



MATHS

BOOKS - OMEGA PUBLICATION

LIMITS AND DERIVATIVES

Question

1. Evaluate

$$\lim_{x \rightarrow 3} (x + 3)$$



Watch Video Solution

2. Evaluate $\lim_{r \rightarrow 1} \pi r^2$

 [Watch Video Solution](#)

3. Evaluate $\lim_{x \rightarrow 2} \frac{3x^2 - x - 10}{x^2 - 4}$

 [Watch Video Solution](#)

4. ਹੇਠ ਲਿਖੀ ਸੀਮਾਵਾਂ ਦਾ ਮੁੱਲ ਪ੍ਰਾਪਤ ਕਰੋ:-

$$\lim_{x \rightarrow 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$$



Watch Video Solution

5. Evaluate $\lim_{x \rightarrow -2} \frac{\frac{1}{x} + \frac{1}{2}}{x + 2}$



Watch Video Solution

6. ਮੁੱਲ ਪਤਾ ਕਰੋ:- $\lim_{x \rightarrow 1} \frac{x^{15} - 1}{x^{10} - 1}$



Watch Video Solution

7. $\lim_{x \rightarrow 0} \frac{(x + 1)^5 - 1}{x}$ is :



Watch Video Solution

8. ਮੁੱਲ ਪਤਾ ਕਰੋ:- $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$



Watch Video Solution

9. If x is measured in radians, then prove that

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



Watch Video Solution

10. If x is measured in radians, then prove that

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



Watch Video Solution

11. Evaluate $\lim_{x \rightarrow 0} \frac{\sin ax}{bx}$



Watch Video Solution

12. Evaluate

$$\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx}, a, b \neq 0$$



Watch Video Solution

13. ਹੇਠ ਲਿਖੀ ਸੀਮਾਵਾਂ ਦਾ ਮੁੱਲ ਪ੍ਰਾਪਤ ਕਰੋ:-

$$\lim_{x \rightarrow \pi} \frac{\sin(\pi - x)}{\pi(\pi - x)}$$



Watch Video Solution

14. ਹੇਠ ਲਿਖੀ ਸੀਮਾਵਾਂ ਦਾ ਮੁੱਲ ਪ੍ਰਾਪਤ ਕਰੋ:-

$$\lim_{x \rightarrow 0} (\cos ecx - \cot x)$$



Watch Video Solution

15. ਹੇਠ ਲਿਖੀ ਸੀਮਾਵਾਂ ਦਾ ਮੁੱਲ ਪ੍ਰਾਪਤ ਕਰੋ:-

$$\lim_{x \rightarrow \frac{\pi}{2}} \frac{\tan 2x}{x - \frac{\pi}{2}}$$



Watch Video Solution

16. Evaluate $\lim_{x \rightarrow 0} \frac{\sin ax + bx}{ax + \sin bx}$



Watch Video Solution

17. $\lim_{x \rightarrow 0} f(x)$ ਅਤੇ $\lim_{x \rightarrow 1} f(x)$ ਪਤਾ ਕਰੋ ਜਿੱਥੇ

$$f(x) = \begin{cases} 2x + 3 & x \leq 0 \\ 3(x + 1) & x > 0 \end{cases} \text{ ਹੈ।}$$



Watch Video Solution

18. $\lim_{x \rightarrow 1} f(x)$ ਪਤਾ ਕਰੋ ਜਿੱਥੇ

$$f(x) = \begin{cases} x^2 - 1 & x \leq 1 \\ -x^2 - 1 & x > 1 \end{cases} \text{ ਹੈ।}$$



Watch Video Solution

19. Find $\lim_{x \rightarrow 0} f(x)$ where $f(x) = \begin{cases} \frac{x}{|x|}, & x \neq 0 \\ 0, & x = 0 \end{cases}$



[View Text Solution](#)

20. Suppose $f(x) = \begin{cases} a + bx & x < 1 \\ 4 & x = 1 \\ b - ax & x > 1 \end{cases}$ and if $\lim_{x \rightarrow 1} f(x) = f(1)$, what are possible values

of a and b?



