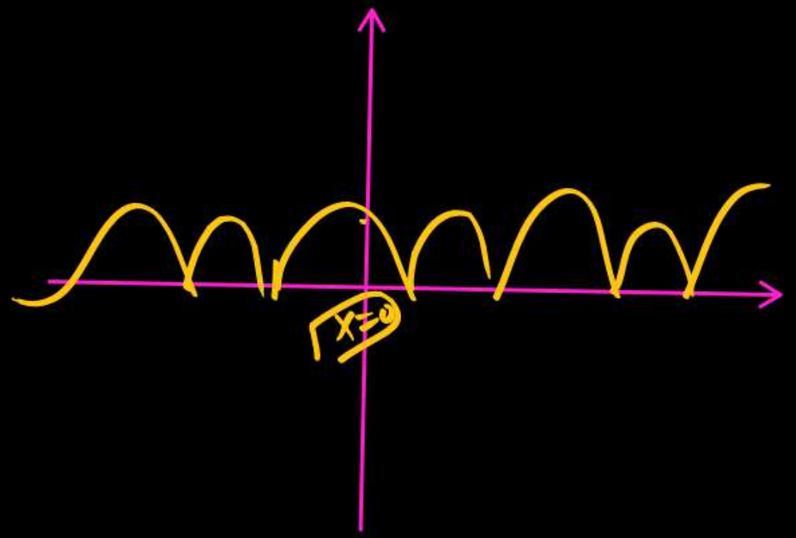








$Y = |\sin x|$



$Y = \cos x$

Question – CUET 2025 PYQs

#Q. The greatest integer function $f(x) = [x]$ is differentiable for all values of

A $x \in \mathbb{Z}$ (set of integers)

B $x \in \mathbb{R}$ (set of real numbers)

C $x \in \mathbb{R} - \mathbb{Z}$

D $x \in \square$ (set of rational numbers)

Question – CUET 2025 PYQs

#Q. Which of the following functions $f(x)$ are differentiable at $x = 0$?

(A) $|x|$

(B) $|x - 1|$

(C) $[x]$,where $[t]$ denotes the greatest integer $\leq t$

(D) $|x + 1|$

(E) x^2

Choose the correct answer from the options given below:

A (A), (B) and (D) only

B (B) and (D) only

C (B), (D) and (E) only

D (A), (D) and (E) only

Question – CUET 2025 PYQs

#Q. If $f(x) = |x| + |x-5|$, then which of the following statements are TRUE?

(A) f is a continuous function everywhere

(B) f is a continuous function except $x = 5$ and $x = 0$

(C) f is a continuous function except $x = 0$ but not differentiable at $x = 5$

(D) f is a continuous function everywhere but not differentiable at $x = 0$ and $x = 5$

Choose the correct answer from the options given below:

A (A) and (B) only

B (B) and (C) only

C (A) and (D) only

D (B) and (D) only

SSR SIR

Question – CBSE 2025 PYQs [MCQS]

If $f(x) = |x| + |x - 1|$, then which of the following is correct?

A $f(x)$ is both continuous and differentiable, at $x = 0$ and $x = 1$.

B $f(x)$ is differentiable but not continuous, at $x = 0$ and $x = 1$.

C $f(x)$ is continuous but not differentiable, at $x = 0$ and $x = 1$.

D $f(x)$ is neither continuous nor differentiable, at $x = 0$ and $x = 1$.

#Q. The function $f(x) = [x]$,where $[x]$ denotes the greatest integer function, is continuous at $x =$

(A) $2.9 \notin \mathbb{Z}$

(B) $5 \in \mathbb{Z}$ ✗

(C) $-3 \in \mathbb{Z}$ ✗

(D) $6.5 \notin \mathbb{Z}$

Choose the correct answer from the options given below:

A (A), (B) and (C) only

B (B), (C) and (D) only

C (A) and (D) only

D (C) and (D) only

Question – CUET 2025 PYQs

#Q. Match List-I with List-II. Where $\mathbb{R}$ is set of real numbers

List-I	List-II
(A) $\sin x$ is continuous on:	(I) $\mathbb{R} - \{0\}$
(B) $\tan x$ is continuous on:	(II) $\mathbb{R}$
(C) $\cot x$ is continuous on:	(III) $\mathbb{R} - \{n\pi : n \in \mathbb{Z}\}$
(D) x^{-n}, $n \in$ □ is continuous on:	(IV) $\mathbb{R} - \left\{(2n+1)\frac{\pi}{2} : n \in \mathbb{Z}\right\}$

Choose the correct answer from the options given below:

A (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

B (A)-(II), (B)-(IV), (C)-(III), (D)-(I)

C (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

D (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

SSR SIR

Question – CUET 2025 PYQs

Match List-I with List-II

List-I	List-II
(A) $f(x) = \|x\|$	(I) Not differentiable at $x = -2$ only
(B) $f(x) = \|x + 2\|$	(II) Not differentiable at $x = 0$ only
(C) $f(x) = \|x^2 - 4\|$	(III) Not differentiable at $x = 2$ only
(D) $f(x) = \|x - 2\|$	(IV) Not differentiable at $x = 2, -2$ only

SSR SIR

Question – CUET 2025 PYQs

Choose the correct answer from the options given below:

A (A) – (I), (B) – (II), (C) – (III), (D) – (IV)

B (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

C (A) – (II), (B) – (I), (C) – (III), (D) – (IV)

D (A) – (IV), (B) – (III), (C) – (II), (D) – (I)

Question – CUET 2025 PYQs

Match List-I with List-II

List-I	List-II
Function	Property
(A) $f(x) = \begin{cases} \frac{x}{\|x\|} & : x \neq 0 \\ 0 & : x = 0 \end{cases}$	(1) continuous but not differentiable at $x = 0$
(B) $f(x) = \|x\|$	(II) continuous but not differentiable at $x = 1$
(C) $f(x) = \|x^2 - 1\|$	(III) discontinuous at $x = 0$
(D) $f(x) = \|x - 1\|$	(IV) continuous but not differentiable at $x = 1, -1$

Question – CUET 2025 PYQs

Choose the correct answer from the options given below:

A (A) – (III), (B) – (I), (C) – (IV), (D) – (II)

B (A) – (IV), (B) – (I), (C) – (II), (D) – (III)

C (A) – (III), (B) – (I), (C) – (II), (D) – (IV)

D (A) – (IV), (B) – (III), (C) – (I), (D) – (II)

Question – CUET 2025 PYQs

Match List-I with List-II. Here $[x]$ denotes the greatest integer function

List-I	List-II
(A) $f(x) = [x]$	(I) is continuous everywhere but not differentiable at $x = -1$
(B) $f(x) = \|x - 1\|$	(II) is continuous everywhere except at all integral values
(C) $f(x) = e^{\|x\|}$	(III) is continuous everywhere but not differentiable at $x = 1$
(D) $f(x) = \|x + 1\|$	(IV) is continuous everywhere but not differentiable at $x = 0$

Choose the correct answer from the options given below:

A (A) – (I), (B) – (II), (C) – (III), (D) – (IV)

B (A) – (II), (B) – (III), (C) – (IV), (D) – (I)

C (A) – (III), (B) – (IV), (C) – (I), (D) – (II)

D (A) – (IV), (B) – (I), (C) – (II), (D) – (III)

Match List-I with List-II

List-I	List-II
(A) $f(x) = \|x\| + 1$	(I) Not differentiable at $x = 3$ only
(B) $f(x) = \|x - 3\|$	(II) Not differentiable at $x = -3$ only
(C) $f(x) = \|x + 3\|$	(III) Not differentiable at $x = 3, -3$ only
(D) $f(x) = \|x^2 - 9\|$	(IV) Not differentiable at $x = 0$ only

Question – CUET 2025 PYQs

Choose the correct answer from the options given below:

A (A) – (I), (B) – (III), (C) – (IV), (D) – (II)

B (A) – (IV), (B) – (II), (C) – (I), (D) – (III)

C (A) – (III), (B) – (IV), (C) – (II), (D) – (I)

D (A) – (IV), (B) – (I), (C) – (II), (D) – (III)

SSR SIR

QUESTION: CUET 2023 PYQs

The set of points where the function f given by $f(x) = |x - 2|$ is differentiable is :

$x = 2$

$R - \{2\}$

A $\mathbb{R}$

B $(0, \infty)$

C $\mathbb{R} - \{2\}$

D $\mathbb{R} - \{0\}$

QUESTION: CUET 2023 PYQs

Which of the following statements are correct?

(A) If $f: \mathrm{R} \to \mathrm{R}$ then $f(x) = |x|$ is continuous everywhere.

(B) If $f: \mathbb{R} \to \mathbb{R}$ then $f(x) = |x|$ is continuous everywhere but not differentiable at $x = 0$.

(C) Let $f: \mathrm{R} - \{0\} \to \mathrm{R}$ then $f(x) = \frac{1}{x}$ is continuous everywhere

(D) Let $f: \mathrm{R} \to \mathrm{R}$ then $f(x) = |x - 1| + |x - 2|$ is continuous everywhere but not differentiable at exactly 2 points.

(E) If $f: \mathrm{R} \to \mathrm{R}$ then $f(x) = \cot x$ is continuous everywhere.

Choose the correct answer from the options given below :

A (A) only

B (A), (B), (C), (D) only

C (A), (C) only

D (D), (E) only

SSR SIR

QUESTION: CUET 2023 PYQs

If $f(x) = |2x + 5|$, then $f(x)$ is :

A Discontinuous at $x = -5/2$

B Continuous and differentiable at $x = \frac{-5}{2}$

C Discontinuous and non-differentiable at $x = -5/2$

D Continuous and non differentiable at $x = -5/2$

QUESTION: CUET 2023 PYQs

Which of the following statements is/are correct?

(A) $|x|$ is continuous every where in its domain.

(B) $|x|$ is differentiable every where in its domain.

(C) $[x]$ is continuous at every integral point.

(D) $[x]$ is discontinuous at every integral point.

Choose the correct answer from the options given below :

A (A), (C) Only

B (B), (D) Only

C (B), (C) Only

D (A), (D) Only

QUESTION: NCERT EXAMPLER

Let $f(x) = |\cos x|$. Then,

A f is everywhere differentiable.

B f is everywhere continuous but not differentiable at $x = n\pi, n \in Z$.

C f is everywhere continuous but not differentiable at $x = (2n+1)\frac{\pi}{2}, n \in Z$.

D none of these

QUESTION: CBSE SPQs 2025

Q. The function $f: R \to Z$ defined by $f(x) = [x]$; where $[.] denotes the greatest integer function, is$

(A) Continuous at $x = 2.5$ but not differentiable at $x = 2.5$

(B) Not Continuous at $x = 2.5$ but differentiable at $x = 2.5$

(C) Not Continuous at $x = 2.5$ and not differentiable at $x = 2.5$

(D) Continuous as well as differentiable at $x = 2.5$



IMP. NOTE 1

- ✓ If a function is **Differentiable**, it must be **continuous**
- ✓ If a function is **discontinuous**, it must be **non – differentiable**.
- ✓ If a function is **continuous**, it may or **may not be differentiable**
- ✓ If a function is **non differentiable**, it **may or may not be continuous**.



IMP. NOTE 2

- ✓ All trigonometric functions are continuous and differentiable in its Domain.
- ✓ Modulus Functions: Always continuous in $x \in R$ and non differentiable where

  [Mod ke ander ka term Zero hota hai]
- ✓ [x] and {x} discontinuous and non differentiable at the Integral only.
- ✓ Exponential Functions → Continuous and differentiable $x \in R$
- ✓ Logarithm Functions → Continuous and differentiable in $x > 0$
- ✓ Polynomial Functions → of any degree, $x \in R$ continuous and differentiable.
- ✓ Rational Functions $\frac{p(x)}{q(x)}$ are continuous and differentiable, if $q(x) \neq 0$

Eg:

$$f(x) = \frac{2}{x^2-5x+6}$$

$$x^2-5x+6=0$$

$$(x-2)(x-3)=0$$

$$x=2, x=3$$

Cm : $R-\{D^r=0\}$

$R-\{2,3\}$

$$y=\frac{1}{x}$$

$x=0$

$x \in R-\{0\}$



Continuity at a Point

- **Let we have a function $y = f(x)$ is continuous at a point $x = a$, then**

A function $f(x)$ is said to be continuous at $x = a$; where $a \in$ domain of $f(x)$, if

$$\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x) = f(a)$$

i.e., LHL = RHL = value of a function at $x = a$

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

$$|x| = \begin{cases} x; & x \geq 0 \\ -x; & x < 0 \end{cases}$$

- ✓ ***We should check*** **continuity and differentiability at the *Doubtful Points* only**
- ✓ **Doubtful Point: is a point, where function changes its definitions**

#

$$\operatorname{Sgn}(x) = \begin{cases} 1; & x>0 \\ 0 & x=0 \\ -1 & x<0 \end{cases}$$

└ D.P: $x=0$

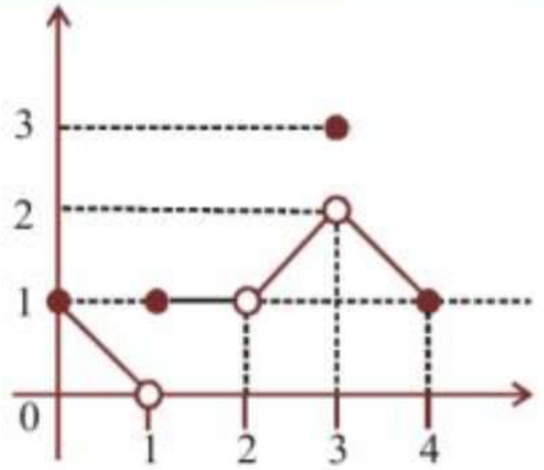
$[x] \longrightarrow \begin{cases} 0; & 0 \le x < 1 \\ 1; & 1 \le x < 2 \\ 2; & 2 \le x < 3 \\ \vdots & \\ \vdots & \end{cases}$ D.P: $x \in \mathbb{Z}$

Discontinuity at a Point

If $f(x)$ is not continuous at $x = a$, we say that $f(x)$ is discontinuous at $x = a$.

