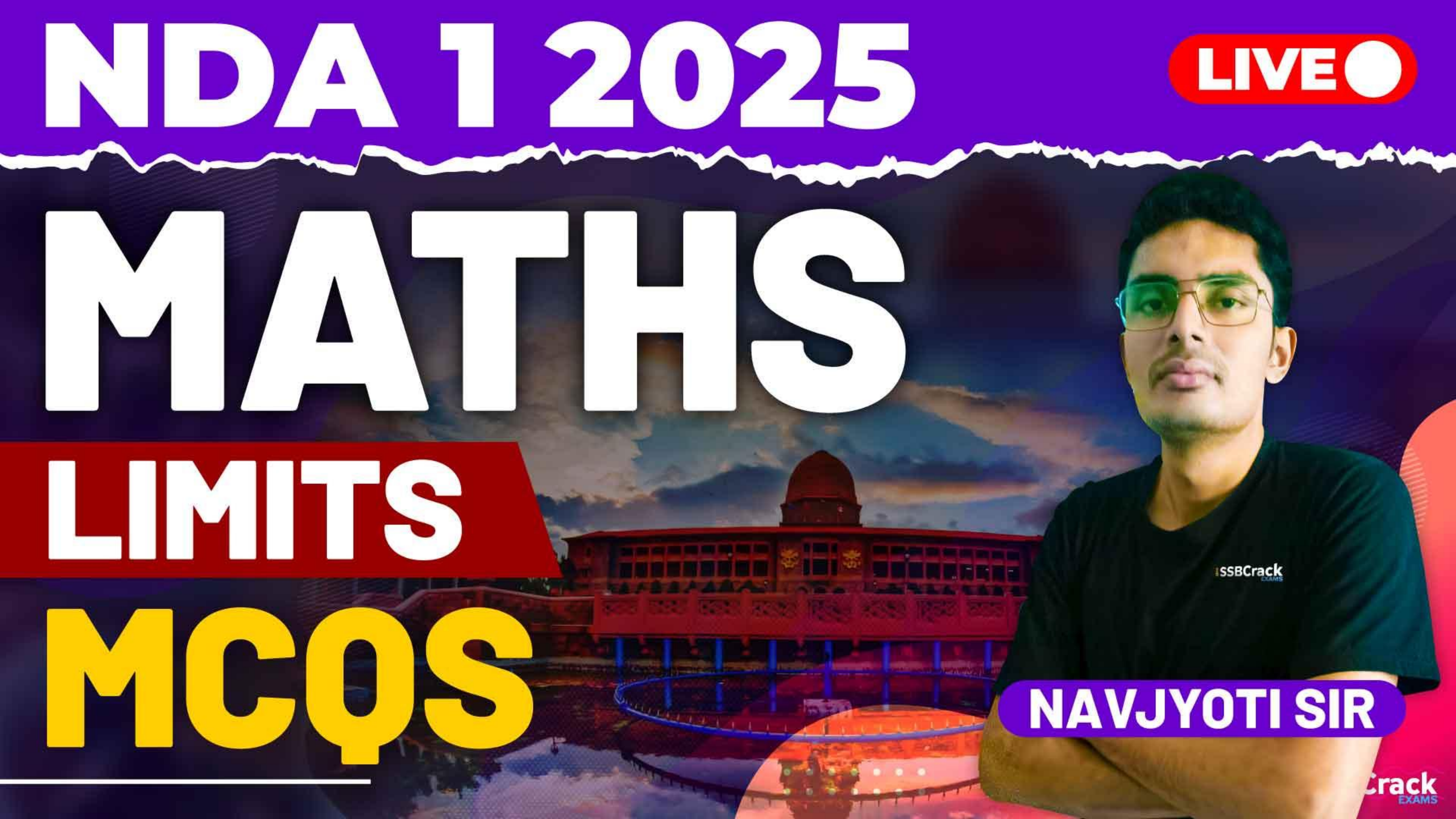


NDA 1 2025
LIVE
MATHS
LIMITS
MCQS
SSBCrack EXAMS
NAVJYOTI SIR
Crack EXAMS

12 Feb 2025 Live Classes Schedule

9:00AM	12 FEBRUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	12 FEBRUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

