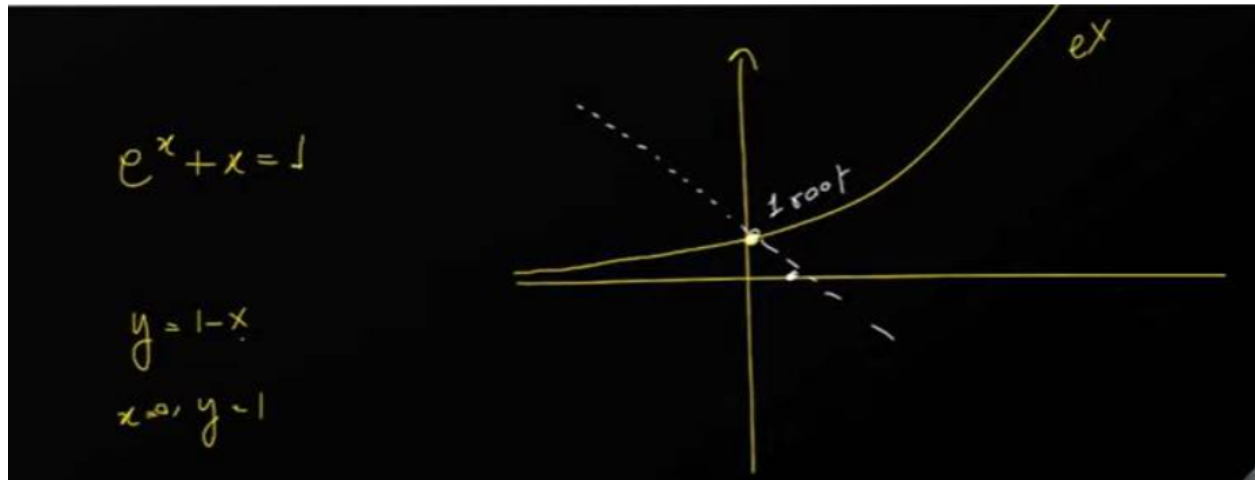


CSIR NET July 25, 2024 Mathematical Sciences Memory Based Questions

Ques.



Ques.

If a seq is bdd wotk is True?

(a) $\limsup a_n = \liminf a_n \Rightarrow$ seq conv. ✓

(b) $\sup a_n = \liminf$ then a_n is constant

Ques.

$$f(z) = \frac{\sin\left(\frac{1}{z}\right)}{z}$$

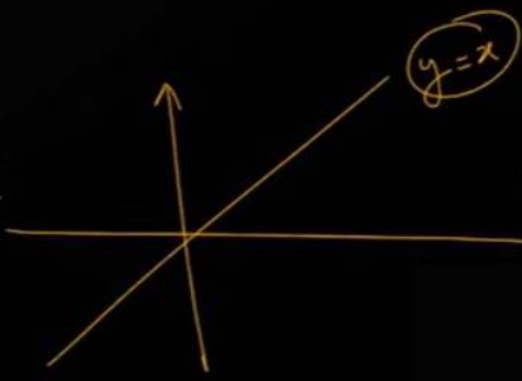
$$= \frac{1}{z} \left(\sin \frac{1}{z} \right)$$

$$= \frac{1}{z} \left(\frac{1}{z} - \left(\frac{1}{z}\right)^3 \frac{1}{3!} + \left(\frac{1}{z}\right)^5 \frac{1}{5!} \dots \right)$$

$$= \frac{1}{z^2} - \frac{1}{z^4} \frac{1}{3!} + \frac{1}{z^6} \frac{1}{5!} \dots$$

only many terms
essential

Ques.

$|f(x) - f(y)| \leq |x - y| \rightarrow \lim_{h \rightarrow 0} \left| \frac{f(x+h) - f(x)}{h} \right| \leq 1$
 $f(x) = 1 \quad \forall x$
 $f(x) = 1$
 $f(y) = 1$
 $|1 - 1| \leq |x - y|$
 $0 \leq |x - y|$
 $\Rightarrow f(x) = x$
 $x, y \quad |x - y| \leq |x - y|$
 $\underline{f'(x) = x \text{ itself}}$
 $f'(x) = \text{constant}$


Ques.

Consider the function

$$f(x, y) = \begin{cases} \frac{y \sqrt{x^2 + y^2}}{x} & ; (x, y) \neq (0, 0) \\ 0 & ; (x, y) = (0, 0) \end{cases}$$

 then
 (A) f_x exists at $(0, 0)$ (B) f is continuous at $(0, 0)$
 (C) f_y exists at $(0, 0)$ (D) f is differentiable at $(0, 0)$