There are following possibilities of discontinuity :

1. $\lim\limits_{x \to a^-} f(x)$ and $\lim\limits_{x \to a^+} f(x)$ exist but they are not equal.
2. $\lim\limits_{x \to a^-} f(x)$ and $\lim\limits_{x \to a^+} f(x)$ exists and are equal but not equal to $f(a)$.
3. $f(a)$ is not defined.
4. At least one of the limits does not exist. Geometrically, the graph of the function will exhibit a break at the point of discontinuity.



The graph as shown is discontinuous at $x = 1$, 2 and 3.

SSR SIR

Basics of limit

$\frac{0}{0}, \frac{\infty}{\infty}, \infty - \infty \ldots$

(I) $\lim_{x \to a} \frac{f(x)}{g(x)} - \frac{A\log_a b}{A\log_b}$

↳ factorize $f(x)$ & $g(x)$

(II) $\lim_{x \to a} \frac{x + \sqrt{x^2 + a^2}}{x - \sqrt{\quad}}$ * (Rationalization)

Underroot Type Problem

$$\frac{(a - \sqrt{b})}{(a + \sqrt{b}) * (a - \sqrt{b})}$$

$\lim_{x \to 0} \frac{\sin x}{x} = 1$

$\lim_{x \to 0} \frac{\tan x}{x} = 1$

$\lim_{x \to 0} \frac{\sin^{-1} x}{x} = 1$

$\lim_{x \to 0} \frac{\tan^{-1} x}{x} = 1$

$\lim_{x \to 0} \frac{\sin(kx)}{x} = k$

$\lim_{x \to 0} \frac{\tan kx}{x} = k$

$\lim_{x \to 0} \frac{\sin^{-1} kx}{x} = k$

$\lim_{x \to 0} \frac{\tan^{-1} kx}{x} = k$

$\lim_{x \to 0} \frac{e^x - 1}{x} = 1$

$\lim_{x \to 0} \frac{e^{kx} - 1}{x} = k$

$\lim_{x \to 0} \frac{\log(1+x)}{x} = 1$

$\lim_{x \to 0} \frac{\log(1+kx)}{x} = k$

$\lim_{x\to 0} \frac{1-\cos 2x}{x^2} = 2$

$$\Rightarrow \lim_{x\to 0} \frac{1-(1-2\sin^2 x)}{x^2}$$

$$\Rightarrow \lim_{x\to 0} 2\left(\frac{\sin x}{x}\right)^{\frac{1}{2}}$$

$$\Rightarrow 2$$

$\lim_{x\to 0} \frac{1-\cos x}{x^2} = \frac{1}{2}$

$$\lim_{x\to 0} \frac{1-(1-2\sin^2 x/2)}{x^2}$$

$$\lim_{x\to 0} 2\left(\frac{\sin \frac{1}{2}x}{x}\right)^{\frac{1}{2}\cdot 2}$$

$$\lim_{x\to 0} 2\left(\frac{1}{2}\right)^2$$

$$\Rightarrow \frac{1}{2}$$

2023

$$\lim_{x\to a} [f(x)]^{[g(x)]}$$

$$\to 1^{\infty}$$

$$\lim_{x\to a} [f(x)-1]\cdot g(x)$$

$$\Rightarrow e$$



L' HOSPITAL'S RULE

$$\lim_{x\to a}\frac{f(x)}{g(x)} = \frac{0}{0}\Big|\frac{\infty}{\infty}$$

$$\Rightarrow \lim_{x\to a}\frac{f'(x)}{g'(x)} \Rightarrow \frac{f'(a)}{g'(a)} = \frac{0}{0}\Big|\frac{\infty}{\infty}$$

If $f(x)$ & $g(x)$ are functions of x such that :

(i) $\lim\limits_{x\to a} f(x) = 0 = \lim\limits_{x\to a} g(x)$ or $\lim\limits_{x\to a} f(x) = \infty = \lim\limits_{x\to a} g(x)$ and

$$\lim_{x\to a}\frac{f''(x)}{g''(x)} \Rightarrow \frac{f''(a)}{g''(a)} = \frac{0}{0}\Big|\frac{\infty}{\infty}$$

(ii) Both $f(x)$ & $g(x)$ are continuous at $x = a$ and

(iii) Both $f(x)$ & $g(x)$ are differentiable at $x = a$ and

(iv) Both $f'(x)$ & $g'(x)$ are continuous at $x = a$, Then

$$\lim_{x\to a}\frac{f^{n}(x)}{g^{n}(x)}$$

$$\text{Limit}_{x\to a}\frac{f(x)}{g(x)} = \text{Limit}_{x\to a}\frac{f'(x)}{g'(x)} = \text{Limit}_{x\to a}\frac{f''(x)}{g''(x)}$$ & so on till

indeterminant form vanishes..

SSR SIR

Question: CUET 2026 PYQs | CBSE 2025

If $f(x) = \begin{cases} \frac{\log_e(1+ax) - \log_e(1-bx)}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ and $f(x)$ is continuous at $x = 0$, then the value of k is

(A) $a - b$

(B) $\log a + \log b$

(C) ab

(D) $a + b$

$f(0) = k$

$$\lim_{x \to 0} \frac{\log(1+ax) - \log(1-bx)}{x}$$

$$\Rightarrow \lim_{x \to 0} \frac{\log(1+ax)}{x} - \lim_{x \to 0} \frac{\log(1-bx)}{x}$$

$$\Rightarrow (a - (-b)) \Rightarrow a + b$$

↳ $\lim_{x \to 0} f(x) = f(0)$

$k = (a+b)$.

Question: CUET 2026 PYQs

If $f(x) = \begin{cases} \frac{1-\cos 2kx}{x^2} & \text{if } x \neq 0 \\ 8 & \text{if } x = 0 \end{cases}$ is a continuous function at $x = 0$, then the value of k is:

(A) ± 2

(B) $\pm 2\sqrt{2}$

(C) ± 1

(D) ± 4

$f(0) = 8$

$\lim_{x \to 0} \frac{1-\cos 2kx}{x^2}$

$\Rightarrow \lim_{x \to 0} \frac{1-(1-2\sin^2 kx)}{x^2} \Rightarrow 2\lim_{x \to 0} \left(\frac{\sin kx}{x}\right)^2$

$\Rightarrow 2k^2$

$\because f(x)$ is Cont

$\therefore 2k^2 = 8$

$k^2 = 4$

$k = \pm 2$

SSR SIR

Question: CUET 2026 PYQs

If the function $f(x) = \begin{cases} 3x-6 & , x \leq 5 \\ 4k & , x > 5 \end{cases}$ is continuous at $x = 5$, then the value of k is:

A $\frac{1}{9}$

B $\frac{9}{2}$

C 9

D $\frac{9}{4}$

$4k = 3(5) - 6$

$4k = 9$

$k = 9/4$

SSR SIR

Question: CUET 2026 PYQs

If the function $f(x) = \begin{cases} \frac{e^{2\log_e x^2} - 1}{x-1} & , x \neq 1 \\ a & , x = 1 \end{cases}$ is continuous at $x = 1$, then the value of a is:

$4 = a$

(A) 1

(B) 2

(C) 4 ✓

(D) $\log_e 2$

$x = 1 \quad f(x) = a$

$$\lim_{x \to 1} \frac{e^{2\log_e x^2} - 1}{(x-1)} \Rightarrow \lim_{x \to 1} \frac{e^{\log_e (x^2)^2} - 1}{(x-1)}$$

$$\Rightarrow \lim_{x \to 1} \frac{x^4 - 1}{(x-1)} \Rightarrow \lim_{x \to 1} \frac{(x^2+1)(x^2-1)}{(x-1)}$$

$$\Rightarrow \lim_{x \to 1} \frac{(x^2+1)(x+1)(x-1)}{(x-1)} \Rightarrow (2)(2)$$

$\Rightarrow 4$ //

$$\Rightarrow \lim_{x \to 1} \frac{e^{\log_e x^4} - 1}{(x-1)}$$

SSR SIR

Question: CUET 2026 PYQs

If the function $f(x) = \begin{cases} \frac{1-\cos kx}{\sin^2 x} & , x \neq 0 \\ \frac{1}{2} & , x = 0 \end{cases}$ is continuous at $x = 0$, then the value of k is

A 1

B -1

C ± 1

D $\frac{1}{2}$

$f(0) = \frac{1}{2}$

$\lim_{x \to 0} \frac{1-\cos kx}{\sin^2 x}$

$\lim_{x \to 0} \frac{1-(1-2\sin^2 kx)}{\sin^2 x}$

$\lim_{x \to 0} \frac{2\sin^2 kx}{\sin^2 x}$

$\Rightarrow \lim_{x \to 0} \frac{\frac{2\sin^2 kx}{x^2}}{\frac{\sin^2 x}{x^2}}$

$\Rightarrow \lim_{x \to 0} \frac{2\left(\frac{\sin kx}{x}\right)^2}{\left(\frac{\sin x}{x}\right)^2} \Rightarrow 2k^2$

$\Rightarrow 2k^2$

$\because f(x)$ is Cont

$2k^2 = \frac{1}{2}$

$k^2 = \frac{1}{4} \Rightarrow k = \pm\frac{1}{2}$

SSR SIR

Question: CUET 2026 PYQs

If $f(x) = \begin{cases} \frac{x^2+3x-10}{x-2} & , x \neq 2 \\ 2k+1 & , x = 2 \end{cases}$ is continuous at $x = 2$, then the value of k is

A. 7

B. 4

C. $\frac{7}{2}$

D. 3

$f(x) = 2k+1$

$\lim_{x \to 2} \frac{x^2+3x-10}{(x-2)} \Rightarrow \frac{0}{0}$

$\Rightarrow \lim_{x \to 2} \frac{(2x+3)}{1} \Rightarrow 2(2)+3$

$\Rightarrow 7$

$2k+1 = 7$

$2k = 6$

$k = 3$

#

$\lim_{x \to 2} \frac{x^2+5x-2x-10}{(x-2)}$

$\Rightarrow \lim_{x \to 2} \frac{(x+5)(x-2)}{(x-2)}$

$\rightarrow 7$

SSR SIR

Question: CUET 2026 PYQs

Match List-I with List-II

List-I	Column 1	List-II	Column 2
A.	$f(x) = \begin{cases} x^{10} - 1 & ,x \leq 1 \\ x^2 & ,x > 1 \end{cases}$	I.	is continuous at all points of domain
B.	$g(x) = [x]$, $[x]$ denotes the greatest integer function	II.	is continuous at $x = 0$
C.	$h(x) = \begin{cases} \frac{\sin x}{x} & ,x < 0 \\ x + 1 & ,x \geq 0 \end{cases}$	III.	is discontinuous at $x = -2$
D.	$p(x) = \begin{cases} \frac{x}{\lvert x \rvert} & ,x < 0 \\ -1 & ,x \geq 0 \end{cases}$	IV.	is discontinuous at $x = 1$

Choose the correct answer from the options given below (referring to the Match List-I with List-II above):

A (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

B (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

C (A)-(IV), (B)-(II), (C)-(I), (D)-(III)

D (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

SSR SIR

Question: CUET 2026 PYQs

For the greatest integer function $f(x) = [x]$, which of the following statements are correct?

