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MATHEMATICS · JEE MAIN

Limits

Chapter-wise previous year questions, with answer key

99	2020–2025	5
PYQS	PAPERS	TOPICS

Indeterminate Forms · L'Hopital's Rule · Standard Limits · Concept of Limit · Sandwich Theorem

1. Attempt each question on paper first — they're grouped by topic, newest papers first.
2. Check yourself against the answer key at the end.
3. Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Indeterminate Forms · 44 PYQs

Q1 JEE Main 2025 · 8 Apr · Shift 2

Given below are two statements:

Statement I: $\lim\limits_{x\to 0}\left(\frac{\tan^{-1}x+\log_e\sqrt{\frac{1+x}{1-x}}-2x}{x^5}\right)=\frac{2}{5}$

Statement II: $\lim\limits_{x\to 1}\left(x^{\frac{2}{1-x}}\right)=\frac{1}{e^2}$

In the light of the above statements, choose the **correct** answer from the options given below:

(A) Statement I is false but Statement II is true

(B) Both Statement I and Statement II are false

(C) Both Statement I and Statement II are true

(D) Statement I is true but Statement II is false

Step-by-step solution ▸ prepwiser.in/questions/uOFcm3etdQ

Q2 JEE Main 2025 · 7 Apr · Shift 2

For $t>-1$, let α_t and β_t be the roots of the equation

$$\left((t+2)^{1/7}-1\right)x^2+\left((t+2)^{1/6}-1\right)x+\left((t+2)^{1/21}-1\right)=0.\ \text{If}\ \lim_{t\to-1^+}\alpha_t=a\ \text{and}\ \lim_{t\to-1^+}\beta_t=b,$$

then $72(a+b)^2$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/adFWQosJb2

Q3 JEE Main 2025 · 3 Apr · Shift 2

$$If\ \lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}=p,\ \text{then}\ 96\log_e p\ \text{is equal to}\_\_\_\_\_$$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/EQaLpFED2a

Q4 JEE Main 2025 · 2 Apr · Shift 1

For $\alpha,\beta,\gamma\in\mathbf{R}$, if $\lim\limits_{x\to 0}\frac{x^2\sin\alpha x+(\gamma-1)e^{x^2}}{\sin 2x-\beta x}=3$, then $\beta+\gamma-\alpha$ is equal to :

(A) -1 **(B)** 4

(C) 6 **(D)** 7

Step-by-step solution ▸ prepwiser.in/questions/w92yLvZczK

Q5 JEE Main 2025 · 2 Apr · Shift 2

$$If\ \lim_{x\to 0}\frac{\cos(2x)+a\cos(4x)-b}{x^4}\ is\ finite,\ then\ (a+b)\ is\ equal\ to:$$

(A) 0 **(B)** $\frac{3}{4}$

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

Step-by-step solution ▸ prepwiser.in/questions/JdUPw4Almg

Q6 JEE Main 2025 · 29 Jan · Shift 2

If $\lim\limits_{t\to 0}\left(\int\limits_0^1 (3x+5)^t dx\right)^{\frac{1}{t}} = \frac{\alpha}{5e}\left(\frac{8}{5}\right)^{\frac{2}{3}}$, then α is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Stc38sw2e1

Q7 JEE Main 2025 · 24 Jan · Shift 1

$\lim\limits_{x\to 0} \operatorname{cosec} x\left(\sqrt{2\cos^2 x + 3\cos x} - \sqrt{\cos^2 x + \sin x + 4}\right)$ is:

(A) $\frac{1}{\sqrt{15}}$ **(B)** $\frac{1}{2\sqrt{5}}$

(C) 0 **(D)** $-\frac{1}{2\sqrt{5}}$

Step-by-step solution ▸ prepwiser.in/questions/qEuClId60A

Q8 JEE Main 2025 · 23 Jan · Shift 2

$\lim\limits_{x\to\infty} \frac{\left(2x^2-3x+5\right)(3x-1)^{\frac{x}{2}}}{(3x^2+5x+4)\sqrt{(3x+2)^x}}$ is equal to :

(A) $\frac{2e}{3}$ **(B)** $\frac{2}{3\sqrt{e}}$

(C) $\frac{2e}{\sqrt{3}}$ **(D)** $\frac{2}{\sqrt{3e}}$

Step-by-step solution ▸ prepwiser.in/questions/U14uZkhViW

Q9 JEE Main 2025 · 22 Jan · Shift 2

If $\lim\limits_{x\to\infty}\left(\left(\frac{e}{1-e}\right)\left(\frac{1}{e}-\frac{x}{1+x}\right)\right)^x = \alpha$, then the value of $\frac{\log_e \alpha}{1+\log_e \alpha}$ equals :

(A) e^{-2} **(B)** e^2

(C) e **(D)** e^{-1}

Step-by-step solution ▸ prepwiser.in/questions/6-IpKk6UnF

Q10 JEE Main 2024 · 8 Apr · Shift 2

If

$$\alpha = \lim_{x\to 0^+}\left(\frac{e^{\sqrt{\tan x}} - e^{\sqrt{x}}}{\sqrt{\tan x} - \sqrt{x}}\right)$$

and $\beta = \lim\limits_{x\to 0}(1+\sin x)^{\frac{1}{2}\cot x}$ are the roots of the quadratic equation $ax^2 + bx - \sqrt{e} = 0$, then $12\log_e(a+b)$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/pvJeeO-xW2

Q11 JEE Main 2024 · 6 Apr · Shift 2

$$\lim_{n\to\infty}\frac{\left(1^2-1\right)(n-1)+\left(2^2-2\right)(n-2)+\cdots+\left((n-1)^2-(n-1)\right)\cdot 1}{\left(1^3+2^3+\cdots\cdots+n^3\right)-\left(1^2+2^2+\cdots\cdots+n^2\right)}$$

is equal to :

(A) $\frac{2}{3}$ **(B)** $\frac{1}{2}$

(C) $\frac{3}{4}$ **(D)** $\frac{1}{3}$

Step-by-step solution ▸ prepwiser.in/questions/TdTOPFDBos

Q12 JEE Main 2024 · 1 Feb · Shift 1

Let $\{x\}$ denote the fractional part of x and $f(x)=\frac{\cos^{-1}\left(1-\{x\}^2\right)\sin^{-1}(1-\{x\})}{\{x\}-\{x\}^3}, x\neq 0$. If L and R respectively denotes the left hand limit and the right hand limit of $f(x)$ at $x=0$, then $\frac{32}{\pi^2}\left(\mathrm{L}^2+\mathrm{R}^2\right)$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/qRBFAQQeTm