SSB INTERVIEW LIVE CLASSES

9:30AM	PIQ FORM & PERSONAL INTERVIEW	ANURADHA MA'AM

AFCAT 1 2025 LIVE CLASSES

3:00PM	STATIC GK - HISTORY	DIVYANSHU SIR
4:30PM	ENGLISH - CLOZE TEST - CLASS 2	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

10:00AM	MATHS - LIMITS	NAVJYOTI SIR
11:30AM	POLITY - CLASS 5	RUBY MA'AM
1:00PM	BIOLOGY - CLASS 3	SHIVANGI MA'AM
4:30PM	ENGLISH - CLOZE TEST - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	POLITY - CLASS 5	RUBY MA'AM
1:00PM	BIOLOGY - CLASS 3	SHIVANGI MA'AM
4:30PM	ENGLISH - CLOZE TEST - CLASS 2	ANURADHA MA'AM
5:30PM	MATHS - MENSURATION 3D	NAVJYOTI SIR

Q) If $f(x) = \dfrac{[x]}{|x|}, x \neq 0,$

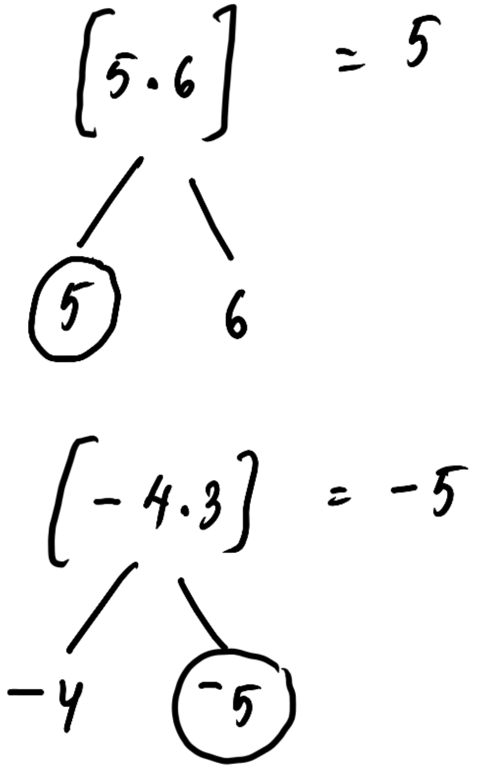
where [ ] denotes the greatest integer function, then what is the right-hand limit of $f(x)$ at $x = 1$?

(a) – 1

(b) 0

(c) 1

(d) Right-hand limit of $f(x)$ at $x = 1$ does not exist



$$\lim_{x \to 1^+} f(x)$$

$$x = 1 + h$$

$$\lim_{h \to 0} \frac{[1+h]}{1+h} = \frac{1}{1} = 1$$

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

Q) If $f(x) = \frac{[x]}{|x|}, x \neq 0,$

where [ ] denotes the greatest integer function, then what is the right-hand limit of $f(x)$ at $x = 1$?

(a) – 1

(b) 0

(c) 1

(d) Right-hand limit of $f(x)$ at $x = 1$ does not exist

Ans: (c)

Q) Consider the following function $f: R \rightarrow R$ such that $f(x) = x$ if $x \geq 0$ and $f(x) = -x^2$ if $x < 0$. Then, which one of the following is correct?

(a) $f(x)$ is continuous at every $x \in R$

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

(c) $f(x)$ is discontinous at $x = 0$ only

(d) $f(x)$ is discontinuous at every $x \in R$

$$f(x) = \begin{cases} x, & \text{if } x \geq 0 \\ -x^2, & x < 0 \end{cases}$$

At $x = 0$

$f(0) = 0$

$LHL = -(0)^2 = 0$

$RHL = 0$

Q) Consider the following function $f: R \to R$ such that $f(x) = x$ if $x \geq 0$ and $f(x) = -x^2$ if $x < 0$. Then, which one of the following is correct?

