Preparation for CSIR NET | IIT JAM | GATE

Continuity and Differentiability : Short Trick

$$f(x) = \begin{cases} x^{\alpha} \sin\left(\frac{1}{x^{\beta}}\right) & : x \neq 0 \\ 0 & : x = 0 \end{cases}$$

(i) $f(x)$ is differenciable at $x=0$ iff $\alpha > 1$

(ii) $f(x)$ is Continous at $x=0$ iff $\alpha > 0$

$$f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$$

Then $f(x)$ at $x=0$.

(a) limit does not exist.

(b) Continous and differenciable ✓

(c) Continous but not differenciable.

(d) None of these.

$$f(x) = \begin{cases} \sqrt{x}\,\sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$$ then $f(x)$ is at $x=0$.

(a) Limit does not exist.

(b) Continous and differenciable

(c) Continous but not differenciable.

(d) None of these.

$$f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$$ then $f(x)$ is at $x=0$

(a) limit does not exist.

(b) Continous and differenciable

(C) Continous but not differenciable.

(d) None of these.

$$f(x) = \begin{cases} x^{1/3} \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$$ then $f(x)$ at $x=0$ is.

(a) Limit does not exist

(b) Continous and differenciable

(c) Continous but not differenciable.

(d) None of these.