Q13 JEE Main 2024 · 31 Jan · Shift 1

$\lim\limits_{x\to 0}\frac{e^{2|\sin x|}-2|\sin x|-1}{x^2}$

(A) is equal to 1

(B) does not exist

(C) is equal to -1

(D) is equal to 2

Step-by-step solution ▸ prepwiser.in/questions/Zzni-bPkd9

Q14 JEE Main 2024 · 27 Jan · Shift 1

If $\mathrm{a}=\lim\limits_{x\to 0}\frac{\sqrt{1+\sqrt{1+x^4}}-\sqrt{2}}{x^4}$ and $\mathrm{b}=\lim\limits_{x\to 0}\frac{\sin^2 x}{\sqrt{2}-\sqrt{1+\cos x}}$, then the value of ab^3 is :

(A) 36

(B) 25

(C) 32

(D) 30

Step-by-step solution ▸ prepwiser.in/questions/eLzmFim6IO

Q15 JEE Main 2023 · 13 Apr · Shift 2

If

$$\lim_{x\to 0}\frac{e^{ax}-\cos(bx)-\frac{cxe^{-cx}}{2}}{1-\cos(2x)}=17$$

, then $5a^2+b^2$ is equal to

(A) 64

(B) 68

(C) 72

(D) 76

Step-by-step solution ▸ prepwiser.in/questions/i5LbDLeTee

Q16 JEE Main 2023 · 8 Apr · Shift 1

$$\lim_{x\to 0}\left(\left(\frac{\left(1-\cos^2(3x)\right)}{\cos^3(4x)}\right)\left(\frac{\sin^3(4x)}{\left(\log_e(2x+1)\right)^5}\right)\right)$$

is equal to _____.

(A) 15

(B) 18

(C) 9

(D) 24

Step-by-step solution ▸ prepwiser.in/questions/0TfRnOrQWN

Q17 JEE Main 2023 · 6 Apr · Shift 1

Let $a_1, a_2, a_3, \ldots, a_n$ be n positive consecutive terms of an arithmetic progression. If $d > 0$ is its common difference, then

$$\lim_{n\to\infty} \sqrt{\frac{d}{n}} \left(\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \ldots\ldots\ldots + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} \right)$$

is

(A) $\frac{1}{\sqrt{d}}$

(B) 1

(C) 0

(D) $\sqrt{d}$

Step-by-step solution ▸ prepwiser.in/questions/E9czA5sT2q

Q18 JEE Main 2023 · 29 Jan · Shift 1

Let $x = 2$ be a root of the equation $x^2 + px + q = 0$ and

$$f(x) = \begin{cases} \frac{1-\cos(x^2-4px+q^2+8q+16)}{(x-2p)^4}, & x \neq 2p \\ 0, & x = 2p \end{cases}$$

Then $\lim\limits_{x\to 2p^+} [f(x)]$, where $[.]$ denotes greatest integer function, is

(A) 2

(B) 1

(C) 0

(D) -1

Step-by-step solution ▸ prepwiser.in/questions/1FYgApPQIO

Q19 JEE Main 2023 · 24 Jan · Shift 1

$$\lim_{t\to 0} \left(1^{\frac{1}{\sin^2 t}} + 2^{\frac{1}{\sin^2 t}} + \ldots + n^{\frac{1}{\sin^2 t}} \right)^{\sin^2 t}$$

is equal to

(A) $\frac{n(n+1)}{2}$

(B) n

(C) $n^2 + n$

(D) n^2

Step-by-step solution ▸ prepwiser.in/questions/qea0zJfXoO

Q20 JEE Main 2022 · 29 Jul · Shift 1

If

$$\lim_{x\to 0} \frac{\alpha e^x + \beta e^{-x} + \gamma \sin x}{x \sin^2 x} = \frac{2}{3}$$

, where $\alpha, \beta, \gamma \in \mathbf{R}$, then which of the following is NOT correct?

(A) $\alpha^2 + \beta^2 + \gamma^2 = 6$

(B) $\alpha\beta + \beta\gamma + \gamma\alpha + 1 = 0$

(C) $\alpha\beta^2 + \beta\gamma^2 + \gamma\alpha^2 + 3 = 0$

(D) $\alpha^2 - \beta^2 + \gamma^2 = 4$

Step-by-step solution ▸ prepwiser.in/questions/bZWjXI2bDG

Q21 JEE Main 2022 · 28 Jul · Shift 1

$$\lim_{x\to 0}\left(\frac{(x+2\cos x)^3+2(x+2\cos x)^2+3\sin(x+2\cos x)}{(x+2)^3+2(x+2)^2+3\sin(x+2)}\right)^{\frac{100}{x}}$$

is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/a-1UU050S7

Q22 JEE Main 2022 · 26 Jul · Shift 2

Let

$$\beta=\lim_{x\to 0}\frac{\alpha x-\left(e^{3x}-1\right)}{\alpha x\left(e^{3x}-1\right)}$$

for some $\alpha\in\mathbb{R}$. Then the value of $\alpha+\beta$ is :

(A) $\frac{14}{5}$ **(B)** $\frac{3}{2}$

(C) $\frac{5}{2}$ **(D)** $\frac{7}{2}$

Step-by-step solution ▸ prepwiser.in/questions/5b8rgnk4Sv

Q23 JEE Main 2022 · 25 Jul · Shift 1

If

$$\lim_{n\to\infty}\left(\sqrt{n^2-n-1}+n\alpha+\beta\right)=0$$

, then $8(\alpha+\beta)$ is equal to :

(A) 4 **(B)** -8

(C) -4 **(D)** 8

Step-by-step solution ▸ prepwiser.in/questions/CqXznONKeB

Q24 JEE Main 2022 · 25 Jul · Shift 2

$$\lim_{x\to\frac{\pi}{4}}\frac{8\sqrt{2}-(\cos x+\sin x)^7}{\sqrt{2}-\sqrt{2}\sin 2x}$$

is equal to

(A) 14 **(B)** 7

(C) $14\sqrt{2}$ **(D)** $7\sqrt{2}$

Step-by-step solution ▸ prepwiser.in/questions/vQnng7zsry

Q25 JEE Main 2022 · 30 Jun · Shift 1

Suppose $\lim\limits_{x\to 0}\frac{F(x)}{x^3}$ exists and is equal to L, where

$$F(x)=\begin{vmatrix} a+\sin\frac{x}{2} & -b\cos x & 0 \\ -b\cos x & 0 & a+\sin\frac{x}{2} \\ 0 & a+\sin\frac{x}{2} & -b\cos x \end{vmatrix}$$

.

