

Limits and Derivatives — CBSE Pattern Test 2

Class 11 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Maths · Limits and Derivatives · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- The value of $\lim_{x \rightarrow 1} (x^2 - 1)/(x - 1)$ is
 - 2
 - 0
 - 1
 - undefined
- $\lim_{x \rightarrow a} f(x)$ exists if
 - LHL = RHL
 - LHL $\neq$ RHL
 - LHL = 0
 - RHL = 0
- $\lim_{x \rightarrow 0} (1 - \cos x)/x^2$ equals
 - $1/2$
 - 1
 - 0
 - 2
- If $\lim_{x \rightarrow a} f(x)$ exists but is not equal to $f(a)$, the function is
 - discontinuous at a
 - continuous at a
 - differentiable at a
 - constant
- The derivative of $f(x) = x^2$ from first principles is
 - $2x$
 - x
 - x^2
 - 2
- The product rule is
 - $(uv)' = u'v + uv'$
 - $(uv)' = u'v'$
 - $(uv)' = u'v - uv'$
 - $(uv)' = u + v$
- $d/dx (\sin x)$ equals
 - $\cos x$

(B) $-\cos x$

(C) $\sin x$

(D) $-\sin x$

8. $d/dx (e^x)$ equals

(A) e^x

(B) $x e^x$

(C) e^x/x

(D) 1

9. State the condition for continuity of f at $x = a$.

10. Write the definition of the derivative from first principles.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. Find the left-hand limit of $|x|$ at $x = 0$.

12. Evaluate $\lim_{x \rightarrow 0} (\tan x)/x$.

13. Is every polynomial function continuous?

14. Write the derivative of x^n .

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Evaluate $\lim_{x \rightarrow 0} (\sin 3x)/(\sin 5x)$.

16. Check the continuity of $f(x) = |x|$ at $x = 0$.

17. Find the derivative of $f(x) = 3x + 2$ from first principles.

18. Differentiate $f(x) = 2 \sin x + 3 \cos x$.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Discuss the continuity of $f(x) = x + 2$ for $x \geq 0$ and $x - 2$ for $x < 0$ at $x = 0$.

20. Find the derivative of $f(x) = \sqrt{x}$ from first principles. Differentiate $f(x) = x/(x + 1)$ using the quotient rule.

Answer Key (Marking Scheme)

Q1 — (A) 2. Q2 — (A) LHL = RHL. Q3 — (A) $1/2$. Q4 — (A) discontinuous at a .

Q5 — (A) $2x$. Q6 — (A) $(uv)' = u'v + uv'$. Q7 — (A) $\cos x$. Q8 — (A) e^x .

Q9 — $\lim_{x \rightarrow a} f(x) = f(a)$.

Q10 — $f'(x) = \lim_{h \rightarrow 0} [f(x + h) - f(x)]/h$.

Q11 — 0.

Q12 — 1.

Q13 — Yes.

Q14 — $n x^{n-1}$.

Q15 — $3/5$.

Q16 — Continuous at 0.

Q17 — 3.

Q18 — $2 \cos x - 3 \sin x$.

Q19 — Discontinuous at $x = 0$ (LHL = -2 , RHL = 2).

Q20 — $1/(2\sqrt{x})$; $1/(x + 1)^2$.