



MATHS

BOOKS - NCERT MATHS (HINGLISH)

LIMITS AND DERIVATIVES

Short Answer Types Questions

1. Evaluate $\lim_{x \rightarrow 3} \frac{(x^2 - 9)}{(x - 3)}$

A. 6

B. 3

C. 9

D. none of the above

Answer: A



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2. Evaluate $\lim_{x \rightarrow 1/2} \frac{(4x^2 - 1)}{(2x - 1)}$.

A. 2

B. 3

C. 0

D. 1

Answer: A



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3. Evaluate $\lim_{h \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$

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

B. $\frac{1}{\sqrt{x}}$

C. $\frac{1}{2x}$

D. none of these

Answer: A



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4. Evaluate $\lim_{x \rightarrow 0} \frac{(x + 2)^{1/3} - 2^{1/3}}{x}$

A. $\frac{1}{3}(2)^{2/3}$

B. $\frac{1}{3 \cdot (2)^{2/3}}$

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

D. none of the above

Answer: B



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5. Evaluate $\lim_{x \rightarrow 0} \frac{(1+x)^6 - 1}{(1+x)^2 - 1}$.

A. 1

B. 2

C. 3

D. 4

Answer: C



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6. Evaluate $\lim_{x \rightarrow a} \frac{(2 + x)^{5/2} - (a + 2)^{5/2}}{x - a}$



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7. Evaluate $\lim_{x \rightarrow 1} \frac{x^4 - \sqrt{4}}{\sqrt{x} - 1}$.



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8. Evaluate $\lim_{x \rightarrow 20} \frac{x^2 - 4}{(\sqrt{3x} - 2) - (\sqrt{x} + 2)}$

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9. Evaluate, $\lim_{x \rightarrow \sqrt{2}} \frac{x^4 - 4}{x^7(2) + 3\sqrt{2x} - 8}$.

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10. Evaluate $\lim_{x \rightarrow 0} \left(\frac{\sqrt{1+x^3} - \sqrt{1-x^3}}{x^2} \right)$

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11. Evaluate $\lim_{x \rightarrow 0} \frac{\sqrt{1+x^3} - \sqrt{1-x^3}}{x^2}$



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12. Evaluate $\lim_{x \rightarrow -3} \frac{x^3 + 27}{x^5 + 243}$



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13. Evaluate , $\lim_{x \rightarrow 1/2} \left(\frac{8x - 3}{2x - 1} - \frac{4x^2 + 1}{4x^2 - 1} \right)$

A. 2

B. $\frac{1}{2}$

C. 0

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

Answer: D



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14. Find the value of n , if $\lim_{x \rightarrow 2} \frac{x^n - 2^n}{x - 2} = 80$,

$n \in \mathbb{N}$.

A. 3

B. 5

C. 4

D. 6

Answer: B



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15. Given, $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 7x}$.

A. $\frac{3}{5}$

B. $\frac{3}{7}$

C. $\frac{1}{5}$

D. $\frac{7}{3}$

Answer: B



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16. Evaluate $\lim_{x \rightarrow 0} \frac{\sin^2 2x}{\sin^2 4x}$

A. $\frac{1}{2}$

B. 1

C. $\frac{1}{4}$

D. 2

Answer: C



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17. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x^2}$

A. 2

B. 1

C. 4

D. 3

Answer: A



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18. Evaluate $\lim_{x \rightarrow 0} \frac{2 \sin x - \sin 2x}{x^3}$

A. 0

B. 1

C. 2

D. 3

Answer: B



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19. Evaluate, $\lim_{x \rightarrow 0} \frac{1 - \cos mx}{1 - \cos nx}$



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20. Evaluate $\lim_{x \rightarrow \left(\frac{\pi}{3}\right)} \frac{\sqrt{1 - \cos 6x}}{\sqrt{2}\left(\frac{\pi}{3} - x\right)}$



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21. Evaluate, $\lim_{x \rightarrow (\pi/4)} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$

A. $\sqrt{2}$

B. 2

C. 0

D. 1

Answer: A



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22. Evaluate, $\lim_{x \rightarrow (\pi/6)} \frac{\sqrt{3} \sin x - \cos x}{\pi - \frac{\pi}{6}}$



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23. Evaluate, $\lim_{x \rightarrow 0} \frac{\sin 2x + 3x}{2x + \tan 3x}$.



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24. Evaluate $\lim_{x \rightarrow a} \frac{\sin x - \sin a}{\sqrt{x} - \sqrt{a}}$



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25. Evaluate, $\lim_{x \rightarrow (\pi/6)} \frac{\cot^2 x - 3}{\operatorname{cosec} x - 2}$

A. 2

B. 3

C. 4

D. 5

Answer: C



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26. Evaluate, $\lim_{x \rightarrow 0} \frac{\sqrt{2} - \sqrt{1 + \cos x}}{\sin^2 x}$



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27. Evaluate, $\lim_{x \rightarrow 0} \frac{\sin x - 2 \sin 3x + \sin 5x}{x}$

A. 0

B. 1

C. 2

D. 3

Answer: A



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28. Evaluate, $\lim_{x \rightarrow 1} \frac{x^4 - 1}{x - 1} = \lim_{x \rightarrow k} \frac{x^3 - k^3}{x^2 - k^2}$,

then find the value of k.