Then, -112 L is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/CfPrWV2--7

Q26 JEE Main 2022 · 26 Jun · Shift 2

$\lim\limits_{x\to 0}\frac{\cos(\sin x)-\cos x}{x^4}$ is equal to :

(A) $\frac{1}{3}$ **(B)** $\frac{1}{4}$

(C) $\frac{1}{6}$ **(D)** $\frac{1}{12}$

Step-by-step solution ▸ prepwiser.in/questions/SI0wTVuHL5

Q27 JEE Main 2022 · 25 Jun · Shift 1

Let f(x) be a polynomial function such that $f(x)+f'(x)+f''(x)=x^5+64$. Then, the value of $\lim\limits_{x\to 1}\frac{f(x)}{x-1}$ is equal to:

(A) -15 **(B)** -60

(C) 60 **(D)** 15

Step-by-step solution ▸ prepwiser.in/questions/Omphgyrs16

Q28 JEE Main 2021 · 31 Aug · Shift 2

If

$$\alpha=\lim_{x\to\frac{\pi}{4}}\frac{\tan^3 x-\tan x}{\cos\left(x+\frac{\pi}{4}\right)}$$

and $\beta=\lim\limits_{x\to 0}(\cos x)^{\cot x}$ are the roots of the equation, $ax^2 + bx - 4 = 0$, then the ordered pair (a, b) is :

(A) (1, -3) **(B)** (-1, 3)

(C) (-1, -3) **(D)** (1, 3)

Step-by-step solution ▸ prepwiser.in/questions/2mrBjoynDW

Q29 JEE Main 2021 · 27 Aug · Shift 1

If

$$U_n=\left(1+\frac{1}{n^2}\right)\left(1+\frac{2^2}{n^2}\right)^2.....\left(1+\frac{n^2}{n^2}\right)^n$$

, then $\lim\limits_{n\to\infty}(U_n)^{\frac{-4}{n^2}}$ is equal to :

(A) $\frac{e^2}{16}$ **(B)** $\frac{4}{e}$

(C) $\frac{16}{e^2}$ **(D)** $\frac{4}{e^2}$

Step-by-step solution ▸ prepwiser.in/questions/_AgfYFEe7a

Q30 JEE Main 2021 · 27 Aug · Shift 2

If

$$\lim_{x\to\infty}\left(\sqrt{x^2-x+1}-ax\right)=b$$

, then the ordered pair (a, b) is :

(A) $\left(1,\frac{1}{2}\right)$ **(B)** $\left(1,-\frac{1}{2}\right)$

(C) $\left(-1,\frac{1}{2}\right)$ **(D)** $\left(-1,-\frac{1}{2}\right)$

Step-by-step solution ▸ prepwiser.in/questions/AhR0zLFVTY

Q31 JEE Main 2021 · 26 Aug · Shift 2

$$\lim_{x\to 2}\left(\sum_{n=1}^{9}\frac{x}{n(n+1)x^2+2(2n+1)x+4}\right)$$

is equal to :

(A) $\frac{9}{44}$ **(B)** $\frac{5}{24}$

(C) $\frac{1}{5}$ **(D)** $\frac{7}{36}$

Step-by-step solution ▸ prepwiser.in/questions/fT5zIbdIIg

Q32 JEE Main 2021 · 27 Jul · Shift 2

The value of

$$\lim_{x\to 0}\left(\frac{x}{\root 8\of{1-\sin x}-\root 8\of{1+\sin x}}\right)$$

is equal to :

(A) 0 **(B)** 4

(C) -4 **(D)** -1

Step-by-step solution ▸ prepwiser.in/questions/FWk8h7-SS8

Q33 JEE Main 2021 · 22 Jul · Shift 2

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

$$f(x)=\begin{cases}\frac{x^3}{(1-\cos 2x)^2}\log_e\left(\frac{1+2xe^{-2x}}{(1-xe^{-x})^2}\right), & x\neq 0\\ \alpha, & x=0\end{cases}$$

If f is continuous at x = 0, then α is equal to :

(A) 1 **(B)** 3

(C) 0 **(D)** 2

Step-by-step solution ▸ prepwiser.in/questions/nDRQM36jvh

Q34 JEE Main 2021 · 20 Jul · Shift 2

If

$$\lim_{x\to 0}\frac{\alpha x e^{x}-\beta\log_e(1+x)+\gamma x^2 e^{-x}}{x\sin^2 x}=10,\alpha,\beta,\gamma\in R$$

, then the value of $\alpha + \beta + \gamma$ is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/rTxc1I84xZ

Q35 JEE Main 2021 · 20 Jul · Shift 1

If the value of

$$\lim_{x\to 0}\left(2-\cos x\sqrt{\cos 2x}\right)^{\left(\frac{x+2}{x^2}\right)}$$

is equal to e^a, then a is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/DTatg0GzAD

Q36 JEE Main 2021 · 17 Mar · Shift 2

The value of the limit

$$\lim_{\theta\to 0}\frac{\tan(\pi\cos^2\theta)}{\sin(2\pi\sin^2\theta)}$$

is equal to :

(A) 0

(B) $-${1 \over 2}$

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

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

Step-by-step solution ▸ prepwiser.in/questions/EEmMw-u4pS

Q37 JEE Main 2021 · 25 Feb · Shift 2

If

$$\lim_{x\to 0}\frac{ax-(e^{4x}-1)}{ax(e^{4x}-1)}$$

exists and is equal to b, then the value of $a - 2b$ is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/EpiAy_4yf9

Q38 JEE Main 2021 · 24 Feb · Shift 1

$$\lim_{x\to 0}\frac{\int_0^{x^2}\left(\sin\sqrt{t}\right)dt}{x^3}$$

is equal to :

