Differentiability - Class XII

Related Questions with Solutions

Questions

Quetion: 01

$f(x)=\begin{cases} x^2+1 & ; \quad x<1 \\ 3-x & ; \quad 1\le x\le 2 \\ -1+3x-x^2 & ; \quad x>2 \end{cases}$. Then f(x) is:

A. Continuous and differentiable everywhere

B. differentiable only at x = 1

C. Continuous at both points and differentiable only at x=2

D. None of these

Solutions

Solution: 01

At x = 1,

$f[1^+] = f[1] = 3 - 1 = 2$

$f[1^-] = 1 + 1 = 2$

So, f[x] is continuous at x = 1

Now check for differentiability at x = 1

RHD at x = 1 = $f'[1^+] = -1$,

LHD at x = 1 = $f'[1^-] = 2$

So, f[x] is not differentiable at x = 1.

At x = 2,

$f[2^-] = f[2] = 3 - 2 = 1$, $f[2^+] = -1 + 6 - 4 = 1$

∴ continuity at x = 2

LHD at x = 2 = $f'[2^-] = -1$

RHD at x = 2 = $f'[2^+] = 3 - 2[2] = -1$

So, f[x] is differentiable as well as continuous at x = 2

Correct Options

Answer:01

Correct Options: C