NDA 2 2024

LIVE

MATHS REVISION

CLASS 12

NAVJYOTI SIR

SSBCrack EXAMS

22 August 2024 Live Classes Schedule

8:00AM	22 AUGUST 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	22 AUGUST 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:00AM	MOCK PERSONAL INTERVIEWS	ANURADHA MA'AM

NDA 2 2024 LIVE CLASSES

11:00AM	GK - CURRENT AFFAIRS REVISION - CLASS 1	RUBY MA'AM
1:00PM	MATHS REVISION - CLASS 12	NAVJYOTI SIR
2:00PM	CHEMISTRY REVISION - CLASS 5	SHIVANGI MA'AM
5:30PM	ENGLISH - REVISION - CLASS 6	ANURADHA MA'AM

CDS 2 2024 LIVE CLASSES

11:00AM	GK - CURRENT AFFAIRS REVISION - CLASS 1	RUBY MA'AM
2:00PM	CHEMISTRY REVISION - CLASS 5	SHIVANGI MA'AM
3:00PM	MATHS REVISION - CLASS 12	NAVJYOTI SIR
5:30PM	ENGLISH - REVISION - CLASS 6	ANURADHA MA'AM

REVISION TOPICS :

- Differentiability
- AOD

Q) Let [.] denotes the greatest integer function and $f(x) = [\tan^2 x]$, then

(a) $\lim_{x \to 0} f(x)$ does not exist

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

(c) $f(x)$ is not differentiable at $x = 0$

(d) $f'(0) = 1$

$[\tan^2 x]$

RHL $\rightarrow$ $\lim_{x \to 0^+} [\tan^2 x] = 0$

LHL $\rightarrow$ $\lim_{x \to 0^-} [\tan^2 x] = 0$

$[\tan^2(0)] = [0] = 0$

$f'(x) = 2 \tan x \sec^2 x$

$f'(0) = 0$

Q) Let [.] denotes the greatest integer function and $f(x) = [\tan^2 x]$, then

(a) $\lim_{x \to 0} f(x)$ does not exist

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

(c) $f(x)$ is not differentiable at $x = 0$

(d) $f'(0) = 1$

Ans: (b)

Q) What is the set of all points, where the function

$f(x)=\dfrac{x}{1+|x|}$ is differentiable?

(a) $(-\infty,\infty)$ only

(b) $(0,\infty)$ only

(c) $(-\infty,0)\cup(0,\infty)$ only

(d) $(-\infty,0)$ only

$$|x| = \begin{cases} x, & x \geq 0 \longrightarrow f(x) = \dfrac{x}{1+x} \\ -x, & x < 0 \longrightarrow f(x) = \dfrac{x}{1-x} \end{cases}$$

LHD at $x=0$

$$\lim_{h\to 0} \frac{f(0-h)-f(0)}{-h}$$

$$\lim_{h\to 0} \frac{\frac{-h}{1+h}-0}{-h} = \frac{1}{1+h} = 1/2$$

RHD at $x=0$

$$\lim_{h\to 0} \frac{f(0+h)-f(0)}{h}$$

$$\frac{h}{1+h}\Big/h = 1/2$$

LHD = RHD

Q) What is the set of all points, where the function $f(x)=\frac{x}{1+|x|}$ is differentiable?

(a) $(-\infty,\infty)$ only

(b) $(0,\infty)$ only

(c) $(-\infty,0)\cup(0,\infty)$ only

(d) $(-\infty,0)$ only

Ans: (a)

Q) If $f(x) = x(\sqrt{x} + \sqrt{(x+1)})$, then

(a) $f(x)$ is continuous but not differentiable at $x = 0$
(b) $f(x)$ is differentiable at $x = 0$
(c) $f(x)$ is not differentiable at $x = 0$
(d) None of the above

For $x > 0$ $\longrightarrow$ $f(x)$ is defined,

At $x = 0$ $\longrightarrow$ $f(x)$ is defined,

$x < 0$ $\longrightarrow$ $\sqrt{x}$ / $\sqrt{(-ve)}$ $\longrightarrow$ $f(x)$ is not defined,

So $\lim_{x \to 0^-} f(x)$ does not exist.