(A) $\frac{1}{15}$ **(B)** 0

(C) $\frac{2}{3}$ **(D)** $\frac{3}{2}$

Step-by-step solution ▸ prepwiser.in/questions/4mgkWQ-76a

Q39 JEE Main 2020 · 6 Sep · Shift 1

$$\lim_{x\to 1}\left(\frac{\int_0^{(x-1)^2} t\cos\left(t^2\right)dt}{(x-1)\sin(x-1)}\right)$$

(A) is equal to 0 **(B)** is equal to $\frac{1}{2}$

(C) does not exist **(D)** is equal to $-\frac{1}{2}$

Step-by-step solution ▸ prepwiser.in/questions/x90yN0FfPv

Q40 JEE Main 2020 · 5 Sep · Shift 1

If α is positive root of the equation, $p(x) = x^2 - x - 2 = 0$, then

$$\lim_{x\to\alpha^+}\frac{\sqrt{1-\cos\left(p\left(x\right)\right)}}{x+\alpha-4}$$

is equal to :

(A) $\frac{1}{\sqrt{2}}$ **(B)** $\frac{1}{2}$

(C) $\frac{3}{\sqrt{2}}$ **(D)** $\frac{3}{2}$

Step-by-step solution ▸ prepwiser.in/questions/ydl3xL8VZ2

Q41 JEE Main 2020 · 3 Sep · Shift 1

If

$$\lim_{x\to 0}\left\{\frac{1}{x^8}\left(1-\cos\frac{x^2}{2}-\cos\frac{x^2}{4}+\cos\frac{x^2}{2}\cos\frac{x^2}{4}\right)\right\}$$

$= 2^{-k}$

then the value of k is _____ .

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Y0xZ6Q30T0

Q42 JEE Main 2020 · 3 Sep · Shift 2

$$\lim_{x\to a}\frac{(a+2x)^{\frac{1}{3}}-(3x)^{\frac{1}{3}}}{(3a+x)^{\frac{1}{3}}-(4x)^{\frac{1}{3}}}$$

$(a \neq 0)$ is equal to :

(A) $\left(\frac{2}{9}\right)\left(\frac{2}{3}\right)^{\frac{1}{3}}$

(B) $\left(\frac{2}{3}\right)\left(\frac{2}{9}\right)^{\frac{1}{3}}$

(C) $\left(\frac{2}{3}\right)^{\frac{4}{3}}$

(D) $\left(\frac{2}{9}\right)^{\frac{4}{3}}$

Step-by-step solution ▸ prepwiser.in/questions/SMy6JeiWz0

Q43 JEE Main 2020 · 8 Jan · Shift 1

$$\lim_{x\to 0}\left(\frac{3x^2+2}{7x^2+2}\right)^{\frac{1}{x^2}}$$

is equal to

(A) e

(B) e^2

(C) $\frac{1}{e^2}$

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

Step-by-step solution ▸ prepwiser.in/questions/HNRimRzGUi

Q44 JEE Main 2020 · 7 Jan · Shift 1

$$\lim_{x\to 2}\frac{3^x+3^{3-x}-12}{3^{-x/2}-3^{1-x}}$$

is equal to_____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/btuNyoocQ3

L'Hopital's Rule · 14 PYQs

Q45 JEE Main 2024 · 9 Apr · Shift 2

$$\lim_{x\to\frac{\pi}{2}}\left(\frac{\int_{x^3}^{(\pi/2)^3}\left(\sin\left(2t^{1/3}\right)+\cos\left(t^{1/3}\right)\right)dt}{\left(x-\frac{\pi}{2}\right)^2}\right)$$

is equal to

(A) $\frac{3\pi^2}{2}$

(B) $\frac{9\pi^2}{8}$

(C) $\frac{5\pi^2}{9}$

(D) $\frac{11\pi^2}{10}$

Step-by-step solution ▸ prepwiser.in/questions/zUJKQ8gMnP

Q46 JEE Main 2024 · 4 Apr · Shift 1

If

$$\lim_{x\to 1}\frac{(5x+1)^{1/3}-(x+5)^{1/3}}{(2x+3)^{1/2}-(x+4)^{1/2}}=\frac{\mathrm{m}\sqrt{5}}{\mathrm{n}(2\mathrm{n})^{2/3}}$$

, where $\gcd(\mathrm{m},\mathrm{n})=1$, then $8\mathrm{m}+12\mathrm{n}$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/a10QLivrcW

Q47 JEE Main 2024 · 4 Apr · Shift 2

Let $f(x)=\int_0^x\left(t+\sin\left(1-e^t\right)\right)dt, x\in\mathbb{R}$. Then, $\lim_{x\to 0}\frac{f(x)}{x^3}$ is equal to

(A) $\frac{1}{6}$ **(B)** $-\frac{1}{6}$

(C) $\frac{2}{3}$ **(D)** $-\frac{2}{3}$

Step-by-step solution ▸ prepwiser.in/questions/JVLXJXHTn9

Q48 JEE Main 2024 · 30 Jan · Shift 1

Let $f:\left[-\frac{\pi}{2},\frac{\pi}{2}\right]\to\mathbf{R}$ be a differentiable function such that $f(0)=\frac{1}{2}$. If the

$$\lim_{x\to 0}\frac{x\int_0^x f(\mathrm{t})\mathrm{dt}}{\mathrm{e}^{x^2}-1}=\alpha$$

, then $8\alpha^2$ is equal to :

(A) 4 **(B)** 2

(C) 1 **(D)** 16

Step-by-step solution ▸ prepwiser.in/questions/Id8KD0fTwC

Q49 JEE Main 2024 · 29 Jan · Shift 2

Let the slope of the line $45x+5y+3=0$ be $27r_1+\frac{9r_2}{2}$ for some $r_1,r_2\in\mathbb{R}$. Then

$$\lim_{x\to 3}\left(\int_3^x\frac{8t^2}{\frac{3r_2x}{2}-r_2x^2-r_1x^3-3x}dt\right)$$

is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Vm9qme5NHG

Q50 JEE Main 2024 · 29 Jan · Shift 1

$$\lim_{x\to\frac{\pi}{2}}\left(\frac{1}{\left(x-\frac{\pi}{2}\right)^2}\int_{x^3}^{\left(\frac{\pi}{2}\right)^3}\cos\left(t^{\frac{1}{3}}\right)dt\right)$$

is equal to

(A) $\frac{3\pi^2}{4}$ **(B)** $\frac{3\pi^2}{8}$

(C) $\frac{3\pi}{4}$ **(D)** $\frac{3\pi}{8}$

Step-by-step solution ▸ prepwiser.in/questions/-Iin3PO2pa

Q51 JEE Main 2024 · 27 Jan · Shift 2

$$\text{If } \lim_{x\to 0}\frac{3+\alpha\sin x+\beta\cos x+\log_e(1-x)}{3\tan^2 x}=\frac{1}{3}, \text{ then } 2\alpha-\beta \text{ is equal to :}$$