A. It is continuous at all real numbers.

B. It is continuous at $x = 2$ and 3.

C. It is continuous and differentiable for $x \in (2,3)$

D. It is continuous and differentiable at $x = 4.5$

Choose the correct answer from the options given below:

A. A and D only

B. C and D only

C. B and C only

D. A and B only

SSR SIR

Question: CUET 2026 PYQs

Function $f(x) = [x]$, greatest integer function is

(A) Continuous at $x = 2.5$
(B) Continuous at $x = 1$
(C) Differentiable at $x = 2$
(D) Differentiable at $x = -1.2$

Choose the correct answer from the options given below:

A (B) and (C) only

B (A) and (D) only

C (A), (B) and (D) only

D (A), (B) and (C) only

SSR SIR

If $f(x) = \begin{cases} \frac{\log(1+ax)+\log(1-bx)}{x} & , \text{ for } x \neq 0 \\ k & , \text{ for } x = 0 \end{cases}$

is continuous at $x = 0$, then the value of k is :

A) a

B) a + b

C) a − b

D) b

If $f(x) = \begin{cases} \frac{1-\sin^3 x}{3\cos^2 x}, & \text{for } x \neq \frac{\pi}{2} \\ k, & \text{for } x = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$, then the value of k is :

A $\frac{3}{2}$

B $\frac{1}{6}$

C $\frac{1}{2}$

D 1

$f(\pi/2) = k$

$\lim_{x \to \pi/2} \frac{1-\sin^3 x}{3\cos^2 x} = \frac{0}{0}$

$\Rightarrow \lim_{x \to \pi/2} \frac{(1-\sin x)(1+\sin^2 x+\sin x)}{3(1-\sin^2 x) \Rightarrow 3(1-\sin x)(1+\sin x)}$

$\Rightarrow \frac{1}{3}\left[\frac{1+1+1}{1+1}\right] \Rightarrow \frac{3}{3\cdot 2} \Rightarrow \frac{1}{2}$

Question – CUET 2025 PYQs

#Q. The value of k for which the function, defined by,

$$f(x) = \begin{cases} \dfrac{3x + 4\tan x}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$$

is continuous at $x = 0$, is:

A. 3

B. 4

C. 7

D. 0

$k = 7$

$f(0) = k$

$\lim_{x \to 0} \dfrac{3x + 4\tan x}{x} \Rightarrow \lim_{x \to 0} \dfrac{3x}{x} + \lim_{x \to 0} 4\left(\dfrac{\tan x}{x}\right)^1$

$\Rightarrow \lim_{x \to 0} 3 + \lim_{x \to 0} 4$

$\Rightarrow 7$

SSR SIR

Question – CUET 2025 PYQs

#Q. The value of k for which the function $f(x) = \begin{cases} \frac{1-\cos 8x}{16x^2}, & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$ is:

A. 0

B. 2

C. −2

D. 1

$$k = \lim_{x \to 0} \frac{1-(1-2\sin^2 4x)}{16x^2}$$

$$k = \lim_{x \to 0} \frac{1}{8}\left(\frac{\sin 4x}{x}\right)^2$$

$$k = \frac{16}{8} = 2$$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $f(x)=\begin{cases}\frac{\tan\left(\frac{\pi}{4}-x\right)}{\cot 2x}, & x\neq\frac{\pi}{4}\\ 2K+1, & x=\frac{\pi}{4}\end{cases}$ is continuous at $x=\frac{\pi}{4}$, then the value of K is equal to

$f(\pi/4)=2k+1$

$\lim_{x\to\pi/4}\frac{\tan\left(\frac{\pi}{4}-x\right)}{\cot 2x}=\frac{0}{0}$

$\lim_{x\to\pi/4}\frac{\sec^2\left[\frac{\pi}{4}-x\right](-1)}{-(\operatorname{cosec}^2(2x)(2))}$

$\Rightarrow\frac{1}{2(\operatorname{cosec}^2(\pi/4))}$

$\Rightarrow\frac{1}{2}$

(A) $\frac{1}{4}$

(B) $\frac{1}{2}$

(C) $-\frac{1}{2}$

(D) $-\frac{1}{4}$

$2k+1=\frac{1}{2}$

$2k=-\frac{1}{2}$

$k=-1/4$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $f(x) = \begin{cases} mx + 1, & x \geq \frac{\pi}{2} \\ \sin x + n, & x \leq \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$, where $m \in \mathbb{Z}$ (set of integers), then $\sin 2n =$

$f\left(\frac{\pi}{2}\right) = \sin\frac{\pi}{2} + n = (1+n)$

$\lim_{x \to \frac{\pi}{2}^+} (mx+1) \Rightarrow \left(\frac{m\pi}{2} + 1\right)$

$(1+n) = \left(\frac{m\pi}{2} + 1\right)$

$n = \left(\frac{m\pi}{2}\right)$

$\sin 2n = \sin\left[\frac{m\pi}{\cancel{2}}\right] \Rightarrow 0$

A) 0

B) 1

C) –1

D) a finite value between –1 and 0

SSR SIR

Question – CUET 2025 PYQs

#Q. If the function $f(x) = \begin{cases} \frac{\sin 3x}{x}, & \text{if } x \neq 0 \\ \frac{3k}{2}, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$, then the value of k is

$\frac{3k}{2} = \lim_{x \to 0} \frac{\sin 3x}{x} \cdot 3$

$\frac{3k}{2} = 3$

$k = 2$

A $\frac{2}{3}$

B 4

C 2

D 9

SSR SIR

QUESTION: CUET 2023 PYQs

If $f(x) = \begin{cases} \frac{\sqrt{x^2+5}-3}{x+2}, & x \neq -2 \\ k, & x = -2 \end{cases}$ is continuous at $x = -2$ then the value of k is:

A $-\frac{2}{3}$

B 0

C $\frac{2}{3}$

D $\frac{3}{2}$

$k = \lim_{x \to -2} \frac{\sqrt{x^2+5} - 3}{(x+2)}$

$\Rightarrow \lim_{x \to -2} \frac{\frac{1}{2\sqrt{x^2+5}}(2x)}{1} \Rightarrow \frac{-2}{3}$

Properties of Continuous Functions

Let $f(x)$ and $g(x)$ be continuous functions at $x = a$. Then,

1. $c\,f(x)$ is continuous at $x = a$, where c is any constant.
2. $f(x) \pm g(x)$ is continuous at $x = a$.
3. $f(x).\,g(x)$ is continuous at $x = a$.
4. $f(x)/g(x)$ is continuous at $x = a$, provided $g(a) \neq 0$.-

$f(x) \pm g(x) \to c$

$\frac{f(x)}{g(x)}$; $g(a) \neq 0$

$|f(x)|$

$|g(x)|$

$\lambda f(x)$

$\lambda g(x)$

SSR SIR

Question

If $f(x) = 2x$ and $g(x) = \frac{x^2}{2} + 1$, then which of the following can be a discontinuous function ?

A. $x \in R$ $\quad$ $x \in R$

A $f(x) + g(x)$

B $f(x) - g(x)$

C $f(x) \cdot g(x)$

D $\frac{g(x)}{f(x)}$

$\frac{g(x)}{f(x)} = \frac{\frac{x^2}{2}+1}{2x}$ | $x = 0$



Differentiation – Basic Formulas

(i) $\frac{d}{dx}\left(x^n\right) = n \cdot x^{n-1}\ ;\ x \in R,\ n \in R,\ x > 0$

(ii) $\frac{d}{dx}\left(e^x\right) = e^x$

(iii) $\frac{d}{dx}\left(a^x\right) = a^x \cdot \ln a\ (a > 0)$

(iv) $\frac{d}{dx}\left(\ln|x|\right) = \frac{1}{x}$

(v) $\frac{d}{dx}\left(\log_a|x|\right) = \frac{1}{x}\log_a e$

(vi) $\frac{d}{dx}\left(\sin x\right) = \cos x$

(vii) $\frac{d}{dx}\left(\cos x\right) = -\sin x$

(viii) $\frac{d}{dx}\left(\tan x\right) = \sec^2 x$

(ix) $\frac{d}{dx}\left(\sec x\right) = \sec x \cdot \tan x$

(x) $\frac{d}{dx}\left(\operatorname{cosec} x\right) = -\operatorname{cosec} x \cdot \cot x$

(xi) $\frac{d}{dx}\left(\cot x\right) = -\operatorname{cosec}^2 x$

SSR SIR

(xii) $\frac{d}{dx}(\text{constant}) = 0$

(xiii) $\frac{d}{dx}(\sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}, \quad -1 < x < 1$

(xiv) $\frac{d}{dx}(\cos^{-1}x) = \frac{-1}{\sqrt{1-x^2}}, \quad -1 < x < 1$

(xv) $\frac{d}{dx}(\tan^{-1}x) = \frac{1}{1+x^2}, \quad x \in R$

(xvi) $\frac{d}{dx}(\cot^{-1}x) = \frac{-1}{1+x^2}, \quad x \in R$

(xvii) $\frac{d}{dx}(\sec^{-1}x) = \frac{1}{|x|\sqrt{x^2-1}}, \quad |x| > 1$

(xviii) $\frac{d}{dx}(\text{cosec}^{-1}x) = \frac{-1}{|x|\sqrt{x^2-1}}, \quad |x| > 1$

$\frac{d}{dx}(kx) = k \; ; \; k \in R$

\# $\frac{d}{dx}[\sqrt{x}] = \frac{1}{2\sqrt{x}}$

$\frac{d}{dx}\left[\frac{1}{\sqrt{x}}\right] = \frac{-1}{2x\sqrt{x}}$

\# $\frac{d}{dx}\left[\frac{1}{x^{(1)}}\right] = -\frac{(1)}{x^{(2)}}$

$\frac{d}{dx}\left[\frac{1}{x^{(2)}}\right] = -\frac{(2)}{x^{(3)}}$

$\frac{d}{dx}\left[\frac{1}{x^{(3)}}\right] = -\frac{(3)}{x^{(4)}}$ ...

$\frac{d}{dx}\left[\frac{1}{x^{99}}\right] = \frac{-99}{x^{100}}$

$\frac{d}{dx}\left[\frac{1}{x^{(n)}}\right] = \frac{-n}{x^{n+1}}$

SSR SIR



Differentiation – Basic Properties

If u and v are derivable functions of x, then,

(i) Term by term differentiation : $\frac{d}{dx}(u \pm v) = \frac{du}{dx} \pm \frac{dv}{dx}$

(ii) Multiplication by a constant $\frac{d}{dx}(Ku) = K\frac{du}{dx}$, where K is any constant

(III) Order of The Derivative : No of times diff Have been Done.

(1) $\frac{dy}{dx} = f'(x) = y_1$

$\frac{d^2y}{dx^2} \Rightarrow f''(x) = y_2$

$\frac{d^3y}{dx^3} = f^3(x) = y_3$

SSR SIR



Multiplication Rule

"Product Rule" $\dfrac{d}{dx}(u.v) = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$

for 2 fun : $\dfrac{d}{dx}\left[f(x)\cdot g(x)\right] = \dfrac{d}{dx}\left[f(x)\right]\cdot g(x) + f(x)\cdot\dfrac{d}{dx}\left[g(x)\right]$

for 3 fun $\dfrac{d}{dx}\left[f\cdot g\cdot h\right] = \dfrac{d}{dx}\left[f(x)\right]\cdot g(x)\cdot h(x) + f(x)\cdot\dfrac{d}{dx}\left[g(x)\right]\cdot h(x)$

$+ f(x)\cdot g(x)\cdot\dfrac{d}{dx}\left[h(x)\right]$

SSR SIR



Multiplication Rule for more than 2 Functions

If $u_1, u_2, u_3, u_4, \ldots, u_n$ are the functions of x, then

$$\frac{d}{dx}(u_1 . u_2 . u_3 . u_4 \ldots . u_n)$$

$$= \left(\frac{du_1}{dx}\right)(u_2\ u_3\ u_4 \ldots u_n) + \left(\frac{du_2}{dx}\right)(u_1\ u_3\ u_4 \ldots u_n)$$

$$+ \left(\frac{du_3}{dx}\right)(u_1\ u_2\ u_4 \ldots u_n) + \left(\frac{du_4}{dx}\right)(u_1\ u_2\ u_3\ u_5 \ldots u_n)$$

$$+ \ldots + \left(\frac{du_n}{dx}\right)(u_1\ u_2\ u_3 \ldots u_{n-1})$$

SSR SIR



Division Rule (Quotient Rule)

"Quotient Rule" $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\left(\frac{du}{dx}\right) - u\left(\frac{dv}{dx}\right)}{v^2}$ where $v \neq 0$

known as

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{f'(x)\cdot g(x) - f(x)\cdot g'(x)}{[g(x)]^2}$$

SSR SIR

Question: CUET 2026 PYQs

If $y = (1+x)(1+x^2)(1+x^4)$, then $\frac{dy}{dx}$ at $x = -1$ is

A 4

B 2

C $\frac{1}{4}$

D $\frac{1}{2}$

$\left(\frac{dy}{dx}\right)_{x=-1} \Rightarrow 1(1+x^2)(1+x^4) + (1+x)(2x)\cdot(1+x^4) + (1+x)(1+x^2)\cdot 4x^3$

$\Rightarrow (1+1)(1+1) + 0 + 0$

$\Rightarrow (2)(2)$

$\Rightarrow 4$

SSR SIR

Question: CUET 2026 PYQs

2023

If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ then $2x\frac{dy}{dx}$ is equal to

(A) $\sqrt{x} - \frac{1}{\sqrt{x}}$

(B) $\sqrt{x} + \frac{1}{\sqrt{x}}$

(C) $\frac{1}{\sqrt{x}} + \sqrt{x}$

(D) $\frac{1}{2\sqrt{x}} + \frac{1}{2x\sqrt{x}}$

$$\frac{dy}{dx} = \frac{1}{2\sqrt{x}} - \frac{1}{2x\sqrt{x}}$$

$$\frac{dy}{dx} = \frac{1}{2x}\left[\frac{\sqrt{x}}{\sqrt{x}} - \frac{1}{\sqrt{x}}\right]$$

$$2x\left(\frac{dy}{dx}\right) = \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$$

SSR SIR

Question – CBSE 2024 PYQs

If $y = \sin^{-1}x$, then $\frac{d^2y}{dx^2}$ is:

$x = \sin y$

$\frac{dx}{dy} = \cos y$

$\frac{dy}{dx} = \frac{1}{\left(\frac{dx}{dy}\right)}$

$\Rightarrow \frac{1}{\cos y} = \sec y$

$\therefore \frac{dy}{dx} = \sec y$

$\frac{d^2y}{dx^2} \Rightarrow (\sec y \cdot \tan y)\cdot\frac{dy}{dx}$

$\Rightarrow (\sec y \cdot \tan y)\sec y$

$\Rightarrow \sec y \cdot \tan y$

A. Sec y

B. sec y tan y

C. $\sec^2 y \tan y$ ✓

D. $\tan^2 y \sec y$

Question – CBSE 2024 PYQs

If $\sin(xy) = 1$, then $\frac{dy}{dx}$ is equal to:

A $\frac{x}{y}$

B $-\frac{x}{y}$

C $\frac{y}{x}$

D $-\frac{y}{x}$

$xy = \pi/2$

$y + x \cdot \frac{dy}{dx} = 0 \Rightarrow \frac{dy}{dx} = -y/x$

Question – CBSE 2024 PYQs

If $e^{x^2y} = c$, then $\frac{dy}{dx}$ is:

A $\frac{xe^{x^2y}}{2y}$

B $\frac{-2y}{x}$

C $\frac{2y}{x}$

D $\frac{x}{2y}$

$x^2y = \log c$.