Q) If $f(x) = x(\sqrt{x} + \sqrt{(x+1)})$, then

(a) $f(x)$ is continuous but not differentiable at $x = 0$
(b) $f(x)$ is differentiable at $x = 0$
(c) $f(x)$ is not differentiable at $x = 0$
(d) None of the above

Ans: (c)

Q) If f is a differentiable function satisfying $f\left(\frac{1}{n}\right) = 0, \forall\ n \geq 1, n \in I$, then

(a) $f(x) = 0, x \in (0, 1]$

(b) $f'(0) = 0 = f(0)$

(c) $f(0) = 0$ but $f'(0)$ not necessarily zero

(d) $|f(x)| \leq 1, x \in (0, 1]$

$f(1) = f\left(\frac{1}{2}\right) = f\left(\frac{1}{3}\right) = f\left(\frac{1}{4}\right) = 0$

$f(x) = 0$,

$f'(x) = 0$

$f(0) = f'(0) = 0$

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(d) $|f(x)| \leq 1, x \in (0, 1]$

Ans: (b)

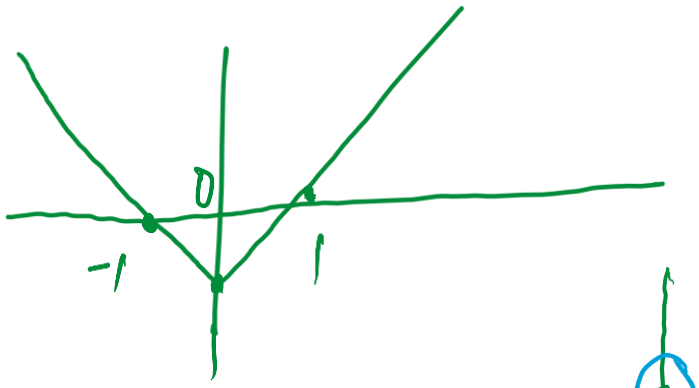
Q) Let $f(x) = ||x| - 1|$, then points where, $f(x)$ is not differentiable is/are

(a) $0, \pm 1$ (b) ± 1

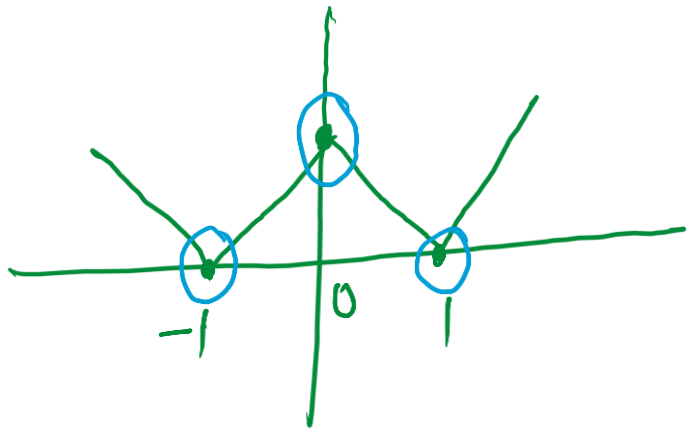
(c) 0 (d) 1

Sharp turns on graph of function ⟶ points where $f(x)$ is not differentiable,

$|x| - 1$



$||x| - 1|$



$x = 0, 1, -1$ are those points,

Q) Let $f(x) = ||x| - 1|$, then points where, $f(x)$ is not differentiable is/are

(a) $0, \pm 1$
(b) ± 1
(c) 0
(d) 1

Ans: (a)

Q) Which of the following functions is differentiable at $x = 0$?

(a) $\cos(|x|) + |x|$

(b) $\cos(|x|) - |x|$

(c) $\sin(|x|) + |x|$

(d) $\sin(|x|) - |x|$

Q) Which of the following functions is differentiable at $x = 0$?

(a) $\cos(|x|) + |x|$

(b) $\cos(|x|) - |x|$

(c) $\sin(|x|) + |x|$

(d) $\sin(|x|) - |x|$

Ans: (d)

Q) Let $f : R \to R$ be defined as

$$f(x) = \sin(|x|)$$

Which one of the following is correct?

(a) f is not differentiable only at 0
(b) f is differentiable at 0 only
(c) f is differentiable everywhere
(d) f is non-differentiable at many points

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Which one of the following is correct?