(A) 2 **(B)** 1

(C) 5 **(D)** 7

Step-by-step solution ▸ prepwiser.in/questions/YtJ2DQzee3

Q52 JEE Main 2023 · 30 Jan · Shift 1

$$\lim_{x\to 0}\frac{48}{x^4}\int_0^x \frac{t^3}{t^6+1}\mathrm{d}t$$

is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/4QOaiSSO8f

Q53 JEE Main 2022 · 26 Jun · Shift 1

$$\lim_{x\to\frac{1}{\sqrt{2}}}\frac{\sin(\cos^{-1}x)-x}{1-\tan(\cos^{-1}x)}$$

is equal to :

(A) $\sqrt{2}$ **(B)** $-\sqrt{2}$

(C) $\frac{1}{\sqrt{2}}$ **(D)** $-\frac{1}{\sqrt{2}}$

Step-by-step solution ▸ prepwiser.in/questions/U8AVdB6keq

Q54 JEE Main 2021 · 1 Sep · Shift 2

Let f : R $\to$ R be a continuous function. Then

$$\lim_{x\to\frac{\pi}{4}}\frac{\int_2^{\sec^2 x} f(x)\,dx}{x^2-\frac{\pi^2}{16}}$$

is equal to :

(A) f (2) **(B)** 2f (2)

(C) 2f $\left(\sqrt{2}\right)$ **(D)** 4f (2)

Step-by-step solution ▸ prepwiser.in/questions/BvpuWZhTT7

Q55 JEE Main 2021 · 1 Sep · Shift 2

Let $f(x)=x^6+2x^4+x^3+2x+3$, x $\in$ R. Then the natural number n for which $\lim_{x\to 1}\frac{x^n f(1)-f(x)}{x-1}=44$ is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/EltiDevUp7

Q56 JEE Main 2021 · 31 Aug · Shift 1

Let f be a non-negative function in [0, 1] and twice differentiable in (0, 1). If $\int_0^x \sqrt{1-(f'(t))^2}dt = \int_0^x f(t)dt$, $0 \le x \le 1$ and f(0) = 0, then $\lim\limits_{x\to 0} \frac{1}{x^2}\int_0^x f(t)dt$:

(A) equals 0

(B) equals 1

(C) does not exist

(D) equals $\frac{1}{2}$

Step-by-step solution ▸ prepwiser.in/questions/GG5D0Xu1xL

Q57 JEE Main 2021 · 16 Mar · Shift 1

If

$$\lim_{x\to 0} \frac{ae^x - b\cos x + ce^{-x}}{x\sin x} = 2$$

, then a + b + c is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/YvGjWbQu-f

Q58 JEE Main 2021 · 26 Feb · Shift 2

Let f(x) be a differentiable function at x = a with f'(a) = 2 and f(a) = 4.

Then $\lim\limits_{x\to a} \frac{xf(a)-af(x)}{x-a}$ equals :

(A) 4 − 2a

(B) 2a + 4

(C) a + 4

(D) 2a − 4

Step-by-step solution ▸ prepwiser.in/questions/qe3WOV89em

Standard Limits · 24 PYQs

Q59 JEE Main 2025 · 7 Apr · Shift 1

$\lim\limits_{x\to 0^+} \frac{\tan\left(5(x)^{\frac{1}{3}}\right)\log_e\left(1+3x^2\right)}{\left(\tan^{-1}3\sqrt{x}\right)^2\left(e^{5(x)^{\frac{4}{3}}}-1\right)}$ is equal to

(A) $\frac{5}{3}$

(B) 1

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

(D) $\frac{1}{15}$

Step-by-step solution ▸ prepwiser.in/questions/yoFY-qANKV

Q60 JEE Main 2025 · 4 Apr · Shift 2

Let f be a differentiable function on $\mathbf{R}$ such that $f(2) = 1, f'(2) = 4$. Let $\lim\limits_{x\to 0}(f(2+x))^{3/x} = e^{\alpha}$. Then the number of times the curve $y = 4x^3 - 4x^2 - 4(\alpha - 7)x - \alpha$ meets x-axis is :

(A) 3

(B) 1

(C) 2

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/jWDZiXJgUI

Q61 JEE Main 2025 · 4 Apr · Shift 1

If $\lim\limits_{x\to1^+}\frac{(x-1)(6+\lambda\cos(x-1))+\mu\sin(1-x)}{(x-1)^3}=-1$, where $\lambda,\mu\in\mathbb{R}$, then $\lambda+\mu$ is equal to

(A) 20 **(B)** 19

(C) 18 **(D)** 17

Step-by-step solution ▸ prepwiser.in/questions/DDlCno2XHH

Q62 JEE Main 2025 · 24 Jan · Shift 2

For some a, b, let $f(x)=\begin{vmatrix} a+\frac{\sin x}{x} & 1 & b \\ a & 1+\frac{\sin x}{x} & b \\ a & 1 & b+\frac{\sin x}{x}\end{vmatrix}, x\neq0, \lim\limits_{x\to0}f(x)=\lambda+\mu a+\nu b$. Then $(\lambda+\mu+v)^2$ is equal to :