$(2x)y + x^2 \cdot \frac{dy}{dx} = 0$

$y' = -2y/x$

QUESTION: CUET 2023 PYQs

If $y = 500e^{7x} + 600e^{-7x}$, then $\frac{d^2y}{dx^2}$ is equal to :

C

A 7y

B 49y

C 14y

D 29y

$$\frac{dy}{dx} = (500)e^{7x} \cdot (7) + 600e^{-7x} \cdot (-7)$$

$$\frac{d^2y}{dx^2} \Rightarrow (500)e^{7x} \cdot (7)^2 + 600e^{-7x}(-7)^2$$

$$\Rightarrow 49\left[500e^{7x} + 600e^{-7x}\right]$$

$$\Rightarrow 49y$$

SSR SIR

QUESTION: CUET 2023 PYQs

If $y = x^3 \log x$, then $\frac{d^2y}{dx^2}$ is equal to :

A $x^2(3 + 4\log x)$

B $x(4 + 3\log x)$

C $3x^2 \log x$

D $x(5 + 6\log x)$

$\frac{dy}{dx} \Rightarrow 3x^2(\log x) + x^3 \cdot \frac{1}{x}$

$\frac{dy}{dx} = x^2[3\log x + 1]$

$\frac{d^2y}{dx^2} \Rightarrow 2x(3\log x + 1) + x^2\left(3 \cdot \frac{1}{x}\right)$

$\Rightarrow 6x \cdot \log x + 2x + 3x$

$\Rightarrow 6x \log x + 5x$

QUESTION: CUET 2023 PYQs

The value of k for which $k\frac{dy}{dx} = \sqrt{x} - \frac{1}{\sqrt{x}}$, where $y = \sqrt{x} + \frac{1}{\sqrt{x}}$; is :

A $2x$

B 2

C x

D $\sqrt{x}$

$K = 2x$

CUET 2026

Q. If $y = e^{\log_e \sin^{-1} x} + e^{\log_e \cos^{-1} x}, 0 < x < 1$, then

$y = \sin^{-1}x + \cos^{-1}x$

$y = \frac{\pi}{2}$

$dy/dx = 0$

$e^{\log_e x} = x$

A. $\frac{dy}{dx} = 0$

B. $\frac{dy}{dx} = \frac{\pi}{2}$

C. $\frac{dy}{dx} = \frac{\pi}{3}$

D. Does not exist

QUESTION: CUET 2022 PYQs

Q. If $y = 1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} \ldots$, If $\frac{d^2y}{dx^2}$ is:

(1) $-x$
(2) $-y$
(3) x
(4) y

$$\frac{d^2y}{dx^2} \Rightarrow \underbrace{1 - x + \frac{x^2}{2!} - \cdots}_{y}$$

$$y' = 0 - 1 + \frac{2x}{1*2} - \frac{3x^2}{1*2*3} + \frac{4x^3}{1*2*3*4} - \cdots$$

$$\frac{dy}{dx} = -1 + x - \frac{x^2}{2} + \frac{x^3}{3*2*1} - \cdots$$

$$\frac{d^2y}{dx^2} = 0 + 1 - \frac{2x}{2} + \frac{3x^2}{3*2*1} - \cdots$$

A. 1
B. 2
C. 3
D. 4

SSR SIR



CHAIN RULE

$$y = f[g(h(x))]$$

Composite form

$$\frac{dy}{dx} \Rightarrow f'[g(h(x))] * g'[h(x)] * h'(x) \cdot 1$$

Power ko sabse pehle diff karte hai

SSR SIR

NOTES :

In general if $y = f(u)$ then $\frac{dy}{dx} = f'(u).\frac{du}{dx}$.

SSR SIR

Question: CUET 2026 PYQs

$\frac{d}{dx}\log\left(x+\sqrt{x^2+4}\right)$ is

(A) $\frac{1}{x+\sqrt{x^2+4}}$

(B) $\frac{2x}{x+\sqrt{x^2+4}}$

(C) $\frac{2x}{x-\sqrt{x^2+4}}$

(D) $\frac{1}{\sqrt{x^2+4}}$

$$\frac{1}{x+\sqrt{x^2+4}} \times \left[1+\frac{1}{2\sqrt{x^2+4}}(2x)\right]$$

$$\frac{1}{x+\sqrt{x^2+4}}\left[\frac{\sqrt{x^2+4}+x}{\sqrt{x^2+4}}\right]$$

$$\Rightarrow \frac{1}{\sqrt{x^2+4}}$$

SSR SIR

Question: CUET 2026 PYQs | 2023

If $y = \log_e\left(\frac{x^2}{e^2}\right)$, then $\frac{d^2y}{dx^2}$ is equal to:

A $\frac{-1}{x}$

B $\frac{-1}{x^2}$

C $\frac{-2}{x^2}$

D $\frac{2}{x^2}$

$y = \log_e x^2 - \log_e e^3$

$y = 2\log_e x - \log_e e^3$

$\frac{dy}{dx} = \frac{2}{x} - 0$

$\frac{d^2y}{dx^2} = -2/x^2$

SSR SIR

Question: CUET 2026 PYQs

Match List-I with List-II.

List-I	List-II
(A) $\frac{d}{dx}(\sqrt{\sin x})$	(I) $\frac{-\sin x}{2\sqrt{\cos x}}$
(B) $\frac{d}{dx}(\sqrt{\cos x})$	(II) $-\sin 2x$
(C) $\frac{d}{dx}(\sin^2 x)$	(III) $\frac{\cos x}{2\sqrt{\sin x}}$
(D) $\frac{d}{dx}(\quad^2 x)$	(IV) $\sin 2x$

Choose the correct answer from the options given below:

A (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

B (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

C (A) - (III), (B) - (I), (C) - (IV), (D) - (II)

D (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

SSR SIR

Question

If $y = \log\left(x + \sqrt{x^2 + a^2}\right)$ then find $\frac{dy}{dx}$

$$\frac{dy}{dx} = \frac{1}{x+\sqrt{x^2+a^2}} * \left[1 + \frac{1(2x)}{2\sqrt{x^2+a^2}}\right]$$

$$\Rightarrow \frac{1}{x+\sqrt{x^2+a^2}} \left[\frac{\sqrt{x^2+a^2}+x}{\sqrt{x^2+a^2}}\right]$$

$$\Rightarrow \frac{1}{\sqrt{x^2+a^2}} \quad \text{Ans}$$

SSR SIR

Question

The derivative of $\sin(\tan^{-1} e^{2x})$ with respect to x is:

A. $\frac{2e^{2x}\sin(\tan^{-1} e^{2x})}{1+e^{4x}}$

B. $\frac{2e^{2x}\cos(\tan^{-1} e^{2x})}{1+e^{4x}}$

C. $\frac{2e^{2x}\sin(\tan^{-1} e^{2x})}{1+e^{x^2}}$

D. $\frac{2e^{2x}\cos(\tan^{-1} e^{2x})}{1+e^{2x}}$

$$\cos\left[\tan^{-1} e^{2x}\right] \cdot \frac{1}{1+\left(e^{2x}\right)^2} * e^{2x} \quad (2)$$

$$\Rightarrow \frac{2e^{2x} \cdot \cos\left(\tan^{-1} e^{2x}\right)}{1+e^{4x}}$$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $y = \log_e(\sec e^{x^2})$, then $\frac{dy}{dx}$ is

$y' = \frac{1}{\sec e^{x^2}} \cdot \sec(e^{x^2}) \cdot \tan(e^{x^2}) \cdot e^{x^2} \cdot 2x$

$y' = 2x \cdot e^{x^2} \cdot \tan e^{x^2}$

A $x^2 e^{x^2} \tan e^{x^2}$

B $2xe^{x^2} \tan e^{x^2}$

C $e^{x^2} \tan e^{x^2}$

D $xe^{x^2} \tan e^{x^2}$

If $\sqrt{x}+\sqrt{y}=\sqrt{a}$, then $\frac{dy}{dx}$ is

A $\frac{-\sqrt{x}}{\sqrt{y}}$

B $-\frac{1}{2}\frac{\sqrt{y}}{\sqrt{x}}$

C $-\frac{\sqrt{y}}{\sqrt{x}}$

D $\frac{-2\sqrt{y}}{\sqrt{x}}$

$$\frac{1}{2\sqrt{x}}+\frac{1}{2\sqrt{y}}\cdot\frac{dy}{dx}=0$$

$$\frac{dy}{dx}=-\sqrt{\frac{y}{x}}$$

QUESTION: NCERT EXAMPLER

Differential coefficient of $\sec(\tan^{-1} x)$ w.r.t. x is

A $\dfrac{x}{\sqrt{1+x^2}}$

B $\dfrac{x}{1+x^2}$

C $x\sqrt{1+x^2}$

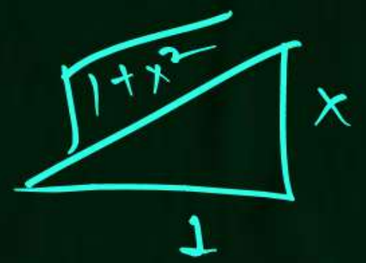
D $\dfrac{1}{\sqrt{1+x^2}}$

$\Rightarrow \sec\theta$

$\theta = \tan^{-1} x$

$\tan\theta = x$

$y \Rightarrow \sqrt{1+x^2}$



$\dfrac{dy}{dx} = \dfrac{1}{2\sqrt{1+x^2}}(2x)$

$\Rightarrow \dfrac{x}{\sqrt{1+x^2}}$

SSR SIR

QUESTION: CBSE 2023 PYQs

If $y = \sin^2(x^3)$, then $\frac{dy}{dx}$ is equal to

$2\sin(x^3) \cdot \cos(x^3) \cdot 3x^2$

A $2\sin x^3 \cos x^3$

B $3x^3 \sin x^3 \cos x^3$

C $6x^2 \sin x^3 \cos x^3$

D $2x^2 \sin^2(x^3)$

QUESTION: CBSE 2023 PYQs

If $y = \frac{\cos x - \sin x}{\cos x + \sin x}$, then $\frac{dy}{dx}$ is

A $-\sec^2\left(\frac{\pi}{4} - x\right)$

B $\sec^2\left(\frac{\pi}{4} - x\right)$

C $\log\left|\sec\left(\frac{\pi}{4} - x\right)\right|$

D $-\log\left|\sec\left(\frac{\pi}{4} - x\right)\right|$

$y = \frac{1 - \tan x}{1 + \tan x}$

$y = \tan\left(\frac{\pi}{4} - x\right)$

$y' = \sec^2\left(\frac{\pi}{4} - x\right)(-1)$

Question – CBSE 2024 PYQs

$\frac{d}{dx}[\cos(\log x + e^x)]$ at x = 1 is :

A. –sin e

B. sin e

C. –(1 + e) sin e

D. (1 + e) sin e

$$= -\sin(\log x + e^x)\left[\frac{1}{x} + e^x\right]\Big|_{x=1}$$

$$\Rightarrow -\sin\left[(\log 1 + e)\right]\left[1 + e\right]$$

SSR SIR

QUESTION: CUET 2023 PYQs

If $y = 8e^{9x} + 6e^{-9x}$, then which of the following is the value of $\frac{d^2y}{dx^2}$?

A $35y$

B $81y$

C $-42y$

D $245y$

9^2y

QUESTION: CUET 2022 PYQs

Q. Let $y = m \sin rx + n \cos rx$. What is the value of $\frac{d^2y}{dx^2}$?

(1) ry

(2) –ry

(3) r^2y

(4) $-r^2y$

$y' = r(m\cos rx) - r(n\sin rx)$

$y'' = -r^2y$

A 1

B 3

C 2

D 4

SSR SIR

QUESTION: CUET 2023 PYQs

If $x\sqrt{1+y}+y\sqrt{1+x}=0$, then $\frac{dy}{dx}=$

$x(\sqrt{1+y})=-y\sqrt{1+x}$

$x^2(1+y)=y^2(1+x)$

$x^2+x^2y=y^2+y^2x$

$(x^2-y^2)+x^2y-y^2x=0$

$(x+y)(x-y)+xy(x-y)=0$

$(x-y)[(x+y)+xy]=0$

$x-y=0 \Rightarrow y=x$

$y'=1$

$x+y+xy=0$

$x+y(1+x)=0$

$y=\frac{-x}{(1+x)}$

$y'=\frac{-1(1+x)-x}{(1+x)^2}$

$\Rightarrow \frac{-1}{(1+x)^2}$

A $\frac{1}{(1+x)^2}$

B $\frac{-1}{(1+x)^2}$

C $(1+x)^2$

D $-(1+x)^2$

QUESTION: CUET 2022 PYQs / 2025

Q. If $y = \log\left(\sec e^{x^2}\right)$, then $\frac{dy}{dx} =$

$$y' = \frac{1}{\sec(e^{x^2})} \cdot \sec(e^{x^2}) \cdot \tan(e^{x^2}) \cdot e^{x^2}(2x)$$

$$\Rightarrow 2x e^{x^2} \cdot \tan e^{x^2}$$

A $x^2 e^{x^2} \tan e^{x^2}$

B $e^{x^2} \tan e^{x^2}$

C $2xe^{x^2} \tan e^{x^2}$

D $xe^{x^2} \tan e^{x^2}$

SSR SIR

QUESTION: CUET 2022 PYQs

Q. If $y = 2\sqrt{e^{\sqrt{x}}}$ then $\frac{dy}{dx}$ is equal to

A. $\frac{1}{2\sqrt{e^{\sqrt{x}}}}$

B. $\frac{\sqrt{e^{\sqrt{x}}}}{2\sqrt{x}}$

C. $\frac{\sqrt{x}}{2\sqrt{e^{\sqrt{x}}}}$

D. $\frac{2\sqrt{e^{\sqrt{x}}}}{\sqrt{x}}$

$$\frac{dy}{dx} = 2 \cdot \frac{1}{2\sqrt{e^{\sqrt{x}}}} \cdot e^{\sqrt{x}} \cdot \frac{1}{2\sqrt{x}}$$