A. $\frac{5}{3}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{8}{3}$

Answer: D



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29. Differentiate function with respect to

$$x, f(x) = \frac{x^4 + x^3 + x^2 + 1}{x}$$



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30. Differentiate with respect to $x, \left(x + \frac{1}{x}\right)^3$



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31. $(3x + 5)(1 + \tan x)$



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32. $(\sec x - 1)(\sec x + 1)$



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33. Differentiate with respect to x to the given

function $\frac{3x + 4}{5x^2 - 7x + 9}$





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34. Differentiate with respect to x , $\frac{x^5 - \cos x}{\sin x}$



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35. differentiate with respect to x to the given

function $\frac{x^2 \frac{\cos \pi}{4}}{\sin x}$



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36. Differentiate w.r.t to x ,

$$(ax^2 + \cot x)(p + q \cos x)$$



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37. Find derivative of the following functions

(it is to be understood that a, b, c, d, p, q, r and

s are fixed non-zero constants and m and n are

integers): $\frac{a + b \sin x}{c + d \cos x}$



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38. Differentiate w.r.t to 'x', $(\sin x + \cos x)^2$



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39. Differentiation of $(2x - 7)^2(3x + 5)^3$



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40. Differentiate w.r.t to 'x' to the following function. $x^2 \sin x + \cos 2x$



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41. $\sin^3 x \cos^3 x$



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42. Differentiate the following function with

respect of x : $\frac{1}{ax^2 + bx^2 + c}$



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Long Answer Type Questions

1. Differentiate w.r.t to 'x' using first principal,

$$\cos(x^2 + 1)$$



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2. Differentiate the following function with

respect of x : $(ax + b) / (cx + d)$



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3. Using First principal differentiate w.r.t 'x',

$$x^{2/3}$$



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4. Differentiate function w.r.t 'x', using first principal $x \cos x$



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5.
$$\lim_{y \rightarrow 0} \frac{(x + y)\sec(x + y) - x \sec x}{y}$$



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6.

$$\lim_{x \rightarrow 0} \frac{\sin(\alpha + \beta)x + \sin(\alpha - \beta)x + \sin 2\alpha x}{\cos 2\beta x - \cos 2\alpha x} \cdot x$$



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7.
$$\lim_{x \rightarrow (\pi/4)} \frac{\tan^3 x - \tan x}{\cos\left(x + \frac{\pi}{4}\right)}$$



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8.
$$\lim_{x \rightarrow (\pi)} \frac{1 - \sin\left(\frac{x}{2}\right)}{\frac{\cos x}{2} \left(\frac{\cos x}{4} - \frac{\sin x}{4} \right)}$$



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9. Show that, $\lim_{x \rightarrow (\pi/4)} \frac{|x - 4|}{x - 4}$, does not exist,



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10. Let $f(x) = \frac{k \cos x}{\pi - 2x}$ if $x \neq \frac{\pi}{2}$ and $f(x) = \frac{\pi}{2}$ if $x = \frac{\pi}{2}$ then find the value of k if

$$\lim_{x \rightarrow \frac{\pi}{2}} f(x) = f\left(\frac{\pi}{2}\right)$$



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11. if $f(x) = \begin{cases} x + 2, & x \leq 1 \\ cx^2, & x > -1 \end{cases}$, then find c when $\lim_{(x \rightarrow -1)} f(x)$ exists.



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Objective Type Questions

1. $\lim_{x \rightarrow (\pi)} \frac{\sin x}{x - \pi}$ is equal to

A. 1

B. 2

C. -1

D. -2

Answer: C



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2. $\lim_{x \rightarrow 0} \frac{x^2 \cos x}{1 - \cos x}$ is equal to

A. 2

B. $\frac{3}{2}$

C. $-\frac{3}{2}$

D. 1

Answer: A



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3. $\lim_{x \rightarrow 0} \frac{(1+x)^n - 1}{x}$ is equal to

A. n

B. 1

C. $-n$

D. 0

Answer: A



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4. $\lim_{x \rightarrow 1} \frac{x^m - 1}{x^n - 1}$ is equal to

A. 1

B. $\frac{m}{n}$

C. $-\frac{m}{n}$

D. $\frac{m^2}{n^2}$

Answer: B



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5. $\lim_{\theta \rightarrow 0} \frac{1 - \cos 4\theta}{1 - \cos 6\theta}$ is equal to

A. $\frac{4}{9}$

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. -1

Answer: a



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6. $\lim_{x \rightarrow 0} \frac{\operatorname{cosec} x - \cot x}{x}$ is equal to