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(d) f is non-differentiable at many points

Ans: (d)

Q) The motion of a particle is described as $s = 2 - 3t + 4t^3$. What is the acceleration of the particle at the point where its velocity is zero?

(a) 0 (b) 4 unit

(c) 8 unit (d) 12 unit

$$v = \frac{ds}{dt} = -3 + 12t^2 = 0 \Rightarrow 12t^2 = 3$$

$$t^2 = \frac{3}{12} = \frac{1}{4} \Rightarrow t = \frac{1}{2}$$

$$a = \frac{dv}{dt} = 24t = 24 \times \frac{1}{2} = 12$$

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(a) 0
(b) 4 unit
(c) 8 unit
(d) 12 unit

Ans: (d)

Q) What is the maximum slope of the curve $y = -x^3 + 3x^2 + 2x - 27$?

(a) 1 (b) 2

(c) 5 (d) -23

$$\text{slope} = \frac{dy}{dx} = -3x^2 + 6x + 2 = S$$

For maximum slope, $\frac{dS}{dx} = 0$

$$-6x + 6 = 0$$

$$x = 1$$

$\frac{d^2S}{dx^2} = -6 < 0$ (so $x = 1$ is a point of maxima)

max. slope $= -3(1) + 6(1) + 2 = 5$

Q) What is the maximum slope of the curve $y = -x^3 + 3x^2 + 2x - 27$?

(a) 1 (b) 2

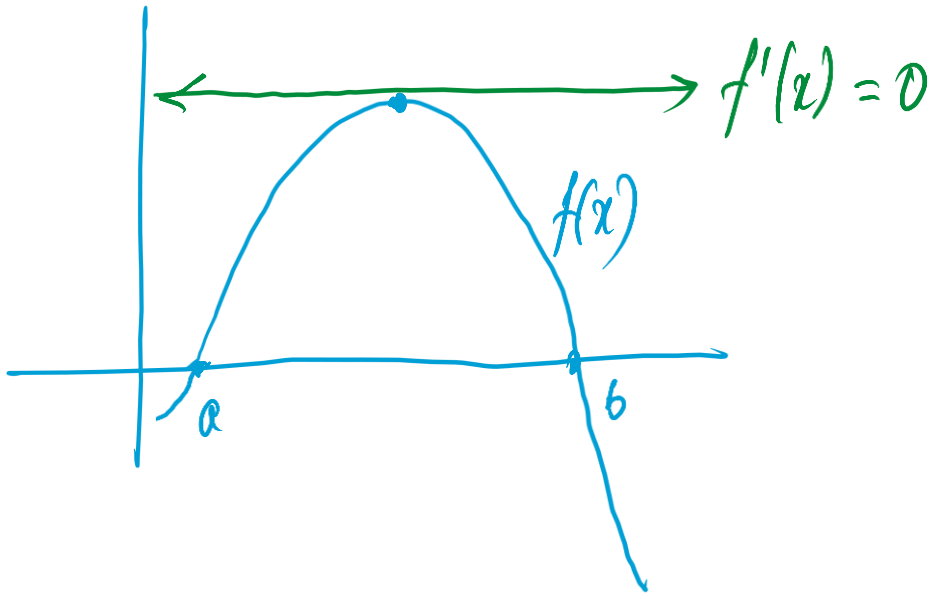
(c) 5 (d) -23

Ans: (c)

Q) Let a and b be two distinct roots of a polynomial equation $f(x)=0$. Then there exists at least one root lying between a and b of the polynomial equation.

(a) $f(x)=0$ (b) $f'(x)=0$

(c) $f''(x)=0$ (d) None of these



Q) Let a and b be two distinct roots of a polynomial equation $f(x)=0$. Then there exists at least one root lying between a and b of the polynomial equation.