[Watch Video Solution](#)

21. If the function $f(x)$ satisfies

$$\lim_{x \rightarrow 1} \frac{f(x) - 2}{x^2 - 1} = \pi \text{ evaluate } \lim_{x \rightarrow 1} f(x)$$



Watch Video Solution

22. If $f(x) = \begin{cases} mx^2 + n & x < 0 \\ nx + m & 0 \leq x \leq 1 \\ nx^3 + m & x > 1 \end{cases}$ For what

integers m and n does both $\lim_{x \rightarrow 0} f(x)$ and

$$\lim_{x \rightarrow 1} f(x) \text{ exist}$$



Watch Video Solution

$$23. \lim_{x \rightarrow 0} \left(\frac{e^{4x-1}}{x} \right)$$



Watch Video Solution

$$24. \lim_{x \rightarrow 0} \frac{e^{2+x} - e^2}{x}$$



Watch Video Solution

$$25. \lim_{x \rightarrow 0} \frac{\log_e(1+2x)}{x}$$



Watch Video Solution

26. Find the derivative of $x^2 - 2$ at $x = 10$.



[Watch Video Solution](#)

27. Find the derivative of the following functions from first principle.

$$x^3 - 27$$



[Watch Video Solution](#)

28. Find the derivative of the following functions from first principle.

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



Watch Video Solution

29. Find the derivative of the following function from first principle $\sin(x + 1)$.



Watch Video Solution

30. Find the derivative of $(\sin x + \cos x)$ from the first principle.



Watch Video Solution

31. For the function

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

Prove that $f'(1) = 100 f'(0)$.



Watch Video Solution

32. For some constants a and b , find the derivative of

$$(x-a)(x-b)$$



[Watch Video Solution](#)

33. For some constants a and b , find the derivative of

$$(ax^2 + b)^2$$



[Watch Video Solution](#)

34. For some constants a and b , find the derivative of

$$\frac{x - a}{x - b}$$



Watch Video Solution

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



Watch Video Solution

36. Find the derivative of

$$x^3(5 + 3x)$$



Watch Video Solution

37. Find the derivative of

$$x^5(3 - 6x^9)$$



Watch Video Solution

38. Find the derivative of the following functions from first principle,

$\sin x$.



Watch Video Solution

39. Find the derivative of the following functions from first principle,

$\cos x$



Watch Video Solution

40. Find the derivative of the following functions

$\sin x \cos x$



[Watch Video Solution](#)

41. Find the derivative of the following functions

$\sec x$



[Watch Video Solution](#)

42. Find the derivative of the following functions

$$\frac{x + \cos x}{\tan x}$$



Watch Video Solution

43. Find the derivative of the following functions

$$2 \tan x - 7 \sec x$$



Watch Video Solution

Important Questions From Miscellaneous Exercise

1. Find the derivative of the following functions from first principle

$$(-x)^{-1}$$



[Watch Video Solution](#)

2. Find the derivative of the following functions from first principle

$$\cos\left(x - \frac{\pi}{8}\right)$$



Watch Video Solution

3. Find the derivative of the following functions:

$$\frac{ax + b}{px^2 + qx + r}$$



Watch Video Solution

4. Find the derivative of the following functions:

$$\frac{a}{x^4} - \frac{b}{x^2} + \cos x$$





[Watch Video Solution](#)

5. Find the derivative of the following functions:

$$(ax + b)^n (cx + d)^m$$



[Watch Video Solution](#)

6. Find the derivative of the following functions:

$$\operatorname{cosec} x \cot x$$



[Watch Video Solution](#)

7. Find the derivative of the following

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



[Watch Video Solution](#)

8. Find the derivative of $\frac{x}{\sin^n x}$



[Watch Video Solution](#)

9. Find the derivative of 'f(x)' from the first principle where f(x) is given by $f(x) = \frac{2x + 3}{x - 2}$



Watch Video Solution

Multiple Choice Question

1. $\lim_{x \rightarrow \infty} \frac{(2x - 3)(3x - 4)}{(4x - 5)(5x - 6)}$

A. 0

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

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

D. $\frac{3}{10}$

Answer: D



Watch Video Solution

2. $\lim_{n \rightarrow \infty} \frac{1^2 + 2^2 + \dots + n^2}{n^3}$

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

B. $\frac{1}{6}$

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

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

Answer: D



Watch Video Solution

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

A. $2\sqrt{x}$

B. \sqrt{x}

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

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

Answer: D



Watch Video Solution

4. The value of $\lim_{x \rightarrow 0} \frac{|x|}{x}$ is

A. 1

B. -1

C. 0

D. does not exist.

Answer: D



Watch Video Solution

5. $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 - 1}}{2x + 1}$ is equal to