A. $\frac{1}{2}$

B. 1

C. $\frac{1}{2}$

D. 1

Answer: c



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7. $\lim_{x \rightarrow 0} \frac{\sin x}{\sqrt{x+1} - \sqrt{1-x}}$ is equal to

A. 2

B. 0

C. 1

D. -1

Answer: C



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8. $\lim_{x \rightarrow (\pi/4)} \frac{\sec^2 x - 2}{\tan x - 1}$ is

A. 3

B. 1

C. 0

D. 2

Answer: D



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9. $\lim_{x \rightarrow 1} \frac{(2x - 3)(\sqrt{x} - 1)}{2x^2 + x - 3}$

A. $\frac{1}{10}$

B. $-\frac{1}{10}$

C. 1

D. None of these

Answer: B



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10. If $f(x) = \left\{ \frac{\sin[x]}{x}, [x] \neq 0; 0, [x] = 0 \right\}$,

Where $[.]$ denotes the greatest integer

function, then $\lim_{x \rightarrow 0} f(x)$ is equal to

A. 1

B. 0

C. -1

D. Does not exist

Answer: d



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11. $\lim_{x \rightarrow 0} \frac{|\sin x|}{x}$ is equal to

A. 1

B. -1

C. Does not exist

D. None of these

Answer: C



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12. If $f(x) = \begin{cases} x^2 - 1, & 0 < x < 2 \\ 2x + 3, & 2 \leq x < 3 \end{cases}$ then

the quadratic

equation whose roots are $\lim_{x \rightarrow 2^+} f(x)$ and

$\lim_{x \rightarrow 2^-} f(x)$ is

A. $x^2 - 6x + 9 = 0$

B. $x^2 - 7x + 8 = 0$

C. $x^2 - 14x + 49 = 0$

D. $x^2 - 10x + 21 = 0$

Answer: d



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13. $\lim_{x \rightarrow 0} \frac{\tan 2x - x}{3x - \sin x}$ is equal to

A. 2

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. $\frac{1}{4}$

Answer: B



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14. if $f(x) = x - [x], \in R$, then $f' \left(\frac{1}{2} \right)$ is equal to

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

B. 1

C. 0

D. -1

Answer: b



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15. if $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then $\frac{dy}{dx}$ at $x = 1$ is equal to

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. 0

Answer: D



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16. If $f(x) = \frac{x - 4}{2\sqrt{x}}$, then $f'(1)$ is equal to

A. $\frac{5}{4}$

B. $\frac{4}{5}$

C. 1

D. 0

Answer: a



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17. if $y = \frac{1 + \frac{1}{x^2}}{1 - \frac{1}{(x)^2}}$, then $\frac{dy}{dx}$ is equal to

A. $\frac{-4x}{(x^2 - 1)^2}$

B. $\frac{-4x}{x^2 - 1}$

C. $\frac{1 - x^2}{4x}$

D. $\frac{4x}{x^2 - 1}$

Answer: A



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18. if $y = \frac{\sin x + \cos x}{\sin x - \cos x}$, then $\frac{dy}{dx}$ at $x=0$ is equal to

A. -2

B. 0

C. $\frac{1}{2}$

D. Does not exist

Answer: a



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19. if $y = \frac{\sin(x + 9)}{\cos x}$, then $\frac{dy}{dx}$ at $x = 0$ is equal to

A. $\cos 9$

B. $\sin 9$

C. 0

D. 1

Answer: a



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20. If $f(x) = 1 + x + \frac{x^2}{2} + \dots + \frac{x^{100}}{100}$, then

$f'(1)$ is equal to

A. $\frac{1}{100}$

B. 100

C. 0

D. Does not exist

Answer: B



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21. Find the derivative of $\frac{x^n - a^n}{x - a}$ for some constant a .

A. 1

B. 0

C. $\frac{1}{2}$

D. Does not exist

Answer: d



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22. If $f(x) = x^{100} + x^{99} + \dots + x + 1$, then $f'(1)$ is equal to

A. 5050

B. 5049

C. 5051

D. 50051

Answer: A



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23.

If

$$f(x) = 1 - x^2 - x^3 + \dots - x^{99} + x^{100}$$

then $f'(1)$ equals

A. 150

B. - 50

C. - 150

D. 50

Answer: D



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1. If $f(x) = \frac{\tan x}{x - \pi}$, then $\lim_{x \rightarrow (\pi)} f(x) =$

.....

A. 1

B. 0

C. -1

D. none of the above

Answer: A



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2. $\lim_{x \rightarrow 0} \left(\sin mx \frac{\cot x}{\sqrt{3}} \right) = 2$, then $m = \dots\dots\dots$



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3. If $y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots\dots$, then $\frac{dy}{dx}$



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4. Prove that $\lim_{x \rightarrow 3^+} \frac{x}{[x]} \neq \lim_{x \rightarrow 3^-} \frac{x}{[x]}$ (

where $[]$ is greatest integer function)



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