(a) $f(x)=0$ (b) $f'(x)=0$

(c) $f''(x)=0$ (d) None of these

Ans: (b)

Q) If $f(x) = 3x^2 + 6x - 9$, then

(a) $f(x)$ is increasing in $(-1, 3)$

(b) $f(x)$ is decreasing in $(3, \infty)$

(c) $f(x)$ is increasing in $(-\infty, -1)$

(d) $f(x)$ is decreasing in $(-\infty, -1)$

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(a) $f(x)$ is increasing in $(-1, 3)$

(b) $f(x)$ is decreasing in $(3, \infty)$

(c) $f(x)$ is increasing in $(-\infty, -1)$

(d) $f(x)$ is decreasing in $(-\infty, -1)$

Ans: (d)

Q) If $x \cos\theta + y \sin\theta = 2$ is perpendicular to the line $x - y = 3$, then what is one of the value of θ?

(a) $\pi/6$ (b) $\pi/4$

(c) $\pi/2$ (d) $\pi/3$

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Ans: (b)

Q) If the tangent to the curve, $y = x^3 + ax - b$ at the point $(1, -5)$ is perpendicular to the line, $-x + y + 4 = 0$, then which one of the following points lies on the curve ?

(a) $(-2, 2)$
(b) $(2, -2)$
(c) $(-2, 1)$
(d) $(2, -1)$

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(a) $(-2, 2)$
(b) $(2, -2)$
(c) $(-2, 1)$
(d) $(2, -1)$

Ans: (b)

Q) What is the slope of the normal at the point $(at^2, 2at)$ of the parabola $y^2 = 4ax$?

(a) $\frac{1}{t}$

(b) t

(c) $-t$

(d) $-\frac{1}{t}$

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(a) $\frac{1}{t}$

(b) t

(c) $-t$

(d) $-\frac{1}{t}$

Ans: (c)

Q) Match List I with List II and select the correct answer using the code given below the lists:

	List I		**List II**
(a)	$f(x) = \cos x$	1.	The graph cuts y-axis in infinite number of points
(b)	$f(x) = \ln x$	2.	The graph cuts x -axis in two point
(c)	$f(x) = x^2 - 5x + 4$	3.	The graph cuts y-axis in only one point
(d)	$f(x) = e^x$	4.	The graph cuts x-axis in only one point
		5.	The graph cuts x-axis in infinite number of points

Codes:

	(A)	**(B)**	**(C)**	**(D)**
(a)	1	4	5	3
(b)	1	3	5	4
(c)	5	4	2	3
(d)	5	3	2	4

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(d)	$f(x) = e^x$	4.	The graph cuts x-axis in only one point
		5.	The graph cuts x-axis in infinite number of points

Codes:

	(A)	**(B)**	**(C)**	**(D)**
(a)	1	4	5	3
(b)	1	3	5	4
(c)	5	4	2	3
(d)	5	3	2	4

Ans: (c)

Q) If $\sin x \cos y = \frac{1}{2}$, then what is the value of $\frac{d^2y}{dx^2}$ at $\left(\frac{\pi}{4}, \frac{\pi}{4}\right)$?

(a) –4
(b) –2
(c) –6
(d) 0

Q) If $\sin x \cos y = \frac{1}{2}$, then what is the value of $\frac{d^2y}{dx^2}$ at $\left(\frac{\pi}{4}, \frac{\pi}{4}\right)$?

(a) -4
(b) -2
(c) -6
(d) 0

Ans: (a)

Q) A wire 34 cm long is to be bent in the form of a quadrilateral of which each angle is 90°. What is the maximum area which can be enclosed inside the quadrilateral?

(a) $68\ cm^2$ (b) $70\ cm^2$

(c) $71.25\ cm^2$ (d) $72.25\ cm^2$

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(c) $71.25\ cm^2$ (d) $72.25\ cm^2$

Ans: (d)

Q) What is the area of the largest rectangular field which can be enclosed with 200 m of fencing ?

(a) $1600\,m^2$ (b) $2100\,m^2$

(c) $2400\,m^2$ (d) $2500\,m^2$

Q) What is the area of the largest rectangular field which can be enclosed with 200 m of fencing ?

(a) $1600\,m^2$ (b) $2100\,m^2$

(c) $2400\,m^2$ (d) $2500\,m^2$

Ans: (d)

Q) The maximum value of $\frac{\ln x}{x}$ is

(a) e (b) $\frac{1}{e}$ (c) $\frac{2}{e}$ (d) 1

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(a) e (b) $\frac{1}{e}$ (c) $\frac{2}{e}$ (d) 1

Ans: (b)

Q) The velocity of telegraphic communication is given by $v = x^2 \log(1/x)$, where x is the displacement. For maximum velocity, x equals to?