A. 1

B. 0

C. -1

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

Answer: D



Watch Video Solution

6. If $\lim_{x \rightarrow 0} \frac{\sin px}{\tan 3x} = 4$, then the value of p is

A. 6

B. 9

C. 12

D. 4

Answer: C



Watch Video Solution

7. The derivative of an odd function is always

- A. an odd function
- B. an even function
- C. does not exist
- D. none of these

Answer: B



Watch Video Solution

8. The rate of change of the volume of a sphere w.r.t. its surface area, when the radius is 2cm, is

A. 1

B. 2

C. 3

D. 4

Answer: A



Watch Video Solution

9. If $f(x) = x^2$, then $f'(2)$ is

A. 2

B. 4

C. 3

D. 5

Answer: B



Watch Video Solution

10. The derivative of $f(x) = |x|$ at $x=0$ is

A. 1

B. 0

C. 0

D. does not exist.

Answer: D



Watch Video Solution

11. If $f(x)=2x-5$, then $f(1)$ is

A. 5

B. -3

C. -5

D. 3

Answer: B



Watch Video Solution

12. Derivative of $x^6 + 6^x$ w.r.t. 'x' is

A. $12x$

B. $x + 4$

C. $6x^5 + 6^x \log 6$

D. $6x^5 + x6^{x-1}$

Answer: C



Watch Video Solution

13. The derivative of $\sin x \cos x$ w.r.t. x is

A. $\sin 2x$

B. $\cos 2x$

C. $2 \sin 2x$

D. $2 \cos 2x$

Answer: B



Watch Video Solution

14. If $x = a(\theta + \sin \theta)$, $y = a(1 - \cos \theta)$, then

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

A. $\tan \theta$

B. $\cos \theta$

C. $\frac{\tan(\theta)}{2}$

D. $\frac{\cot(\theta)}{2}$

Answer: C



Watch Video Solution

15. $\left[\frac{d}{dx} (\sin^{-1} x + \cos^{-1} x) \right]$

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

B. 0

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

D. none of these.

Answer: B



Watch Video Solution

16.

If

$$y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \dots \infty}}}$$

where $\sin x > 0$, then find $\frac{dy}{dx}$.

A. 1

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

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

D. $\frac{1}{2y - 1}$

Answer: D



Watch Video Solution

17. $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} =$

A. θ

B. ∞

C. 1

D. 0

Answer: C



Watch Video Solution

18. $\lim_{\theta \rightarrow 0} \frac{\sin 5\theta}{\theta}$ is

A. 5

B. 0

C. 1

D. none of these

Answer: A



Watch Video Solution

19. $\lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta}$

A. θ

B. ∞

C. 1

D. 0

Answer: C



Watch Video Solution

20. For $a > 0$ $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} =$

A. ∞

B. na^{n-1}

C. 1

D. $(n - 1)a^n$

Answer: B



Watch Video Solution

21. $\frac{d}{dx}(aa^x) = ? (a > 0, a \neq 1)$

A. $a \log a$

B. 0

C. $a(a)^x \log a$

D. none of these

Answer: B



Watch Video Solution

22. $\frac{d}{dx}(\sec x) =$

A. $\sec^2 x$

B. $\tan x$

C. $\sec x \tan x$

D. $-\sec x \tan x$

Answer: C



Watch Video Solution

23. $\frac{d}{dx}(2)^x = ?$

A. $(2)^x$

B. 1

C. $(2)^x \log 2$

D. does not exist.

Answer: A



Watch Video Solution

24. $\frac{d}{dx}(\log_a x) = ?$ (f or $a > 0, a \neq 1$)

A. $\frac{1}{x} \log_a^e$

B. 0

C. $\frac{1}{x} \log_e^a$

D. 1

Answer: A



Watch Video Solution

25. $\frac{d}{dx}|x| = ?$ (f or $x \neq 0$)

A. x

B. 1

C. $\frac{|x|}{x}$

D. not defined.

Answer: C



Watch Video Solution

26. $\frac{d}{dx} (\tan x) =$

A. $\tan x \sec x$

B. $\frac{\sec x}{\tan x}$

C. $\sec^2 x$

D. $\tan^2 x$

Answer: C



Watch Video Solution