$$\Rightarrow \frac{\sqrt{e^{\sqrt{x}}}\sqrt{e^{\sqrt{x}}}}{\sqrt{e^{\sqrt{x}}}} * \frac{1}{2\sqrt{x}}$$

$$\Rightarrow \frac{1}{2}\frac{\sqrt{e^{\sqrt{x}}}}{\sqrt{x}}$$

$2 = \sqrt{2}\sqrt{2}$

$3 = \sqrt{3}\sqrt{3}$

$x = \sqrt{x}\sqrt{x}$

$e^x = \sqrt{e^x}\sqrt{e^x}$

$e^{\sqrt{x}} = \sqrt{e^{\sqrt{x}}}\sqrt{e^{\sqrt{x}}}$

SSR SIR



Properties of Logarithms

1. $\log_e(ab) = \log_e a + \log_e b$ $\{a, b > 0\}$
2. $\log_e\left(\frac{a}{b}\right) = \log_e a - \log_e b$ $\{a, b > 0\}$
3. $\log_e a^m = m \log_e a$ $\{a > 0 \text{ and } m \in R\}$
4. $\log_a a = 1$ $\{a > 0 \text{ and } a \neq 1\}$
5. $\log_{b^m} a = \frac{1}{m} \log_b a$ $\{a, b > 0, b \neq 1 \text{ and } m \in R\}$
6. $\log_b a = \frac{1}{\log_a b}$ $\{a, b > 0 \text{ and } a, b \neq 1\}$
7. $\log_b a = \frac{\log_m a}{\log_m b}$ $\{a, b > 0 \neq \{1\} \text{ and } m > 0\}$
8. $a^{\log_a m} = m$ $\{a, m > 0 \text{ and } a \neq 1\}$
9. $a^{\log_c b} = b^{\log_c a}$ $\{a, b, c > 0 \text{ and } c \neq 1\}$
10. If $\log_m x > \log_m y \Rightarrow \begin{cases} x > y, & \text{if } m > 1 \\ x < y, & \text{if } 0 < m < 1 \end{cases}$ $\{m, x, y, > 0 \text{ and } m \neq 1\}$

SSR SIR

(I) $\log[x_1 \cdot x_2] = \log x_1 + \log x_2$

(II) $\log\left[\frac{x_1}{x_2}\right] = \log x_1 - \log x_2$

(III) $\log 1 = 0$

$\log_e x = \ln x$

$\log_a a = 1$

* Base Change:

$$\log_a b = \frac{\log b}{\log a}$$

$$\log_b a = \frac{\log a}{\log b}$$

$$\log_a b = \frac{1}{\log_b a}$$

Power ka Game.

$$\log_{(a^b)} c \Rightarrow \frac{1}{b} \cdot \log_a c$$

$$\log_a (b^c) \Rightarrow c \cdot \log_a b$$

$$\log_{(a^b)} (c)^d \Rightarrow \frac{d}{b} \log_a c$$

Kat Maare ki Property

$$\log_{\text{Modi}} (\text{Amit}) = \text{Amit}$$

$$e^{\log_e x} = x$$

$$p^{\log_p x} = x$$



Use of Log in the Differentiation

$$\frac{1}{y}\cdot\frac{dy}{dx} = \frac{f_1'}{f_1} + \frac{f_2'}{f_2} + \cdots + \frac{f_n'}{f_n}$$

(1) $\log(x_1 \cdot x_2) = \log x_1 + \log x_2$

$$\frac{dy}{dx} = y\left[\frac{f_1'}{f_1} + \frac{f_2'}{f_2} + \cdots + \frac{f_n'}{f_n}\right]$$

$y = f_1 \cdot f_2 \cdot f_3 \cdots f_n$

Take log both side.

$\log y = \log [f_1 \cdot f_2 \cdots f_n]$

$\log y = \log f_1 + \log f_2 + \cdots + \log f_n$

Now Diff both side

SSR SIR

(11)

$$y = [f(x)]^{g(x)}$$

Take log both side

$$\log y = \log [f(x)]^{g(x)}$$

$$\log y = [g(x)] \cdot \log [f(x)]$$

$$\frac{1}{y} \cdot \frac{dy}{dx} = g'(x) \cdot \log [f(x)] + g(x) \cdot \frac{f'(x)}{f(x)}$$

$$\boxed{\frac{dy}{dx} = y\left[g'(x) \cdot \log (f(x)) + g(x) \cdot \frac{f'(x)}{f(x)}\right]}$$

(11)

$$y = \log_{[f(x)]} [g(x)]$$

$$\boxed{y = \frac{\log [g(x)]}{\log [f(x)]}}$$

Question: CUET 2026 PYQs

If $x^y = e^{x-y}$ then $\frac{dy}{dx}$ =

(A) $y\,x^{y-1} + e^{x-y}$

(B) $\frac{2 + \log x}{(1 + \log x)^2}$

(C) $\frac{x}{1 + \log x}$

(D) $\frac{\log x}{(1 + \log x)^2}$

$\log x^y = \log e^{x-y}$

$y \cdot \log x = (x - y)$

$y[1 + \log x] = x$

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

$\frac{dy}{dx} = \frac{1[1 + \log x] - x\left[\frac{1}{x}\right]}{(1 + \log x)^2}$

$\Rightarrow \frac{\log x}{(1 + \log x)^2}$

SSR SIR

Question

If $y = x^x$, $\frac{dy}{dx}$ will be:

Rat Lo

$\therefore y = x^x$

$\log y = \log x^x$

$\log y = x \log x$

$\frac{1}{y}\cdot\frac{dy}{dx} = (1)(\log x) + (x)\cdot\frac{1}{x}$

$\frac{dy}{dx} = y(1+\log x)$

$\frac{dy}{dx} = x^x(1+\log x)$

(A) x^x

(B) $x^x(1+\log x)$

(C) x^{x-1}

(D) x^{x+1}

(2) If $\frac{dy}{dx} = 0$

$1+\log x = 0$

$\log x = -1$

$\log x = -\log e$

$\log x = \log\left(\frac{1}{e}\right)$

$x = \frac{1}{e}$

SSR SIR

If $y = \log_{2x}(\sqrt{2x})$, then $\frac{dy}{dx}$ is equal to :

A 0

B 1

C $\frac{1}{x}$

D $\frac{1}{\sqrt{2x}}$

$$y = \frac{\log \sqrt{2x}}{\log(2x)}$$

$$y = \frac{\log (2x)^{1/2}}{\log(2x)}$$

$$\Rightarrow \frac{\frac{1}{2}\log(2x)}{\log(2x)} \Rightarrow \frac{1}{2}$$

$$y = \frac{1}{2}$$

$$\frac{dy}{dx} = 0$$

Question – CUET 2025 PYQs

#Q. Differentiation of $\log [\log(\log x^5)]$ with respect to x is

$y = \log [\log_e (\log_e x^5)]$

$y' = \frac{1}{\log_e(\log_e x^5)} \cdot \frac{1}{(\log_e x^5)} * \frac{1}{x^5} (5x^4)$

$\Rightarrow \frac{5}{x \cdot \log_e(\log_e x^5) \cdot (\log_e x^5)}$

A. $\frac{5}{x(\log x^5)\log(\log x^5)}$

B. $\frac{5}{x\log(\log x^5)}$

C. $\frac{5x^2}{(\log x^5)\log(\log x^5)}$

D. $\frac{5x^4}{(\log x^5)\log(\log x^5)}$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $y = 3^x + e^x + x^x + x^3$ then the value of $\frac{dy}{dx}$ at $x = 3$ is

$\frac{dy}{dx} = 3^x \log 3 + e^x + x^x(1+\log x) + 3x^2 \Big|_{x=3}$

$\Rightarrow 27\log 3 + e^3 + 27(1+\log 3) + 27$

$\Rightarrow 54\log 3 + 54 + e^3$

A $e^3 + 27\log_e 3 + 27$

B $e^3 + 54\log_e 3 + 54$

C $e^3 + 54\log_e 3 + 27$

D $e^3 + 27\log_e 3 + 54$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $y = \log_e\left(\frac{e^2}{x^2}\right)$ for $x \neq 0$, then $\frac{d^2y}{dx^2}$ equals

HW

A $-\frac{1}{x}$

B $\frac{1}{x^2}$

C $\frac{2}{x^2}$

D $\frac{-2}{x^2}$

SSR SIR

Question – CUET 2025 PYQs

#Q. $\frac{d}{dx}\left(e^{2\log_e x^3}\right)$ equals

$\frac{d}{dx}\left[e^{\log_e (x^3)^2}\right]$

$\frac{d}{dx}\left[x^6\right] \Rightarrow 6x^5$

A $30x^4$

B $6x^5$

C $5x^6$

D $3x^2$

SSR SIR

#Q. If $e^x + e^y = e^{x+y}$, then $\frac{dy}{dx}$ equals

$$e^x + e^y \cdot \frac{dy}{dx} = e^{x+y}\left[1 + \frac{dy}{dx}\right]$$

$$e^x + e^y \cdot \frac{dy}{dx} = (e^x + e^y)\left(1 + \frac{dy}{dx}\right)$$

$$\frac{dy}{dx}\left[e^y - (e^x + e^y)\right] = (e^x + e^y) - e^x$$

$$\frac{dy}{dx} = \frac{-e^y}{e^x}$$

$$\Rightarrow -e^{y-x}$$

A $-e^{y-x}$

B e^{y-x}

C e^{x-y}

D $-e^{x-y}$

Question – CUET 2025 PYQs

#Q. If $y = (x+1)(x^2+1)(x^4+1)(x^8+1)$ then $\frac{dy}{dx}$ at $x = -1$ is

$\left(\frac{dy}{dx}\right) \Rightarrow 1(x^2+1)(x^4+1)(x^8+1) + (x+1)(2x)(x^4+1)(x^8+1) + (x+1)(x^2+1)4x^3(x^8+1) + (x+1)(x^2+1)(x^4+1)8x^7$

$x=-1$ $\quad (2*2*2) + 0 + 0 + 0$

$\Rightarrow 8$

A 8

B -8

C 16

D -16

SSR SIR

Question – CUET 2025 PYQs

#Q. If $xy = e^{(x-y)}$, then $\frac{dy}{dx}$ is equal to:

$$y + x\cdot\frac{dy}{dx} = e^{(x-y)}\cdot\left[1 - \frac{dy}{dx}\right]$$

$$y + x\cdot\frac{dy}{dx} = e^{x-y} - e^{(x-y)}\cdot\frac{dy}{dx}$$

$$\frac{dy}{dx}\left[x + e^{x-y}\right] = e^{x-y} - y$$

$$\frac{dy}{dx} = \frac{e^{x-y} - y}{x + e^{x-y}}$$

(A) $\frac{e^{x-y} + y}{x + e^{x-y}}$

(B) $\frac{e^{x-y} - y}{x + e^{x-y}}$

(C) $\frac{e^{x-y} - y}{x - e^{x-y}}$

(D) $\frac{e^{x-y} + y}{x - e^{x-y}}$

SSR SIR

#Q. If $y = \left(x + \sqrt{x^2+1}\right)^m$ then $\frac{dy}{dx}$ is

$$\frac{dy}{dx} = m\left[x+\sqrt{x^2+1}\right]^{m-1} * \left[1 + \frac{1}{2\sqrt{x^2+1}}(2x)\right]$$

$$\Rightarrow m\cdot\left[x+\sqrt{x^2+1}\right]^{m-1} * \left[\frac{\left(\sqrt{x^2+1}+x\right)^1}{\sqrt{x^2+1}}\right]$$

(A) $\frac{y}{\sqrt{x^2+1}}$

(B) $\frac{m^2y}{\sqrt{x^2+1}}$

$$y' = \frac{m\left(x+\sqrt{x^2+1}\right)^m}{\sqrt{x^2+1}}$$

(C) $\frac{m}{\sqrt{x^2+1}}$

$$y' = \frac{my}{\sqrt{x^2+1}}$$

(D) $\frac{my}{\sqrt{x^2+1}}$

QUESTION: CUET 2023 PYQs | 2025 | 2026

If $x^m y^n = (x+y)^{m+n}$, then the value of $\frac{d^2y}{dx^2}$ is :

