SmartKalike

CBSE Class 12 · Maths

Continuity and Differentiability

10 most probable questions for Boards 2027

Q1. 0.5 marks · Very short answer

Determine the open interval of x-values on which the derivative of $\sin^{-1}x$ is defined.

Answer

$\therefore x \in (-1, 1)$

Q2. 1 mark · Multiple choice

If g is continuous at c, which statement must be true for every real constant λ?

(A) λg is continuous at c

(B) λg is continuous only if $\lambda>0$

(C) λg is discontinuous when $\lambda=-1$

(D) λg is continuous only if $g(c)=0$

Answer

(A) λg is continuous at c — a constant multiple of a continuous function is continuous.

Q3. 2 marks · Short answer

Evaluate $\lim_{x\to\pi/6} \sin x$ and compare it with $\sin(\pi/6)$ to verify continuity of sine at $x=\pi/6$.

Answer

$\lim x\to\pi/6 \sin x = \sin(\pi/6)$

$= 1/2$

$\therefore \lim x\to\pi/6 \sin x = \sin(\pi/6)$, so sine is continuous at $x = \pi/6$.

Q4. 2.5 marks · Medium answer

By putting $y = \sin^{-1}x$ and differentiating $x = \sin y$, derive dy/dx in terms of x for $-1 < x < 1$.

Answer

Let $y = \sin^{-1}x$, so $x = \sin y$.

$1 = \cos y \cdot dy/dx$

$\cos^2 y = 1 - \sin^2 y$

$= 1 - x^2$

Since $-1 < x < 1$, $\cos y > 0$.

$\therefore dy/dx = 1/\sqrt{(1 - x^2)}$

Q5. 3 marks · Medium answer

For $f(x)=1/(x^2+1)$, find $f(0)$ and evaluate $\lim_{x\to 0} f(x)$. Hence verify continuity at $x=0$ using reciprocal continuity.

Answer

$f(0) = 1/(0^2 + 1) = 1$

$\lim x\to 0\ f(x) = \lim x\to 0\ 1/(x^2 + 1)$
$= 1/(0^2 + 1)$
$= 1$

$\therefore \lim x\to 0\ f(x) = f(0)$, so f is continuous at $x = 0$.

Q6. 4 marks · Long answer

If $f(x) = \sin((2x + 1)^3)$, write it as a composite of three functions and find df/dx using the successive derivatives.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/continuity-and-differentiability

Q7. 5 marks · Long answer

Prove that $f(x) = \sin(x^2)$ is continuous for every real x. Also prove that $f(x) = |1 - x + |x||$ is continuous for every real x, using the continuity of the modulus function and the rules for sums and compositions of continuous functions.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/continuity-and-differentiability

Q8. 0.5 marks · Very short answer

Find $d(\log x)/dx$ for $x > 0$.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/continuity-and-differentiability

Q9. 1 mark · Very short answer

Find the real value of x at which $f(x)=(x+1)/(x^2-4)$ is not continuous.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/continuity-and-differentiability

Q10. 2 marks · Short answer

Evaluate $\lim_{x\to 1} \sin(x^2)$ and hence verify that $\sin(x^2)$ is continuous at $x=1$.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/continuity-and-differentiability

Unlock all answers on SmartKalike

Every probable question of every chapter, each with a full answer, plus study targets and answer-sheet checking.
https://smartkalike.com/cbse/class-12/maths/continuity-and-differentiability
Sign up with a friend's email for 30% off their first purchase.