(a) $f(x)$ is continuous at every $x \in R$

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

(c) $f(x)$ is discontinous at $x = 0$ only

(d) $f(x)$ is discontinuous at every $x \in R$

Ans: (a)

Q) A function f is defined as follows

$$f(x) = x^p \cos\left(\frac{1}{x}\right), x \neq 0, f(0) = 0.$$

What conditions should be imposed on p, so that f may be continuous at $x = 0$?

(a) $p = 0$ (b) $p > 0$ ✓

(c) $p < 0$ (d) No value of p

$$\lim_{x \to 0^-} f(x) = f(0) = \lim_{x \to 0^+} f(x)$$

LHL at $(x = 0) = 0$

$$\lim_{x \to 0^-} x^p \cos\left(\frac{1}{x}\right) = 0$$

$$\lim_{x \to 0^-} x^p \cos\left(\frac{1}{x}\right) = 0$$

If $x \neq 0$,

$$\lim_{x \to 0^-} x^p = 0 \quad \text{or} \quad \lim_{x \to 0^-} \cos\left(\frac{1}{x}\right) = 0$$

$$(-0.001)^p = 0$$

If $p < 0 \Rightarrow (-0.001)^p$ won't tend towards 0, but to a larger number.

If $p = 0 \Rightarrow (-0.001)^p \sim 1$ or will not be defined.

So, $p > 0$,

$$(-0.001)^p \longrightarrow 0$$

Q) A function f is defined as follows

$$f(x) = x^p \cos\left(\frac{1}{x}\right), x \neq 0, f(0) = 0.$$

What conditions should be imposed on p, so that f may be continuous at $x = 0$?

(a) $p = 0$ (b) $p > 0$

(c) $p < 0$ (d) No value of p

Ans: (b)

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) $f'(0) = 1$

(a) $\lim_{x \to 0} [\tan^2 x] = [0] = 0$ ← finite value, therefore $\lim_{x \to 0} f(x)$ exists.

(b) $LHL = \lim_{x \to 0^-} [\tan^2 x] = \lim_{h \to 0} [\tan^2 (0-h)] = 0$

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

} $f(x)$ is continous at $x = 0$,

(c) $f(x)$ is differentiable at $x=0$, as it is continous at $x=0$.] — ✗

(d) $f'(0) = 1$ — ✗

$f(x) = [\tan^2 x]$

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

$f'(0) = [2(0)(1)] = [0] = 0$

SSBCrack EXAMS

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) The function $f(x) = \dfrac{\log(1+ax) - \log(1-bx)}{x}$

is not defined at $x = 0$. The value which should be assigned to f at $x = 0$, so that it is continuous at $x = 0$, is

(a) $a - b$ (b) $a + b$

(c) $\log a + \log b$ (d) None of these

$$\lim_{x \to 0} f(x) = \frac{\log(1+ax) - \log(1-bx)}{x} \Rightarrow \text{gives } \frac{0}{0} \text{ form,}$$

If $\lim_{x \to a} \dfrac{f(x)}{g(x)}$ is not defined

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

L - Hospital rule,

$$= \frac{\frac{1}{1+ax}(a) - \frac{1}{1-bx}(-b)}{1}$$

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

$$= \frac{a}{1+0} - \frac{(-b)}{1-0}$$

$$= a + b$$

Q) The function $f(x) = \dfrac{\log(1 + ax) - \log(1 - bx)}{x}$

is not defined at $x = 0$. The value which should be assigned to f at $x = 0$, so that it is continuous at $x = 0$, is

(a) $a - b$

(b) $a + b$

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

(d) None of these

Ans: (b)

Q) $\lim_{x \to 0} \frac{\sin(\pi \cos^2 x)}{x^2}$ is equal to:

(a) $-\pi$ (b) π (c) $\frac{\pi}{2}$ (d) 1

$$\sin(\pi \cos^2 x) = \sin(\pi(1 - \sin^2 x))$$
$$= \sin(\pi - \pi \sin^2 x)$$
$$= \sin(\pi \sin^2 x)$$

$$\sin(\pi - \theta) = \sin\theta$$

$$\lim_{x \to 0} \frac{\sin(\pi \sin^2 x)}{x^2}$$

$$\lim_{x \to 0} \frac{\cos(\pi \sin^2 x)(\pi(2\sin x)\cos x)}{2x} = \pi(\sin 2x)(\cos(\pi \sin^2 x))$$

$$\lim_{x \to 0} \frac{\pi(\sin 2x)(-\sin(\pi \sin^2 x)\pi(\sin 2x) + \pi\cos(\pi \sin^2 x)(2\cos 2x)}{2}$$

$$= \frac{0 + \pi(1)(2)}{2} = \frac{2\pi}{2} = \pi$$

SSBCrack EXAMS

Q) $\lim_{x\to 0} \frac{\sin\left(\pi \cos^2 x\right)}{x^2}$ is equal to:

(a) $-\pi$ (b) π (c) $\frac{\pi}{2}$ (d) 1

Ans: (b)

Q) What is $\lim_{x \to \frac{\pi}{6}} \frac{2\sin^2 x + \sin x - 1}{2\sin^2 x - 3\sin x + 1}$ equal to?

(a) $-\frac{1}{2}$ (b) $-\frac{1}{3}$ (c) -2 (d) -3

Putting $x = \frac{\pi}{6}$ makes $\frac{0}{0}$ form,

L-Hospital rule,

HW

Q) What is $\lim_{x \to \frac{\pi}{6}} \frac{2\sin^2 x + \sin x - 1}{2\sin^2 x - 3\sin x + 1}$ equal to?

(a) $-\frac{1}{2}$ (b) $-\frac{1}{3}$ (c) -2 (d) -3

Ans: (d)

Q) $\lim_{x \to 0} \dfrac{\sin^{-1} x - \tan^{-1} x}{x^3}$ is equal to

(a) 0 (b) 1 (c) –1 (d) 1/2

$(x)^{-\frac{1}{2}} = -\frac{1}{2}(x)^{-\frac{3}{2}}$

$\frac{0}{0}$ form,

$$\lim_{x \to 0} \frac{\frac{1}{\sqrt{1-x^2}} - \frac{1}{1+x^2}}{3x^2}$$

$\left(\frac{0}{0}\right)$

$$\Rightarrow \lim_{x \to 0} \frac{-\frac{1}{2}(1-x^2)^{-3/2}(-2x) - \left(\frac{-1}{(1+x^2)^2}\right)(2x)}{6x}$$

$$\lim_{x \to 0} \frac{x(1-x^2)^{-3/2} + \frac{2x}{(1+x^2)^2}}{6x}$$

$$\lim_{x \to 0} \frac{x(1-x^2)^{-3/2} + \dfrac{2x}{(1+x^2)^2}}{6x}$$

$$= \frac{(1-x^2)^{-3/2} + \dfrac{2}{(1+x^2)^2}}{6} = \frac{1+2}{6} = \boxed{\frac{1}{2}}$$

SSBCrack EXAMS

Q) $\lim_{x \to 0} \dfrac{\sin^{-1} x - \tan^{-1} x}{x^3}$ is equal to

(a) 0 (b) 1 (c) –1 (d) 1/2

Ans: (d)

Q) Consider the function

$$f(x)=\begin{cases} ax-2 & \text{for } -2<x<-1 \\ -1 & \text{for } -1\le x\le 1 \\ a+2(x-1)^2 & \text{for } 1<x<2 \end{cases}$$

What is the value of a for which f(x) is continuous at $x=-1$ and $x=1$?