A 1

B y/x

C -1

D 0

$x^m \cdot y^n = (x+y)^{m+n}$

$\frac{dy}{dx} = y/x$

$\frac{d^2y}{dx^2} = 0$

$x^6 \cdot y^{10} = (x+y)^{16}$

$x^{60} \cdot y^{70} = (x+y)^{130}$

$x^{12} \cdot y^{13} = (x+y)^{25}$

SSR SIR

#

$$x^m \cdot y^n = (x+y)^{m+n}$$

Taking log both side

$$\log [x^m \cdot y^n] = \log (x+y)^{m+n}$$

$$\log x^m + \log y^n = (m+n) \cdot \log (x+y)$$

$$m \cdot \log x + n \cdot \log y = (m+n) \cdot \log (x+y)$$

Now Diff both side

$$m \cdot \frac{1}{x} + n \cdot \frac{1}{y} \frac{dy}{dx} = (m+n) \cdot \frac{1}{(x+y)} \cdot \left[1 + \frac{dy}{dx}\right]$$

$$\frac{dy}{dx}\left[\frac{n}{y} - \frac{(m+n)}{(x+y)}\right] = \frac{(m+n)}{(x+y)} - \frac{m}{x}$$

$$\frac{dy}{dx}\left[\frac{nx+ny-my-ny}{y(x+y)}\right] = \frac{(mx+nx)-(mx-my)}{x(x+y)}$$

$$\frac{dy}{dx}\left[\frac{mx-my}{y(x+y)}\right] = \frac{[mx-my]}{x(x+y)}$$

$$\boxed{\frac{dy}{dx} = y/x}$$

$\therefore \quad \boxed{\frac{dy}{dx} = y|x}$

$$\hookrightarrow \frac{d^2y}{dx} = \frac{\left(\frac{dy}{dx}\right)\cdot x - y \cdot 1}{x^2}$$

$$\frac{d^2y}{dx^2} \Rightarrow \frac{\left(\frac{y}{x}\right)\cdot x - y}{x^2}$$

$$\Rightarrow \frac{y-y}{x^2}$$

$$\boxed{\frac{d^2y}{dx^2} \Rightarrow 0}$$

QUESTION: CUET 2022 PYQs

Q. If $y = x^{sinx}$, then value of $x^{-sinx}\frac{dy}{dx} - \cos x \log x$ is:

1. $\frac{sinx}{x}$
2. $\sin x$
3. $\cos x$
4. $\frac{cosx}{x}$

$\log y = (\sin x)\cdot \log x$

$\frac{1}{y}\cdot\frac{dy}{dx} = (\cos x)\cdot\log x + (\sin x)\cdot\frac{1}{x}$

$\frac{dy}{dx} = x^{\sin x}\left[\cos x\cdot(\log x) + \frac{\sin x}{x}\right]$

$\Rightarrow x^{-\sin x}\left[x^{\sin x}\left(\cos x\log x + \frac{\sin x}{x}\right)\right]$

$-(\cos x)\log x$

$\Rightarrow \frac{\sin x}{x}$

SSR SIR

QUESTION: CUET 2022 PYQs

Q. If $y = \left(\frac{1}{x}\right)^x$, then value of $e^e \left(\frac{d^2y}{dx^2}\right)_{x=e}$ is:

(A) $2 - \frac{1}{e}$

(B) $4 - \frac{1}{e}$

(C) $\frac{1}{e}$

(D) $1 - \frac{1}{e}$

$$\log y = \log\left[\frac{1}{x}\right]^x$$

$$\log y = x\left[\log\left(\frac{1}{x}\right)\right]$$

$$\log y = x\left[\log 1 - \log x\right]$$

$$\log y = -x \cdot \log x$$

$$\frac{1}{y}\cdot\frac{dy}{dx} = -\left[1\cdot(\log x) + x\cdot\frac{1}{x}\right]$$

$$\frac{dy}{dx} = -y\left[1+\log x\right]$$

$$\frac{d^2y}{dx^2} = -\left\{\frac{dy}{dx}(1+\log x) + y\cdot\frac{1}{x}\right\}$$

$$\frac{d^2y}{dx^2} \Rightarrow -\left\{-y(1+\log x)^2 + \frac{y}{x}\right\}$$

$$y'' \Rightarrow y\left\{(1+\log x)^2 - \frac{1}{x}\right\}$$

SSR SIR

$$\left(\frac{d^2y}{dx^2}\right)_{x=e} = \left(\frac{1}{x}\right)^x \left[(1+\log x)^2 - \frac{1}{x}\right]$$

$$e^e \cdot \left(\frac{d^2y}{dx^2}\right)_{x=e} \Rightarrow \cancel{e^e} \cdot \frac{1}{\cancel{e^e}} \left[(1+\log e)^2 - \frac{1}{e}\right]$$

$$\Rightarrow \left(4 - \frac{1}{e}\right)$$

Ans

Parametric Form of the Differentiation

$x = f(t) \longrightarrow \frac{dx}{dt}$

$y = f(t) \longrightarrow \frac{dy}{dt}$; t is a parameter

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt}$$

$$\frac{d^2y}{dx^2} = \frac{d}{dx}\left[\frac{dy}{dx}\right]$$

SSR SIR

Question: CUET 2026 PYQs

If $x = 4t^3$ and $y = 6t^2$ then $\frac{d^2y}{dx^2}$ at $t = 1$ is

A) 12

B) $-\frac{1}{12}$

C) $\frac{1}{3}$

D) 1

$\frac{dx}{dt} = 12t^2$ | $\frac{dt}{dx} = \frac{1}{12t^2}$

$\frac{dy}{dt} = 12t$

$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} \Rightarrow \frac{12t}{12t^2} \Rightarrow \frac{1}{t}$

$\frac{d^2y}{dx^2} = \frac{d}{dx}\left[\frac{dy}{dx}\right]$

$\Rightarrow \frac{d}{dx}\left[\frac{1}{t}\right]$

$\Rightarrow -\left(\frac{1}{t^2}\right)\cdot\frac{dt}{dx}$

$\Rightarrow \left(-\frac{1}{t^2}\right)\cdot\frac{1}{12t^2}$

$\Rightarrow \frac{-1}{12t^4}\Big|_{t=1}$

$\Rightarrow -1/12$

SSR SIR

Question: CUET 2026 PYQs | 2025

If $x^2 + y^2 = t + \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $\frac{dy}{dx}$ is equal to

(A) $\frac{y}{x}$

(B) $-\frac{y}{x}$

(C) $\frac{y}{x^3}$

(D) $\frac{y^3}{x^2}$

(A) (B) (C) (D)

$\left(t + \frac{1}{t}\right)^2 = (x^2 + y^2)^2$

$t^2 + \frac{1}{t^2} + 2 = x^4 + y^4 + 2x^2y^2$

$(x^4 + y^4) + 2 = x^4 + y^4 + 2x^2y^2$

$2 = 2x^2y^2$

$x^2y^2 = 1$

$y^2 = \frac{1}{x^2}$

$y = \pm\frac{1}{x}$

$\frac{dy}{dx} = \frac{1}{x^2} \mid \frac{-1}{x^2}$

$x^2y\frac{dy}{dx} = \frac{-2}{x^3}$

$\frac{dy}{dx} = \frac{-1}{x^3y}$

SSR SIR

Question: CUET 2026 PYQs

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

(A) $\frac{1}{4a}\sec^4\frac{\theta}{2}$

(B) $\tan\frac{\theta}{2}$

(C) $-\cot\theta$

(D) $\tan\theta$

$\frac{dx}{d\theta} = a[1 + \cos\theta]$

$\frac{dy}{d\theta} = a[\sin\theta]$

$\frac{dy}{dx} = \frac{a(\sin\theta)}{a(1+\cos\theta)}$

$\frac{dy}{dx} = \frac{2\sin\theta/2 \cdot \cos\theta/2}{1 + 2\cos^2\theta/2 - 1}$

$\frac{dy}{dx} = \tan\theta/2$

SSR SIR

$$\frac{dy}{dx} = \tan\theta/2$$

$$\frac{d^2y}{dx^2} = \frac{d}{dx}\left[\frac{dy}{dx}\right]$$

$$\Rightarrow \frac{d}{dx}\left[\tan\theta/2\right]$$

$$\Rightarrow \left(\sec^2\theta/2\right)\cdot\frac{1}{2}\frac{d\theta}{dx}$$

$$\Rightarrow \left(\sec^2\theta/2\right)\cdot\frac{1}{2}\left[\frac{1}{2a\cos^2\theta/2}\right]$$

$$\Rightarrow \frac{1}{4a}\sec^4\theta/2$$

$\because$ $\frac{dx}{d\theta} = a(1+\cos\theta$

$$\frac{d\theta}{dx} = \frac{1}{a(1+\cos\theta)}$$

$$\Rightarrow \frac{1}{a\left[1+2\cos^2\theta/2-1\right]}$$

$$\Rightarrow \frac{1}{2a\cos^2\theta/2}$$

Question: CUET 2026 PYQs | 2023

If $x = a\left(t - \frac{1}{t}\right), y = b\left(t + \frac{1}{t}\right)$, then $\frac{dy}{dx} =$

(A) $\frac{x}{y}$

(B) $\frac{b^2 x}{a^2 y}$

(C) $\frac{bx}{ay}$

(D) $\frac{a^2 y}{b^2 x}$

$x = a\left(t - \frac{1}{t}\right)$

$x = at\left(1 - \frac{1}{t^2}\right)$

$\left(1 - \frac{1}{t^2}\right) = \left(\frac{x}{at}\right)$

$y = b\left(t + \frac{1}{t}\right)$

$y = bt\left[1 - \frac{1}{t^2}\right]$

$\left(1 - \frac{1}{t^2}\right) = \left(\frac{y}{bt}\right)$

$\frac{dx}{dt} = a\left[1 + \frac{1}{t^2}\right]$

$\frac{dy}{dt} = b\left[1 - \frac{1}{t^2}\right]$

$\frac{dy}{dx} = \frac{dy/dt}{dx/dt}$

$\frac{dy}{dx} = \frac{b\left[1 - 1/t^2\right]}{a\left[1 + \frac{1}{t^2}\right]}$

$\frac{dy}{dx} = \frac{b}{a}\frac{\left(x/at\right)}{\left(y/bt\right)}$

$\Rightarrow \left(\frac{b}{a}\right)\frac{bx}{ay} \Rightarrow \frac{b^2}{a^2}\frac{x}{y}$

SSR SIR

Question: CUET 2026 PYQs

If $y = e^{2\log_e t}$ and $x = \log_e e^{t^2}$, then the value of $\frac{d^2y}{dx^2}$ is

(A) 0

(B) t

(C) $2t$

(D) e^t

$y = e^{\log_e t^2} \Rightarrow t^2$

$x = t^2$

$\frac{dy}{dt} = 2t$

$\frac{dx}{dt} = 2t$

$\frac{dy}{dx} = 1$

#Q. If $x = e^{\cos 2t}, y = e^{\sin 2t}$, then $\frac{dy}{dx}$ equals to

$\log x = \cos 2t$

$\log y = \sin 2t$

$\sin^2 2t + \cos^2 2t = (\log x)^2 + (\log y)^2$

$1 = (\log x)^2 + (\log y)^2$

Diff. —

$0 = x(\log x)\cdot\frac{1}{x} + x(\log y)\cdot\frac{1}{y}\cdot\frac{dy}{dx}$

$\frac{dy}{dx} = -\frac{y}{x}\left[\frac{\log x}{\log y}\right]$

(A) $\frac{y\log_e x}{x\log_e y}$

(B) $\frac{x\log_e x}{y\log_e y}$

(C) $-\frac{y\log_e x}{x\log_e y}$

(D) $-\frac{x\log_e x}{y\log_e y}$

$\log x = \cos 2t = p$

$\log y = \sin 2t = q$

Squaring & Adding.

$\sin^2 2t + \cos^2 2t = p^2 + q^2$

$1 = p^2 + q^2$

Question – CUET 2025 PYQs

#Q. If $x^2 - y^2 = t - \frac{1}{t}$, and $x^4 + y^4 = t^2 + \frac{1}{t^2}$ then which of the following is correct?

$x^2y^2 = 1$

$y^2 = \frac{1}{x^2}$

$2y\frac{dy}{dx} = -\frac{2}{x^3}$

$x^3y\frac{dy}{dx} + 1 = 0$

(A) $xy^3\frac{dy}{dx} + 1 = 0$

(B) $x^3\frac{dy}{dx} + y = 1$

(C) $x^2y\frac{dy}{dx} - 1 = 0$

(D) $x^3y\frac{dy}{dx} + 1 = 0$

SSR SIR

QUESTION: CUET 2022 PYQs

Q. If $x = 3t^2 + 5t + 6$ and $y = -4t^3 - 2t^2 + 5t + 7, t \neq \frac{-5}{6}$, then the value of $\frac{dy}{dx}$ is:

(A) $-2t + 1$

(B) $\frac{-12t^2 - 4t - 5}{6t + 5}$

(C) $\frac{-4t^3 - 2t^2 + 5t + 7}{3t^2 + 5t + 6}$

(D) $\frac{-4t^3 - 2t^2 + 5t + 7}{6t + 5}$

$\frac{dx}{dt} = (6t + 5)$

$\frac{dy}{dt} = -12t^2 - 4t + 5$

$\frac{dy}{dx} \Rightarrow \frac{dy/dt}{dx/dt} \Rightarrow \frac{-12t^2 - 4t + 5}{(6t + 5)} \Rightarrow \frac{(6t + 5)(-2t + 1)}{(6t + 5)}$

$\Rightarrow (-2t + 1)$ Ans

SSR SIR



Differentiation of IMPLICIT Functions

Implicit Function: If we can't separate function of x & y

Diff both side directly

Ham Saath-Saath Hain

$$x^2y^2 + \sin xy = 0$$

$$y^3 + x^3 = \log(x^2 + y^2)$$

Explicit Function: If we can separate function of x & y

Ex → Separation

$y = f(x)$

$y = x^2$

$y = x^3 + \sin x$

$y = \frac{x^4}{4} + x^3 + C_3x$

SSR SIR

Question: CUET 2026 PYQs

If $xy = (x+y)^2$, then $\frac{d^2y}{dx^2}$ is equal to:

