

Continuity and Differentiability — Assignment 1

Class 12 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Continuity of a Function

MCQ Questions (choose the correct option)

- A function f is continuous at $x = a$ if
 - $\lim_{x \rightarrow a} f(x) = f(a)$
 - $f(a) = 0$
 - $\lim_{x \rightarrow a} f(x) = 0$
 - f is differentiable
- For continuity at $x = a$, the left-hand limit and right-hand limit must be
 - equal and equal to $f(a)$
 - unequal
 - both zero
 - both infinite
- A polynomial function is continuous
 - everywhere on $\mathbb{R}$
 - nowhere
 - only at $x = 0$
 - only on $[0, 1]$
- If f is continuous at $x = a$, then $\lim_{x \rightarrow a} f(x)$ equals
 - $f(a)$
 - 0
 - undefined
 - $f'(a)$

1 Mark Questions

- Define continuity of a function at a point.
- State the condition for continuity at $x = a$.
- Is every polynomial function continuous?

2 Mark Questions

- Check the continuity of $f(x) = x^2$ at $x = 2$.
- Discuss the continuity of $f(x) = 1/(x - 1)$ at $x = 1$.

3 Mark Questions

- Check the continuity of $f(x) = |x|$ at $x = 0$.
- Find the value of k so that $f(x) = kx + 1$ for $x \leq 2$ and $3x - 1$ for $x > 2$ is continuous at $x = 2$.

Differentiability

MCQ Questions (choose the correct option)

1. A function f is differentiable at $x = a$ if
 - (A) the derivative exists at $x = a$
 - (B) it is continuous
 - (C) $f(a) = 0$
 - (D) the limit is infinite
2. Differentiability implies
 - (A) continuity
 - (B) discontinuity
 - (C) nothing
 - (D) periodicity
3. The function $f(x) = |x|$ at $x = 0$ is
 - (A) continuous but not differentiable
 - (B) differentiable
 - (C) discontinuous
 - (D) constant
4. The derivative of a constant function is
 - (A) 0
 - (B) 1
 - (C) the constant
 - (D) undefined

1 Mark Questions

1. Define differentiability of a function at a point.
2. Does differentiability imply continuity?
3. Is $|x|$ differentiable at $x = 0$?

2 Mark Questions

1. Check the differentiability of $f(x) = |x|$ at $x = 0$.
2. Find the derivative of $f(x) = x^3$ from first principles.

3 Mark Questions

1. Show that $f(x) = |x|$ is continuous but not differentiable at $x = 0$.
2. Show that $f(x) = x^2$ is differentiable at $x = 3$ and find $f'(3)$.

Rules of Differentiation

MCQ Questions (choose the correct option)

1. The derivative of x^n is
 - (A) $n x^{n-1}$
 - (B) x^{n+1}
 - (C) $n x^n$
 - (D) x^n/n
2. The product rule states $(uv)' =$

- (A) $u'v + uv'$
 (B) $u'v'$
 (C) $u'v - uv'$
 (D) uv
3. The quotient rule states $(u/v)' =$
 (A) $(u'v - uv')/v^2$
 (B) $(u'v + uv')/v^2$
 (C) u'/v'
 (D) uv'/v^2
4. The derivative of $\sin x$ is
 (A) $\cos x$
 (B) $-\cos x$
 (C) $\sin x$
 (D) $-\sin x$

1 Mark Questions

- Write the derivative of x^n .
- State the product rule.
- Write the derivative of $\sin x$.

2 Mark Questions

- Differentiate $x^3 + 2x$ with respect to x .
- Differentiate $x \sin x$ with respect to x .

3 Mark Questions

- Differentiate $(x^2 + 1)/(x + 1)$ using the quotient rule.
- Differentiate $x^2 \sin x$ using the product rule.

Logarithmic, Implicit and Parametric Differentiation

MCQ Questions (choose the correct option)

- Logarithmic differentiation is useful when the function is
 (A) a product/quotient of powers
 (B) a constant
 (C) a polynomial only
 (D) a linear function
- For implicit differentiation, we differentiate
 (A) both sides with respect to x
 (B) only y
 (C) only x
 (D) neither side
- If $x = t^2$, $y = t^3$, then dy/dx equals
 (A) $(3t^2)/(2t) = 3t/2$
 (B) $3t^2$
 (C) $2t$

(D) t

4. The derivative of $\log x$ is

(A) $1/x$

(B) x

(C) $\log x$

(D) 1

1 Mark Questions

1. When is logarithmic differentiation used?

2. Write the derivative of $\log x$.

3. If $x = t^2$, $y = t^3$, find dy/dx .

2 Mark Questions

1. Differentiate x^x with respect to x .

2. Find dy/dx if $x^2 + y^2 = 25$.

3 Mark Questions

1. Differentiate $(\sin x)^x$ with respect to x .

2. Find dy/dx if $x = a \cos \theta$, $y = a \sin \theta$.