(a) $e^{1/2}$ (b) $e^{-1/2}$

(c) $(2e)^{-1}$ (d) $2e^{-1/2}$

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(c) $(2e)^{-1}$ (d) $2e^{-1/2}$

Ans: (b)

Q) The maximum value of $\sin\left(x+\frac{\pi}{5}\right)+\cos\left(x+\frac{\pi}{5}\right)$, where $x \in \left(0, \frac{\pi}{2}\right)$, is attained at

(a) $\frac{\pi}{20}$ (b) $\frac{\pi}{15}$ (c) $\frac{\pi}{10}$ (d) $\frac{\pi}{2}$

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(a) $\frac{\pi}{20}$ (b) $\frac{\pi}{15}$ (c) $\frac{\pi}{10}$ (d) $\frac{\pi}{2}$

Ans: (a)

Q) What is the maximum value of $16\sin\theta - 12\sin^2\theta$?

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{16}{3}$ (d) 4

Q) What is the maximum value of $16\sin\theta - 12\sin^2\theta$?

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{16}{3}$ (d) 4

Ans: (c)

Q) What is the minimum value of $a^2x + b^2y$ where $xy = c^2$?

(a) abc (b) $2abc$

(c) $3abc$ (d) $4abc$

Q) What is the minimum value of $a^2x + b^2y$ where $xy = c^2$?

(a) abc (b) $2abc$

(c) $3abc$ (d) $4abc$

Ans: (b)

Q) If $y = |\sin x|^{|x|}$, then what is the value of $\frac{dy}{dx}$ at $x = \frac{\pi}{6}$?

(a) $\frac{2^{-\frac{\pi}{6}}\left(6\,\ell n2 - \sqrt{3}\pi\right)}{6}$

(b) $\frac{2^{\frac{\pi}{6}}\left(6\,\ell n2 + \sqrt{3}\pi\right)}{6}$

(c) $\frac{2^{-\frac{\pi}{6}}\left(6\,\ell n2 + \sqrt{3}\pi\right)}{6}$

(d) $\frac{2^{\frac{\pi}{6}}\left(6\,\ell n2 - \sqrt{3}\pi\right)}{6}$

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(c) $\frac{2^{-\frac{\pi}{6}}\left(6\,\ell n2 + \sqrt{3}\pi\right)}{6}$

(d) $\frac{2^{\frac{\pi}{6}}\left(6\,\ell n2 - \sqrt{3}\pi\right)}{6}$

Ans: (a)

Q) Which one of the following is correct in respect of the function

$$f(x) = x \sin x + \cos x + \frac{1}{2}\cos^2 x \, ?$$

(a) It is increasing in the interval $\left(0, \frac{\pi}{2}\right)$

(b) It remains constant in the interval $\left(0, \frac{\pi}{2}\right)$

(c) It is decreasing in the interval $\left(0, \frac{\pi}{2}\right)$

(d) It is decreasing in the interval $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

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(d) It is decreasing in the interval $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

Ans: (a)

Q) A flower-bed in the form of a sector has been fenced by a wire of 40 m length. If the flower-bed has the greatest possible area, then what is the radius of the sector?

(a) 25 m
(b) 20 m
(c) 10 m
(d) 5 m

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(a) 25 m
(b) 20 m
(c) 10 m
(d) 5 m

Ans: (c)

Q) What is the minimum value of $[x(x-1)+1]^{\frac{1}{3}}$, where $a \leq x \leq 1$?

(a) $\left(\frac{3}{4}\right)^{\frac{1}{3}}$ (b) 1 (c) $\frac{1}{2}$ (d) $\left(\frac{3}{8}\right)^{1/3}$

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(a) $\left(\frac{3}{4}\right)^{\frac{1}{3}}$ (b) 1 (c) $\frac{1}{2}$ (d) $\left(\frac{3}{8}\right)^{1/3}$

Ans: (a)

REVISION TOPICS : (23/08/24)

- Integration
- Differential Equations

NDA 2 2024

LIVE

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CLASS 13

NAVJYOTI SIR

SSBCrack EXAMS