(a) -1 (b) 1

(c) 0 (d) 2

$$\lim_{x\to(-1)^-} = f(-1) = \lim_{x\to(-1)^+}$$

$$a(-1)-2 = -1$$

$$-a-2=-1 \Rightarrow a=-1 \checkmark$$

$$\lim_{x\to1^-} f(x) = f(1) = \lim_{x\to1^+} f(x)$$

$$-1 = a+2(1-1)^2$$

$$a=-1$$

Q) Consider the function

$$f(x)=\begin{cases} ax-2 & \text{for } -2<x<-1 \\ -1 & \text{for } -1\le x\le 1 \\ a+2(x-1)^2 & \text{for } 1<x<2 \end{cases}$$

What is the value of a for which f(x) is continuous at $x=-1$ and $x=1$?

(a) -1 (b) 1

(c) 0 (d) 2

Ans: (a)

Q) If $\lim_{x \to \infty}\left[\dfrac{x^3+1}{x^2+1}-(ax+b)\right]=2$, then

(a) $a = 1$ and $b = 1$

(b) $a = 1$ and $b = -1$

(c) $a = 1$ and $b = -2$

(d) $a = 1$ and $b = 2$

Q) If $\lim_{x \to \infty} \left[\frac{x^3 + 1}{x^2 + 1} - (ax + b) \right] = 2$, then

(a) $a = 1$ and $b = 1$

(b) $a = 1$ and $b = -1$

(c) $a = 1$ and $b = -2$

(d) $a = 1$ and $b = 2$

Ans: (c)

SSBCrack EXAMS

Q) What is $\lim_{n \to \infty} \frac{a^n + b^n}{a^n - b^n}$

where $a > b > 1$, equal to?

(a) – 1 (b) 0

(c) 1

(d) Limit does not exist

Q) What is $\lim_{n \to \infty} \frac{a^n + b^n}{a^n - b^n}$

where $a > b > 1$, equal to?

(a) – 1
(b) 0
(c) 1
(d) Limit does not exist

Ans: (c)

Q) Let $f(x) = \begin{cases} 1 + \dfrac{x}{2k}, & 0 < x < 2 \\ kx, & 2 \leq x < 4 \end{cases}$

If $\lim_{x \to 2} f(x)$ exists, then what is the value of k?

(a) – 2 (b) – 1

(c) 0 (d) 1

Q) Let $f(x) = \begin{cases} 1 + \dfrac{x}{2k}, & 0 < x < 2 \\ kx, & 2 \leq x < 4 \end{cases}$

If $\lim\limits_{x \to 2} f(x)$ exists, then what is the value of k?

(a) – 2 (b) – 1

(c) 0 (d) 1

Ans: (d)

Q) Consider the following statements in respect of the function.

$f(x) = \sin\left(\frac{1}{x^2}\right), x \neq 0.$

1. It is continuous at $x = 0$, if $f(0) = 0$.
2. It is continuous at $x = \frac{2}{\sqrt{x}}$.

Which of the above statements is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q) Consider the following statements in respect of the function.

$$f(x) = \sin\left(\frac{1}{x^2}\right), x \neq 0.$$

1. It is continuous at $x = 0$, if $f(0) = 0$.
2. It is continuous at $x = \frac{2}{\sqrt{x}}$.

Which of the above statements is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (b)