(A) 25 **(B)** 16

(C) 9 **(D)** 36

Step-by-step solution ▸ prepwiser.in/questions/Rd8zIT39ND

Q63 JEE Main 2024 · 9 Apr · Shift 2

$\lim\limits_{x\to0}\frac{e-(1+2x)^{\frac{1}{2x}}}{x}$ is equal to

(A) $\frac{-2}{e}$ **(B)** $e-e^2$

(C) 0 **(D)** e

Step-by-step solution ▸ prepwiser.in/questions/8i13wcJ5Gt

Q64 JEE Main 2024 · 8 Apr · Shift 1

The value of

$$\lim_{x\to0}2\left(\frac{1-\cos x\sqrt{\cos 2x}\sqrt[3]{\cos 3x}\ldots\ldots\sqrt[10]{\cos 10x}}{x^2}\right)$$

is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/6VZMetsOas

Q65 JEE Main 2024 · 6 Apr · Shift 1

Let $f:(-\infty,\infty)-\{0\}\to\mathbb{R}$ be a differentiable function such that $f'(1)=\lim\limits_{a\to\infty}a^2f\left(\frac{1}{a}\right)$. Then

$$\lim_{a\to\infty}\frac{a(a+1)}{2}\tan^{-1}\left(\frac{1}{a}\right)+a^2-2\log_e a$$

is equal to

(A) $\frac{5}{2}+\frac{\pi}{8}$ **(B)** $\frac{3}{8}+\frac{\pi}{4}$

(C) $\frac{3}{4}+\frac{\pi}{8}$ **(D)** $\frac{3}{2}+\frac{\pi}{4}$

Step-by-step solution ▸ prepwiser.in/questions/ZHZFfIYfRQ

Q66 JEE Main 2024 · 5 Apr · Shift 2

Let $\mathrm{a} > 0$ be a root of the equation $2x^2 + x - 2 = 0$. If

$$\lim_{x \to \frac{1}{a}} \frac{16\left(1 - \cos\left(2 + x - 2x^2\right)\right)}{(1 - ax)^2} = \alpha + \beta\sqrt{17}$$

, where $\alpha, \beta \in Z$, then $\alpha + \beta$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/5AlM5qCpFS

Q67 JEE Main 2024 · 31 Jan · Shift 2

If

$$\lim_{x \to 0} \frac{ax^2 e^x - b\log_e(1 + x) + cxe^{-x}}{x^2 \sin x} = 1$$

, then $16\left(a^2 + b^2 + c^2\right)$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/1eVfSNte9R

Q68 JEE Main 2023 · 8 Apr · Shift 2

If $\alpha > \beta > 0$ are the roots of the equation $ax^2 + bx + 1 = 0$, and

$$\lim_{x \to \frac{1}{\alpha}} \left(\frac{1 - \cos\left(x^2 + bx + a\right)}{2(1 - \alpha x)^2}\right)^{\frac{1}{2}} = \frac{1}{k}\left(\frac{1}{\beta} - \frac{1}{\alpha}\right), \text{ then k is equal to}$$

:

(A) 2β

(B) β

(C) α

(D) 2α

Step-by-step solution ▸ prepwiser.in/questions/W9pmPDd32y

Q69 JEE Main 2023 · 31 Jan · Shift 2

$$\lim_{x \to \infty} \frac{\left(\sqrt{3x+1} + \sqrt{3x-1}\right)^6 + \left(\sqrt{3x+1} - \sqrt{3x-1}\right)^6}{\left(x + \sqrt{x^2-1}\right)^6 + \left(x - \sqrt{x^2-1}\right)^6} x^3$$

(A) is equal to 9

(B) is equal to $\frac{27}{2}$

(C) does not exist

(D) is equal to 27

Step-by-step solution ▸ prepwiser.in/questions/uBrYfHMCfZ

Q70 JEE Main 2022 · 27 Jul · Shift 2

If for $\mathrm{p} \neq \mathrm{q} \neq 0$, the function $f(x) = \frac{\sqrt[7]{\mathrm{p}(729+x)} - 3}{\sqrt[3]{729+\mathrm{q}x} - 9}$ is continuous at $x = 0$, then :

(A) $7pq\, f(0) - 1 = 0$

(B) $63q\, f(0) - \mathrm{p}^2 = 0$

(C) $21q\, f(0) - \mathrm{p}^2 = 0$

(D) $7pq\, f(0) - 9 = 0$

Step-by-step solution ▸ prepwiser.in/questions/_XApOO1C5F

Q71 JEE Main 2022 · 29 Jun · Shift 2

The value of

$$\lim_{x\to 1}\frac{(x^2-1)\sin^2(\pi x)}{x^4-2x^3+2x-1}$$

is equal to:

(A) $\frac{\pi^2}{6}$

(B) $\frac{\pi^2}{3}$

(C) $\frac{\pi^2}{2}$

(D) π^2

Step-by-step solution ▸ prepwiser.in/questions/COcGZ0ocXa

Q72 JEE Main 2022 · 25 Jun · Shift 2

$$\lim_{x\to\frac{\pi}{2}}\left(\tan^2 x\left((2\sin^2 x+3\sin x+4)^{\frac{1}{2}}-(\sin^2 x+6\sin x+2)^{\frac{1}{2}}\right)\right)$$

is equal to

(A) $\frac{1}{12}$

(B) $-$${1 \over {18}}$$

(C) $-$${1 \over {12}}$$

(D) $\frac{1}{6}$

Step-by-step solution ▸ prepwiser.in/questions/j1HvLZZEqn

Q73 JEE Main 2021 · 31 Aug · Shift 1

$$\lim_{x\to 0}\frac{\sin^2\left(\pi\cos^4 x\right)}{x^4}$$

is equal to :

(A) π^2

(B) $2\pi^2$

(C) $4\pi^2$

(D) 4π

Step-by-step solution ▸ prepwiser.in/questions/L414mAvSKD

Q74 JEE Main 2021 · 27 Aug · Shift 1

If α, β are the distinct roots of $x^2 + bx + c = 0$, then

$$\lim_{x\to\beta} \frac{e^{2(x^2+bx+c)} - 1 - 2(x^2+bx+c)}{(x-\beta)^2}$$

is equal to :

(A) $b^2 + 4c$

(B) $2(b^2 + 4c)$

(C) $2(b^2 - 4c)$

(D) $b^2 - 4c$

Step-by-step solution ▸ prepwiser.in/questions/6n-RoLAt2R

Q75 JEE Main 2021 · 25 Jul · Shift 2

The lowest integer which is greater

than $\left(1 + \frac{1}{10^{100}}\right)^{10^{100}}$ is _____.