(A) -1

(B) 1

(C) -4

(D) 0 ✓

By the Imp fun

$$1(y) + x\cdot\frac{dy}{dx} = 2(x+y)\cdot\left[1+\frac{dy}{dx}\right]$$

$$y + x\cdot\frac{dy}{dx} = 2(x+y) + 2(x+y)\cdot\frac{dy}{dx}$$

$$\frac{dy}{dx}\left[2x+2y-x\right] + 2x+2y-y = 0$$

$$\frac{dy}{dx}\left[x+2y\right] + (2x+y) = 0$$

$$\frac{dy}{dx} = \frac{-(y+2x)}{(x+2y)}$$

$$\frac{d^2y}{dx^2} = $$

SSR SIR

* $xy = (x+y)^2$

$\log x + \log y = 2\log(x+y)$

$\frac{1}{x} + \frac{1}{y}\cdot\frac{dy}{dx} = \frac{2}{(x+y)}\left[1 + \frac{dy}{dx}\right]$

$(x+y)^2 = xy$

$x^m \cdot y^n = (x+y)^{m+n}$

$x^1 \cdot y^1 = (x+y)^2 \longrightarrow y^1 = y/x$

$y^1 = 0$

Question – CUET 2025 PYQs

#Q. If $xy + \frac{x^2}{y} = x^3y + y$, then $\frac{dy}{dx}$ is equal to

$$(1)\,y + x\cdot\frac{dy}{dx} + \left[\frac{2x\cdot y - x^2\cdot\frac{dy}{dx}}{y^2}\right] \Rightarrow (3x^2)\cdot y + (x^3)\cdot\frac{dy}{dx} + \frac{dy}{dx}$$

(A) $\frac{y(3x^2y^2 + 2x + y^2)}{x^2y - x^2y^3 + x^2 - y^2}$

(B) $\frac{y(3x^2y^2 - 2x - y^2)}{xy^2 - x^3y^2 - x^2 - y^2}$

(C) $\frac{y(3x^2y^2 - 2x + y^2)}{x^2y - x^2y^3 + x^2 + y^2}$

(D) $\frac{y(3y^2x^2 - y^2 + 2x)}{x^2y^3 - x^2y - x - y^2}$

$$y^3 + xy^2\cdot\frac{dy}{dx} + 2xy - x^2\cdot\frac{dy}{dx} = 3x^2y^3 + x^3y^2\frac{dy}{dx} + y^2\cdot\frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{3x^2y^3 - 2xy - y^3}{\left[xy^2 - x^2 - x^3y^2 - y^2\right]}$$

SSR SIR

$y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ is equal to

यदि $y = \sqrt{\sin x + y}$), तो dy/dx किसके बराबर है?

A $\frac{\cos x}{2y - 1}$

B $\frac{\cos x}{1 - 2y}$

C $\frac{\sin x}{1 - 2y}$

D $\frac{\sin x}{2y - 1}$

$$y^2 = (\sin x + y)$$

$$2y \cdot \frac{dy}{dx} = \cos x + \frac{dy}{dx}$$

$$\frac{dy}{dx}(2y - 1) = \cos x$$

$$\frac{dy}{dx} = \frac{\cos x}{(2y - 1)}$$

SSR SIR



Differentiation of a Function W.R.T Another Function

Let $y = f(x)\,;\, z = g(x)$ then $\dfrac{dy}{dz} = \dfrac{dy/dx}{dz/dx} = \dfrac{f'(x)}{g'(x)}$

Diff of $f(x)$ w.r.t $g(x) = \dfrac{f'(x)}{g'(x)}$

Diff of $\sin x$ wrt $\cos x \Rightarrow \dfrac{\frac{d}{dx}(\sin x)}{\frac{d}{dx}(\cos x)}$

$\Rightarrow \dfrac{\cos x}{-\sin x} = -\cot x$

SSR SIR

Question – CUET 2025 PYQs

#Q. The derivative of $(\log x)^x$ with respect to $\log x$ is

$$\Rightarrow \frac{\frac{d}{dx}(\log x)^x}{\frac{d}{dx}(\log x)}$$

$$y = (\log x)^x$$

$$\log y = x \cdot \log[\log x]$$

$$\frac{1}{y} y' = \log[\log x] + x \cdot \frac{1}{\log x \cdot x}$$

$$y' = y\left[\log(\log x) + \frac{1}{\log x}\right]$$

$$\Rightarrow \frac{y\left[\log(\log x) + \frac{1}{\log x}\right]}{\frac{1}{x}}$$

$$\Rightarrow x(\log x)^x\left[\log(\log x) + \frac{1}{\log x}\right]$$

$$\Rightarrow x(\log x)^{x-1}\left[\log(\log x) \cdot \log x + 1\right]$$

A. $x(\log x)^x[1 + \log x \cdot \log(\log x)]$

B. $x(\log x)^x[x + 1 + \log x \cdot \log(\log x)]$

C. $x(\log x)^{x-1}[1 + \log x \cdot \log(\log x)]$

D. $(\log x)^{x-1}[1 + \log x \cdot \log(\log x)]$

Question – CBSE 2024 PYQs

Derivative of $e^{\sin^2 x}$ with respect to cos x is :

A $\sin x\, e^{\sin^2 x}$

B $\cos x\, e^{\sin^2 s}$

C $-2 \cos x\, e^{\sin^2 x}$

D $-2 \sin^2 x \cos x\, e^{\sin^2 x}$

SSR SIR

QUESTION: CUET 2023 PYQs

Differentiation of $\log x$ w.r.t $\frac{1}{x}$ is :

A $-\frac{1}{x^3}$

B $-\frac{1}{x}$

C $-x$

D $\frac{1}{x}$

SSR SIR

QUESTION: CUET 2022 PYQs

Q. Derivative of $x^3 + 1$ with respect to $x^2 + 1$ is:

(1) $\frac{2x}{3}$

(2) $\frac{x}{3}$

(3) $\frac{x}{2}$

(4) $\frac{3x}{2}$

$\frac{3x^2}{2x} \Rightarrow \frac{3}{2}x$

A 1

B 3

C 2

D 4

SSR SIR

QUESTION: CUET 2022 PYQs

Q. The second derivative of $\sqrt{\frac{1-x^2}{1+x^2}}$ with respect to $\sqrt{\frac{1+x^2}{1-x^2}}$ is

t $\quad\quad$ $\frac{1}{t}$

$\frac{dy}{dx} \Rightarrow$ Diff wrt $\frac{1}{t} \Rightarrow \frac{1}{-\frac{1}{t^2}} \Rightarrow -t^2$

$\frac{dy}{dx} \Rightarrow -\left(\frac{1-x^2}{1+x^2}\right)$

$y'' = \frac{-[-2x][1+x^2]+(1-x^2)(2x)}{(1+x^2)^2}$

$\Rightarrow \frac{2x+2x^3+2x-2x^3}{(1+x^2)^2}$

$\Rightarrow \frac{4x}{(1+x^2)^2}$

(A) $-\frac{1-x^2}{1+x^2}$

(B) $\frac{2x}{(1+x^2)^2}$

(C) $2\left(\frac{1-x^2}{1+x^2}\right)^{\frac{3}{2}}$

(D) $\frac{4x}{(1+x^2)^2}$

SSR SIR



SUBSTITUTION Method - Differentiation

Directly - I.T.F.

$1-x^2$: $x=\sin\theta \mid \cos\theta$

$1+x^2$: $x=\tan\theta \mid \cot\theta$

x^2-1 ; $x=\sec^2\theta \mid \operatorname{cosec}\theta$

$\frac{2x}{1+x^2} \mid \frac{1-x^2}{1+x^2} \mid \frac{2x}{1-x^2}$: $x=\tan\theta$

$3x-4x^3$: $x=\sin\theta$

$4x^3-3x$: $x=\cos\theta$

$\frac{1+x}{1-x}$; $x=\cos 2\theta$

$\frac{1}{\sqrt{2}}\sin\theta+\frac{1}{\sqrt{2}}\cos\theta=\sin\left(\frac{\pi}{4}+\theta\right)=\cos\left(\frac{\pi}{4}-\theta\right)$

$\frac{1}{\sqrt{2}}\sin\theta-\frac{1}{\sqrt{2}}\cos\theta=\sin\left(\frac{\pi}{4}-\theta\right)=\cos\left(\frac{3\pi}{4}+\theta\right)$

SSR SIR

Question: CUET 2026 PYQs

If $y = \cot^{-1}\left(\frac{1-x}{1+x}\right)$ then $\frac{dy}{dx}$ equals

$\frac{dy}{dx} = ?$

$x = \cos 2\theta$

$2\theta = \cos^{-1} x$

$\theta = \frac{1}{2}\cos^{-1} x$

$y = \cot^{-1}\left[\frac{1-\cos 2\theta}{1+\cos 2\theta}\right]$

$\Rightarrow \cot^{-1}\left[\frac{1-(1-2\sin^2\theta)}{1+(2\cos^2\theta-1)}\right]$

$\Rightarrow \cot^{-1}[\tan^2\theta]$

(A) $\frac{-1}{1+x^2}$

(B) $\frac{1}{1+x^2}$

(C) $\frac{1}{(1+x^2)^{3/2}}$

(D) $\frac{-1}{(1+x^2)^{3/2}}$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $y = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right), 0 < x < 1$, then $\frac{dy}{dx}$ is equal to

A $\frac{2}{1+x^2}$

B $-\frac{2}{\sqrt{1-x^2}}$

C $-\frac{2}{\sqrt{1+x^2}}$

D $\frac{2}{\sqrt{1-x^2}}$

SSR SIR

QUESTION: CUET 2023 PYQs

The derivative of $\cos^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right), -\frac{\pi}{4} < x < \frac{\pi}{4}$ with respect to x is :

$\cos\left(\frac{\pi}{4}-x\right)$

A $\frac{1}{\sqrt{2}}$

B 1

C -1

D $\frac{-1}{\sqrt{2}}$

SSR SIR



HIGHER ORDER Derivatives

Chain Rule > Use of log > Para > H.O.D

H.O.D — Rel^n b/w $\frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$

SSR SIR

Question: CUET 2026 PYQs

If $x\sqrt{1+y}+y\sqrt{1+x}=0. x>-1$ and $x \neq y$, then $(1+x)^2 \frac{dy}{dx}$ is equal to

A -1

B 0

C 2

D -2

H.W

SSR SIR

Question: CUET 2026 PYQs

$e^y(1+x)=1$, then $\frac{d^2y}{dx^2}$ is

A. $\left(\frac{dy}{dx}\right)^2$

B. $\frac{dy}{dx}$

C. $-\frac{dy}{dx}$

D. $e^y\left(\frac{dy}{dx}\right)$

$e^y = \frac{1}{(1+x)}$

$y = \log\left[\frac{1}{1+x}\right]$

$y = -\log[1+x]$

$y' = -\frac{1}{(1+x)}$

$y'' = \frac{1}{(1+x)^2} = (y')^2$

SSR SIR

Question: CUET 2026 PYQs

If $e^y(x+1)=1$, then

A $\frac{d^2y}{dx^2}=\left(\frac{dy}{dx}\right)^2$

B $\frac{d^2y}{dx^2}=-\left(\frac{dy}{dx}\right)^2$

C $\frac{dy}{dx}=\left(\frac{d^2y}{dx^2}\right)^2$

D $\frac{dy}{dx}=-\left(\frac{d^2y}{dx^2}\right)^2$

Question: CUET 2026 PYQs

If $e^y(x+1)=1$, then $\frac{d^2y}{dx^2}$ is equal to

A $\frac{-1}{x+1}$

B $\frac{-1}{(x+1)^2}$

C $\frac{1}{x+1}$

D $\frac{1}{(x+1)^2}$

SSR SIR

Question: CUET 2026 PYQs — 2022 [Every year]

If $y = \sin^{-1} x$, then $(1-x^2)\frac{d^2y}{dx^2}$ is equal to :

(A) x^2

(B) $x\frac{d^2y}{dx^2}$

(C) xy

(D) $\frac{x}{\sqrt{1-x^2}}$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\left(\sqrt{1-x^2}\right)\frac{dy}{dx} = 1$$

$$\frac{1}{\sqrt{1-x^2}}(-2x)\cdot\frac{dy}{dx} + \left(\sqrt{1-x^2}\right)\cdot\frac{d^2y}{dx^2} = 0$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$(1-x^2)\cdot\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$$

$$(1-x^2)\cdot\frac{d^2y}{dx^2} = x\cdot\frac{dy}{dx}$$

$$\Rightarrow \frac{x}{\sqrt{1-x^2}}$$

SSR SIR

Question: CUET 2026 PYQs

If $y = 500e^{7x} + 600e^{-7x}$, then $\frac{d^2y}{dx^2}$ equals :

(A) $42(600e^{7x} + 600e^{-7x})$

(B) $49(500e^{-7x} + 600e^{7x})$

(C) $49(500e^{7x} + 600e^{-7x})$

(D) $42(500e^{7x} + 600e^{-7x})$

Question: CUET 2026 PYQs

If $x = \sqrt{a^{\tan^{-1}t}}$ and $y = \sqrt{a^{\cot^{-1}t}}$, then $\frac{d^2y}{dx^2}$ is

(A) $-\frac{y}{x}$

(B) $\frac{y}{x^2}$

(C) $\frac{2y}{x^2}$

(D) 0

$$xy = \sqrt{a^{\tan^{-1}x + \cot^{-1}y}}$$

$$xy = a^{1/2}$$

$$1 \cdot y + x\frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = -y/x$$

$$x = \sqrt{a^{\sin^{-1}x}}$$

$$y = \sqrt{a^{\cos^{-1}x}}$$

$$\text{PT } \frac{dy}{dx} = -y/x$$

$$\frac{d^2y}{dx^2} = \frac{-\frac{dy}{dx}\cdot x + y\cdot}{x^2}$$

$$\Rightarrow \frac{-(-y/x)\cdot x + y}{x^2} \Rightarrow \frac{2y}{x^2}$$

SSR SIR

If $y = a\cos(\log x) + b\sin(\log x)$, then $x^2y_2 + xy_1$ is :

$$y = -a\sin(\log x)\cdot\frac{1}{x} + b\cos(\log x)\cdot\frac{1}{x}$$

$$xy_1 = -a\sin(\log x) + b\cos(\log x)$$

$$y_1 + xy_2 = -\frac{a\cos(\log x)}{x} - \frac{b\sin(\log x)}{x}$$

$$xy_1 + x^2y_2 = -y$$

A $\cot(\log x)$

B y

C $-y$

D $\tan(\log x)$

Question – CBSE 2025 PYQs [MCQS]

If $y = \sin^{-1} x$, then $(1 - x^2)\frac{d^2y}{dx^2}$ is equal to :

A $x\frac{dy}{dx}$

B $-x\frac{dy}{dx}$

C $x^2\frac{dy}{dx}$

D $-x^2\frac{dy}{dx}$

Question – CUET 2025 PYQs

#Q. Let $e^y(x+1) = 1$. Then which of the following are TRUE?