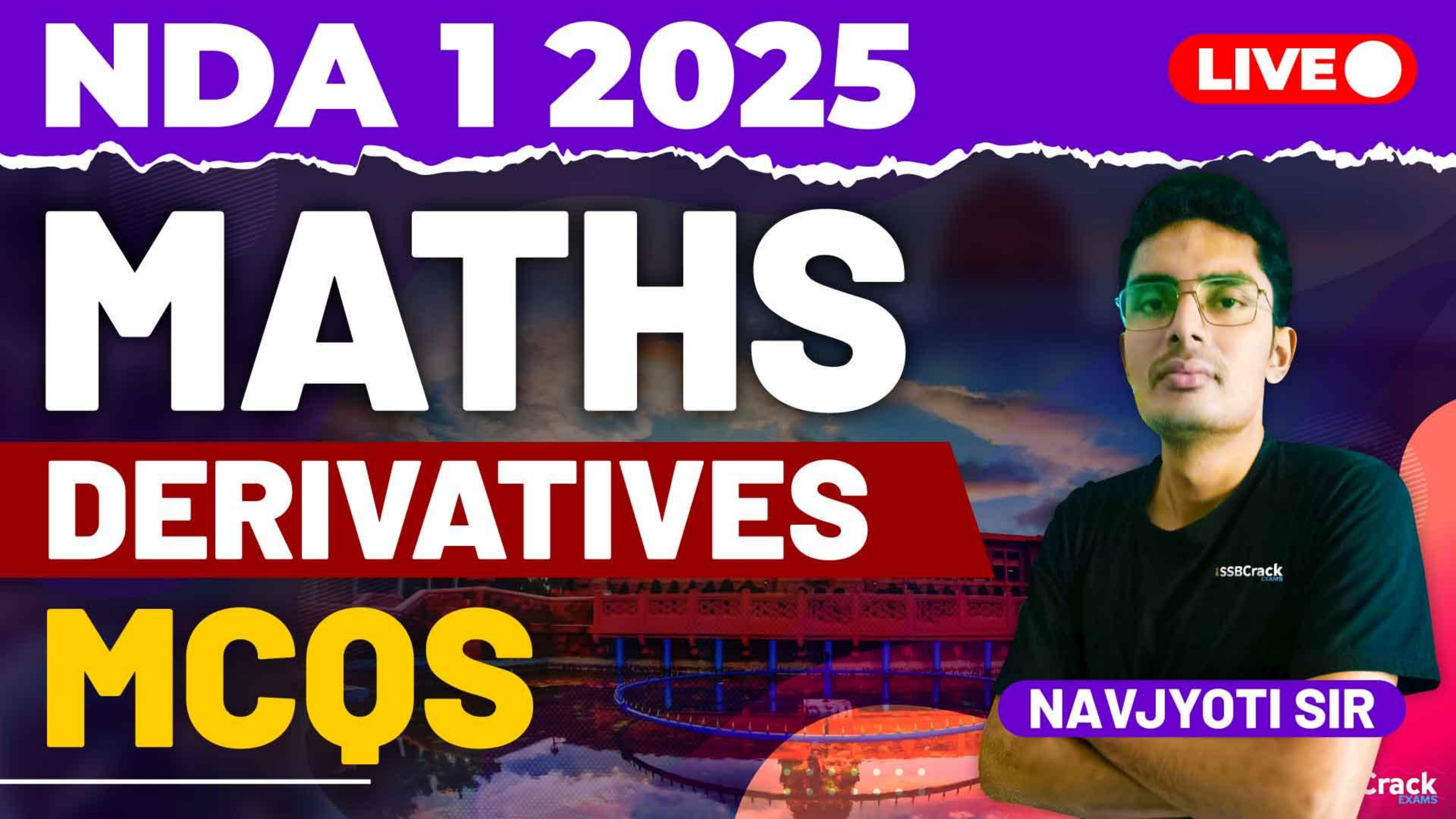
Q) If $f(x)=\sqrt{25-x^2}$, then what is $\lim_{x\to 1}\frac{f(x)-f(1)}{x-1}$ equal to?

(a) $-\frac{1}{\sqrt{24}}$ (b) $\frac{1}{\sqrt{24}}$ (c) $-\frac{1}{4\sqrt{3}}$ (d) $\frac{1}{\sqrt{4\sqrt{3}}}$

Q) If $f(x)=\sqrt{25-x^2}$, then what is $\lim_{x\to 1}\frac{f(x)-f(1)}{x-1}$ equal to?

(a) $-\frac{1}{\sqrt{24}}$ (b) $\frac{1}{\sqrt{24}}$ (c) $-\frac{1}{4\sqrt{3}}$ (d) $\frac{1}{\sqrt{4\sqrt{3}}}$

Ans: (a)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