(A) 3

(B) 4

(C) 2

(D) 1

Step-by-step solution ▸ prepwiser.in/questions/O9IGPPuSlQ

Q76 JEE Main 2021 · 18 Mar · Shift 1

If

$$\lim_{x\to 0} \frac{\sin^{-1}x - \tan^{-1}x}{3x^3}$$

is equal to L, then the value of (6L + 1) is

(A) $\frac{1}{6}$

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

(C) 6

(D) 2

Step-by-step solution ▸ prepwiser.in/questions/5XCKGyadBW

Q77 JEE Main 2021 · 17 Mar · Shift 1

The value of

$$\lim_{x\to 0^+} \frac{\cos^{-1}(x - [x]^2).\sin^{-1}(x - [x]^2)}{x - x^3}$$

, where [x] denotes the greatest integer $\leq$ x is :

(A) π

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/-5EgZ-H78C

Q78 JEE Main 2021 · 26 Feb · Shift 1

The value of

$$\lim_{h\to 0} 2\left\{\frac{\sqrt{3}\sin\left(\frac{\pi}{6}+h\right)-\cos\left(\frac{\pi}{6}+h\right)}{\sqrt{3}h\left(\sqrt{3}\cosh-\sinh\right)}\right\}$$

is :

(A) $\frac{4}{3}$

(B) $\frac{2}{3}$

(C) $\frac{3}{4}$

(D) $\frac{2}{\sqrt{3}}$

Step-by-step solution ▸ prepwiser.in/questions/4FBVTZOyo0

Q79 JEE Main 2021 · 25 Feb · Shift 1

$$\lim_{n\to\infty}\left(1+\frac{1+\frac{1}{2}+\ldots\ldots+\frac{1}{n}}{n^2}\right)^n$$

is equal to :

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

(B) 1

(C) 0

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

Step-by-step solution ▸ prepwiser.in/questions/4qaawkgBwg

Q80 JEE Main 2020 · 5 Sep · Shift 2

$$\lim_{x\to 0}\frac{x\left(e^{\left(\sqrt{1+x^2+x^4}-1\right)/x}-1\right)}{\sqrt{1+x^2+x^4}-1}$$

(A) is equal to 0.

(B) is equal to $\sqrt{e}$.

(C) is equal to 1.

(D) does not exist.

Step-by-step solution ▸ prepwiser.in/questions/zXF7XvKNJn

Q81 JEE Main 2020 · 2 Sep · Shift 2

$$\lim_{x\to 0}\left(\tan\left(\frac{\pi}{4}+x\right)\right)^{\frac{1}{x}}$$

is equal to :

(A) 2

(B) 1

(C) e

(D) e^2

Step-by-step solution ▸ prepwiser.in/questions/DYIJBsoYm1

Q82 JEE Main 2020 · 8 Jan · Shift 2

$$\lim_{x\to 0}\frac{\int_0^x t\sin(10t)\,dt}{x}$$

is equal to

(A) $-\frac{1}{5}$ **(B)** $-\frac{1}{10}$

(C) 0 **(D)** $\frac{1}{10}$

Step-by-step solution ▸ prepwiser.in/questions/tEfSCJjqGT

Concept of Limit · 15 PYQs

Q83 JEE Main 2025 · 29 Jan · Shift 1

Let [t] be the greatest integer less than or equal to t. Then the least value of p ∈ N for which $\lim_{x\to 0^+}\left(x\left(\left[\frac{1}{x}\right]+\left[\frac{2}{x}\right]+\ldots+\left[\frac{p}{x}\right]\right)\right)-x^2\left(\left[\frac{1}{x^2}\right]+\left[\frac{2^2}{x^2}\right]+\ldots+\left[\frac{9^2}{x^2}\right]\right)\geq 1$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/ikX9WQKcid

Q84 JEE Main 2025 · 28 Jan · Shift 2

Let $f(x)=\lim_{n\to\infty}\sum_{r=0}^{n}\left(\frac{\tan\left(x/2^{r+1}\right)+\tan^3\left(x/2^{r+1}\right)}{1-\tan^2\left(x/2^{r+1}\right)}\right)$ Then $\lim_{x\to 0}\frac{e^x-e^{f(x)}}{(x-f(x))}$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/4bxtInfJ-O

Q85 JEE Main 2024 · 5 Apr · Shift 1

If the function $f(x)=\frac{\sin 3x+\alpha\sin x-\beta\cos 3x}{x^3}$, $x\in\mathbf{R}$, is continuous at $x=0$, then $f(0)$ is equal to :

(A) 4 **(B)** -2

(C) -4 **(D)** 2

Step-by-step solution ▸ prepwiser.in/questions/IgNM1S27L1

Q86 JEE Main 2024 · 1 Feb · Shift 2

Let $f(x)=\begin{cases}x-1, & x \text{ is even},\\ 2x, & x \text{ is odd},\end{cases}$ $x\in\mathbf{N}$.

If for some $\mathrm{a}\in\mathbf{N}$, $f(f(f(\mathrm{a})))=21$, then $\lim_{x\to \mathrm{a}^-}\left\{\frac{|x|^3}{\mathrm{a}}-\left[\frac{x}{\mathrm{a}}\right]\right\}$, where $[t]$ denotes the greatest integer less than or equal to t, is equal to :

(A) 169 **(B)** 121

(C) 225 **(D)** 144

Step-by-step solution ▸ prepwiser.in/questions/GZFR_3SRcv

Q87 JEE Main 2023 · 6 Apr · Shift 2

$$\lim_{n\to\infty}\left\{\left(2^{\frac{1}{2}}-2^{\frac{1}{3}}\right)\left(2^{\frac{1}{2}}-2^{\frac{1}{5}}\right)\ldots..\left(2^{\frac{1}{2}}-2^{\frac{1}{2n+1}}\right)\right\}$$

is equal to :

(A) $\sqrt{2}$

(B) 1

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

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/oWeBBVj5HQ

Q88 JEE Main 2023 · 30 Jan · Shift 2

Let f, g and h be the real valued functions defined on $\mathbb{R}$ as

$$f(x)=\begin{cases}\frac{x}{|x|}, & x\neq 0\\ 1, & x=0\end{cases}$$

$$g(x)=\begin{cases}\frac{\sin(x+1)}{(x+1)}, & x\neq -1\\ 1, & x=-1\end{cases}$$

and $h(x)=2[x]-f(x)$, where $[x]$ is the greatest integer $\leq x$. Then the

value of $\lim\limits_{x\to 1} g(h(x-1))$ is :

(A) 1

(B) -1

(C) $\sin(1)$

(D) 0

Step-by-step solution ▸ prepwiser.in/questions/jz4af7wGQ3

Q89 JEE Main 2023 · 25 Jan · Shift 1

The value of

$$\lim_{n\to\infty}\frac{1+2-3+4+5-6+\ldots..+(3n-2)+(3n-1)-3n}{\sqrt{2n^4+4n+3}-\sqrt{n^4+5n+4}}$$

is :