(A) $\frac{d^2y}{dx^2} = -\frac{1}{(x+1)^2}$

(B) $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$

(C) $\left.\frac{d^2y}{dx^2}\right|_{x=0} = -1$

(D) $\left.\frac{d^2y}{dx^2}\right|_{x=0} = 1$

(E) $\left.\frac{d^2y}{dx^2}\right|_{x=1} = \frac{1}{4}$

Choose the correct answer from the options given below:

A (B), (D) and (E) only

B (A) and (C) only

C (B) and (C) only

D (A), (D) and (E) only

$e^y = \frac{1}{(x+1)}$

$y = \log\left[\frac{1}{x+1}\right]$

$y = -\log(x+1)$

$y' = \frac{-1}{(x+1)}$

$y'' = \left.\frac{1}{(x+1)^2}\right|_{x=0} \Rightarrow 1$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $x^2 - y^2 = 1$, then which of the following is correct?

(A) $(x^2-1)\left(\frac{dy}{dx}\right)^2 = x^2$

(B) $(x^2-1)\left(\frac{d^2y}{dx^2}\right)^2 = x^2$

(C) $(x^2-1)^3\left(\frac{d^2y}{dx^2}\right)^2 = x^2$

(D) $(x^2-1)^3\left(\frac{d^2y}{dx^2}\right)^2 = 1$

Choose the correct answer from the options given below:

A (B) and (D) only

B (A), (B) and (C) only

C (A) and (D) only

D (B) and (C) only

SSR SIR

Question – CUET 2025 PYQs

#Q. If $y=\left[\frac{1}{1+x^{b-a}+x^{c-a}}+\frac{1}{1+x^{c-b}+x^{a-b}}+\frac{1}{1+x^{a-c}+x^{b-c}}\right]$ then $\frac{d^2y}{dx^2}$ is

(A) $x^a+x^b+x^c$

(B) $\left(x^a+x^b+x^c\right)\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

(C) 0

(D) 1

$$y=\frac{1}{1+\frac{x^b}{x^a}+\frac{x^c}{x^a}}+\frac{1}{1+\frac{x^c}{x^b}+\frac{x^a}{x^b}}+\frac{1}{1+\frac{x^a}{x^c}+\frac{x^b}{x^c}}$$

$$y=\frac{1}{\frac{x^a+x^b+x^c}{x^a}}+\frac{1}{\frac{x^b+x^c+x^a}{x^b}}+\frac{1}{\frac{x^c+x^a+x^b}{x^c}}$$

SD Rule

Ques → Shakal lengthy

Simplify

Differentiation

SSR SIR

$$y = \frac{x^a}{x^a + x^b + x^c} + \frac{x^b}{x^b + x^c + x^a} + \frac{x^c}{x^c + x^a + x^b}$$

$$y = \frac{(x^a + x^b + x^c)}{(x^a + x^b + x^c)}$$

$$\boxed{y = 1}$$

$$\frac{dy}{dx} = 0$$

$$\frac{d^2y}{dx^2} = 0$$

Question: CUET 2026 PYQs

If $y = \frac{x^2}{1+x^{b-a}+x^{c-a}} + \frac{x^2}{1+x^{a-b}+x^{c-b}} + \frac{x^2}{1+x^{a-c}+x^{b-c}}$, then $\frac{dy}{dx}$ is

$y = x^2 \left[\frac{x^a + x^b + x^c}{x^a + x^b + x^c} \right]$

(A) 1

(B) 2x

$y = x^2$

$\frac{dy}{dx} = 2x$

(C) $x^a + x^b + x^c$

(D) $\frac{1}{x^a+x^b+x^c}$

SSR SIR

Question – CUET 2025 PYQs

#Q. For $|x| < 1$, if $x = \cos\left(\frac{1}{a}\log y\right)$, then

$\frac{1}{a}\log y = \cos^{-1}x$

$\log y = a\cdot\cos^{-1}x$

$y = e^{a\cos^{-1}x}$

$(1-x^2)y_2 - xy_1 - a^2y = 0$

(A) $(1-x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - a^2y = 0$

(B) $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + a^2y = 0$

(C) $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$

(D) $(1-x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} + a^2y = 0$

Question

If $y = e^{a\cos^{-1}x}, -1 < x < 1$, then show that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$.

[CBSE 2020 (65/2/1)]

Rule:

① find $\frac{dy}{dx}$

$$\frac{dy}{dx} = e^{a\cos^{-1}x} \cdot \left[a \cdot \frac{-1}{\sqrt{1-x^2}}\right]$$

② Ques^{n} ko dekho → Cross Multiply | Simpl^{n} | Manup^{n}

$$\underbrace{\left(\sqrt{1-x^2}\right)}_{u}\underbrace{\frac{dy}{dx}}_{v} = -a \cdot e^{a\cos^{-1}x}$$

③ Again Diff both side & Multp^{n} Rule | Chain Rule Dhyaan SE Lagao.

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$$\frac{1(-2x)}{2\sqrt{1-x^2}}\cdot\frac{dy}{dx}+\left(\sqrt{1-x^2}\right)\cdot\frac{d^2y}{dx^2}=a\cdot e^{a\cos^{-1}x}\cdot\left[\frac{-a}{\sqrt{1-x^2}}\right]$$

(4) Question ko Dekho → Jo Nikalna hai → wo आँखो के आगे लिखा है।

$$-x\frac{dy}{dx}+(1-x^2)\cdot\frac{d^2y}{dx^2}=-a^2\underbrace{e^{a\cos^{-1}x}}_{y}$$

$$(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}+a^2y=0$$

Infinite Series type questions

(A) If $y=\sqrt{f(x)+\underbrace{\sqrt{f(x)+\sqrt{f(x)+.....\infty}}}_{y}}$

then $y=\sqrt{f(x)+y} \Rightarrow (y^2-y)=f(x)$

Differentiating both sides w.r.t. x, we get $(2y-1)\dfrac{dy}{dx}=f'(x)$

$y=\sqrt{f(x)+y}$

diff

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Infinite Series type questions

(B) If $y = \{f(x)\}^{\{f(x)\}^{\{f(x)\}^{\cdots\cdots\infty}}}$ then $y = \{f(x)\}^{y} \Rightarrow y = e^{y \ln f(x)}$

Differentiating both sides w.r.t. x, we get

$$\frac{dy}{dx} = \frac{y\{f(x)\}^{y-1}.f'(x)}{1-\{f(x)\}^{y}.\ell n\, f(x)} = \frac{y^2 f'(x)}{f(x)\{1-y\,\ell n\, f(x)\}}$$

$y = [f(x)]^x$

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Question: CUET 2026 PYQs

If $y = e^{x+\underbrace{e^{x+e^{x+\cdots\infty}}}_{y}}$ then $\frac{dy}{dx} =$

(A) $\frac{1-y}{y}$

(B) $1 - \frac{y}{y^2}$

(C) $\frac{y}{1-y}$

(D) Not defined

$y = e^{x+y}$

$\log y = (x+y)$

$\frac{dy}{dx}\frac{1}{y} = 1 + \frac{dy}{dx}$



$\frac{dy}{dx}\left[\frac{1}{y} - 1\right] = 1$

$\frac{dy}{dx}\left[\frac{1-y}{y}\right] = 1$

$y' = \frac{y}{(1-y)}$

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Question – CUET 2025 PYQs

#Q. If $y = \sqrt{x + \underbrace{\sqrt{x + \sqrt{x + \cdots \ldots \ldots}}}_{y}}$, then

A $(2y + 1)\frac{dy}{dx} + 3\sqrt{x} = 0$

B $3\frac{dy}{dx} + 3y^2 = 0$

C $3x\frac{dy}{dx} + (2y + 1) = 0$

D $(2y - 1)\frac{dy}{dx} - 1 = 0$

$y = \sqrt{x+y}$

$y^2 = x+y$

$2y\frac{dy}{dx} = 1 + \frac{dy}{dx}$

$\frac{dy}{dx}(2y-1) = 1$

SSR SIR

Question – CUET 2025 PYQs

#Q. If $y = \sqrt{\sin x + \underbrace{\sqrt{\sin x + \sqrt{\sin x + \cdots + \infty}}}_{y}}$, then $\frac{dy}{dx}$ equals to

A $\frac{-\cos x}{2y-1}$

B $\frac{\cos x}{2y-1}$

C $\frac{\sin x}{1-2y}$

D $\frac{1-2y}{\cos x}$

$y = \sqrt{\sin x + y}$

$y^2 = \sin x + y$

$2yy' = \cos x + y'$

$y'[2y-1] = \cos x$

$y' = \frac{\cos x}{(2y-1)}$

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Conversion of dy/dx to dx/dy

If $y = f(x)$

$$\frac{dy}{dx} = f'(x)$$

$$\frac{dx}{dy} = \frac{1}{(dy/dx)}$$

Again

$$x = f(y)$$

$$\frac{dx}{dy} = f'(y)$$

$$\frac{dy}{dx} = \frac{1}{\left(\frac{dx}{dy}\right)}$$

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Question – CUET 2025 PYQs

#Q. If $\sin y = x \cos(a+y)$, then $\frac{dy}{dx}$ is equal to

$$x = \frac{\sin y}{\cos(a+y)}$$

$\because x = f(y)$

$$\frac{dx}{dy} = \frac{\cos y \cdot \cos(a+y) + \sin y \sin(a+y)}{\cos^2(a+y)}$$

$$\Rightarrow \frac{\cos[y-(a+y)]}{\cos^2(a+y)}$$

$$\frac{dx}{dy} \Rightarrow \frac{\cos a}{\cos^2(a+y)}$$

$$\frac{dy}{dx} = \frac{\cos^2(a+y)}{\cos a}$$

$$\frac{dy}{dx} = \frac{1}{\left(\frac{dx}{dy}\right)}$$

(A) $\frac{\cos^2(a+y)}{\cos a}$

(B) $\frac{\cos a}{\cos^2(a+y)}$

(C) $\frac{\sin^2 y}{\cos a}$

(D) $\frac{\sin^2 y}{\cos^2(a+y)}$

Question: CUET 2026 PYQs

If $x \sin (a+y) + (\sin a)\cos (a+y) = 0$, then $\frac{dy}{dx}$ is

A $\frac{\sin a}{\sin^2(a+y)}$

B $\frac{\sin a}{\cos^2(a+y)}$

C $\frac{\sin^2(a+y)}{\sin a}$

D $\frac{\cos^2(a+y)}{\cos a}$

$$x = \frac{-(\sin a)\cos(a+y)}{\sin(a+y)}$$

$$x = -(\sin a)\cot(a+y)$$

$$\frac{dx}{dy} = +(\sin a)\operatorname{cosec}^2(a+y)$$

$$\frac{dy}{dx} = \frac{1}{(\sin a)\operatorname{cosec}^2(a+y)} \Rightarrow \frac{\sin^2(a+y)}{\sin a}$$

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QUESTION: CUET 2023 PYQs

If $x\cos(a+y)+\cos a\sin(a+y)=0$, then $\frac{dy}{dx}$ is equal to

$$x = \frac{-(\cos a)\cdot\sin(a+y)}{\cos(a+y)}$$

$$x = -(\cos a)\cdot\tan(a+y)$$

$$\frac{dx}{dy} = -(\cos a)\cdot\sec^2(a+y)$$

$$\frac{dy}{dx} = \frac{1}{-(\cos a)\cdot\sec^2(a+y)} \Rightarrow \frac{-\cos^2(a+y)}{\cos a}$$

$$x = f(y)$$

$$\frac{dx}{dy} =$$

$$\frac{dy}{dx} = \frac{1}{\left(\frac{dx}{dy}\right)}$$

(A) $\frac{\cos^2(a+y)}{\cos a}$

(B) $-\frac{\cos^2(a+y)}{\cos a}$

(C) $\frac{\sin(a+y)\cos(a+y)}{\cos a}$

(D) $-\frac{\sin(a+y)\cos(a+y)}{\cos a}$



Quick Summary

- Continuity
- Differentiability

- Trigo Fun
- Modulus
- Exponential
- Signum
- GIF & {x}
- Algebraic

- Continuity of a function at point
- Properties

- Differentiation
- Properties
- Addition
- Multiplication
- Division
- Chain rule
- Use of log
- Parametric form
- Derivative of function WRT to another
- Substitution
- HOD

By- SSR Sir



Home Work

- Complete NCERT Chapter 5
- Complete BPPT 6.0
- Mock Test



By- SSR Sir


Thank
P.D.F ⇒ Com Telegram
You
May God Watch Over You !!
~ SHASHANK SINGH RAJPUT (SSR)