(A) $\frac{3}{2\sqrt{2}}$

(B) $\frac{3}{2}(\sqrt{2}+1)$

(C) $3(\sqrt{2}+1)$

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

Step-by-step solution ▸ prepwiser.in/questions/Sq8wLRV6T8

Q90 JEE Main 2023 · 24 Jan · Shift 2

The set of all values of a for which $\lim\limits_{x\to a}([x-5]-[2x+2])=0$, where $[\alpha]$ denotes the greatest integer less than or equal to α is equal to

(A) $[-7.5,-6.5]$

(B) $(-7.5,-6.5]$

(C) $[-7.5,-6.5)$

(D) $(-7.5,-6.5)$

Step-by-step solution ▸ prepwiser.in/questions/TI9mYWSzst

Q91 JEE Main 2022 · 28 Jun · Shift 2

If

$$\lim_{x\to 1}\frac{\sin(3x^2-4x+1)-x^2+1}{2x^3-7x^2+ax+b}=-2$$

, then the value of (a − b) is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/iiDl-dlFXm

Q92 JEE Main 2022 · 27 Jun · Shift 2

Let [t] denote the greatest integer ≤ t and {t} denote the fractional part of t. The integral value of α for which the left hand limit of the function

$f(x)=[1+x]+\frac{\alpha^{2[x]+\{x\}}+[x]-1}{2[x]+\{x\}}$ at x = 0 is equal to $\alpha-\frac{4}{3}$, is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/IPKKToCFnG

Q93 JEE Main 2022 · 27 Jun · Shift 1

Let a be an integer such that $\lim_{x\to 7}\frac{18-[1-x]}{[x-3a]}$ exists, where [t] is greatest integer ≤ t. Then a is equal to :

(A) −6 **(B)** −2

(C) 2 **(D)** 6

Step-by-step solution ▸ prepwiser.in/questions/AWRYAm52tA

Q94 JEE Main 2021 · 27 Jul · Shift 1

Let f : R → R be a function such that f(2) = 4 and f'(2) = 1. Then, the value of $\lim_{x\to 2}\frac{x^2f(2)-4f(x)}{x-2}$ is equal to :

(A) 4 **(B)** 8

(C) 16 **(D)** 12

Step-by-step solution ▸ prepwiser.in/questions/aoO1YPdu7e

Q95 JEE Main 2021 · 25 Feb · Shift 2

$$\lim_{n\to\infty}\left[\frac{1}{n}+\frac{n}{(n+1)^2}+\frac{n}{(n+2)^2}+\ldots\ldots+\frac{n}{(2n+1)^2}\right]$$

is equal to :

(A) $\frac{1}{2}$ **(B)** $\frac{1}{3}$

(C) 1 **(D)** $\frac{1}{4}$

Step-by-step solution ▸ prepwiser.in/questions/RCpwufqIqo

Q96 JEE Main 2020 · 3 Sep · Shift 1

Let [t] denote the greatest integer $\leq$ t. If for some $\lambda \in$ R - {1, 0},

$$\lim_{x \to 0} \left| \frac{1 - x + |x|}{\lambda - x + [x]} \right|$$

= L, then L is equal to :

(A) 1 **(B)** 2

(C) 0 **(D)** $\frac{1}{2}$

Step-by-step solution ▸ prepwiser.in/questions/oNhGChhXGc

Q97 JEE Main 2020 · 2 Sep · Shift 1

If

$$\lim_{x \to 1} \frac{x + x^2 + x^3 + ... + x^n - n}{x - 1}$$

= 820,
(n $\in$ N) then the value of n is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/714Htjq3-G

Sandwich Theorem · 2 PYQs

Q98 JEE Main 2024 · 31 Jan · Shift 2

Let $f :\to \mathbb{R} \to (0, \infty)$ be strictly increasing function such that $\lim_{x \to \infty} \frac{f(7x)}{f(x)} = 1$. Then, the value of $\lim_{x \to \infty} \left[\frac{f(5x)}{f(x)} - 1 \right]$ is equal to

(A) 0 **(B)** 4

(C) 1 **(D)** 7/5

Step-by-step solution ▸ prepwiser.in/questions/-BRZpb2Kt_

Q99 JEE Main 2021 · 17 Mar · Shift 2

The value of $\lim_{n \to \infty} \frac{[r]+[2r]+...+[nr]}{n^2}$, where r is a non-zero real number and [r] denotes the greatest integer less than or equal to r, is equal to :

(A) r **(B)** $\frac{r}{2}$

(C) 0 **(D)** 2r

Step-by-step solution ▸ prepwiser.in/questions/qohWxlT-UI

Answer key — Limits

Numbers match the question numbers above. For full working, open the solution link under each question.

1	**C**	2	**98**	3	**32**	4	**D**	5	**D**	6	**64**	7	**D**	8	**B**
9	**C**	10	**6**	11	**D**	12	**18**	13	**D**	14	**C**	15	**B**	16	**B**
17	**B**	18	**C**	19	**B**	20	**C**	21	**1**	22	**C**	23	**C**	24	**A**
25	**14**	26	**C**	27	**A**	28	**D**	29	**A**	30	**B**	31	**A**	32	**C**
33	**A**	34	**3**	35	**3**	36	**B**	37	**5**	38	**C**	39	**A**	40	**C**
41	**8**	42	**B**	43	**C**	44	**36**	45	**B**	46	**100**	47	**B**	48	**B**
49	**12**	50	**B**	51	**C**	52	**12**	53	**D**	54	**B**	55	**7**	56	**D**
57	**4**	58	**A**	59	**C**	60	**C**	61	**C**	62	**B**	63	**D**	64	**55**
65	**A**	66	**170**	67	**81**	68	**D**	69	**D**	70	**B**	71	**D**	72	**A**
73	**C**	74	**C**	75	**A**	76	**D**	77	**C**	78	**A**	79	**B**	80	**C**
81	**D**	82	**C**	83	**24**	84	**1**	85	**C**	86	**D**	87	**D**	88	**A**
89	**B**	90	**D**	91	**11**	92	**3**	93	**A**	94	**D**	95	**A**	96	**B**
97	**40**	98	**A**	99	**B**										