$f'(x) = g(x) \cdot h'(x) + h(x) \cdot g'(x)$

$F'(x) = (3x^4)(2x^5)$

$f'(x) = (3x^4)(10x^4) + (2x^5)(12x^3)$

$f'(x) = 30x^8 + 24x^8$

$f'(x) = 54x^8$

Implicita

$-5x^2y - 3y - 6y^2 = 3x$

$-5x^2 \cdot 1\, y' + y \cdot (-10x) - 3y' - 12y y' = 3$

$-5x^2 y' - 3y' - 12y y' = 3 + 10xy$

$y'(-5x^2 - 3 - 12y) = 3 + 10xy$

$y' = \frac{3 + 10xy}{-5x^2 - 3 - 12y}$

Mis Ejercicios !!!

Demostrar

$\lim_{x \to -1} (1 - 5x) = 6$ | $(1 - 5(-1)) \cdot 6$

$1 + 5 = 6$

$6 = 6$

$\varepsilon > 0 \Rightarrow \delta = > 0 : x \in \mathbb{R} \wedge 0 < |x - (-1)| < \delta \Rightarrow$

$|(1 - 5x) - 6| < \varepsilon$

$|(-5 - 5x)| < \varepsilon$

$|-5(1 + x)| < \varepsilon$

$|-5|\,|1 + x| < \varepsilon$

$5\,|x + 1| < \varepsilon$

$|x - (-1)| < \frac{\varepsilon}{5}$

$|(1 - 5x) - 6| < \varepsilon$

$|1 - 5x - 6| < \varepsilon$

$|-5 - 5x| < \varepsilon$

$|-5(x + 1)| < \varepsilon$

$|-5|\,|x + 1| < \varepsilon$

$5\,|x + 1| < \varepsilon$

$|x + 1| < \frac{\varepsilon}{5}$ //

$|x - (-1)|$

Repaso de límites (FRANCI !!)

$f(x) = |x|$ → Demostrar

$\lim_{x \to 0} |x| = 0$

$\varepsilon > 0 : \exists \delta := \delta > 0 / x \in \mathbb{R} \wedge 0 < |x - 0| < \varepsilon$

$|x - 0| < \delta$

$||x| - 0| < \delta$ //

$\lim_{x \to a} (mx + b) = ma + b$

Dem

$\varepsilon > 0 \Rightarrow \delta = > 0 : x \in \mathbb{R} \wedge 0 < |x - a| < \delta \Rightarrow$

$|(mx + b) - (ma + b)| < \varepsilon$

$|mx - ma| < \varepsilon$

$|m(x - a)| < \varepsilon$

$|m|\,|x - a| < \varepsilon$

$m\,|x - a| < \varepsilon$

$|x - a| < \frac{\varepsilon}{m}$

ya !!!

Sice:

$|m|\,|x - a| < \varepsilon$

$|x - a| < \frac{\varepsilon}{|m|}$

Demostrar

$\lim_{x \to 1} (2x + 1) = 3$

Dem:

$\varepsilon > 0 \Rightarrow \delta = \frac{\varepsilon}{2} > 0 /$

$x \in \mathbb{R} \wedge 0 < |x - 1| < \delta \Rightarrow$

$|(2x + 1) - 3| < \varepsilon$

$|(2x - 2)| < \varepsilon$

$|2(x - 1)| < \varepsilon$

$|2|\,|x - 1| < \varepsilon$

$|x - 1| < \frac{\varepsilon}{2}$

Demostrar $\lim_{x \to 1} x^2 = 1$

$\varepsilon > 0 \Rightarrow \delta = > 0 : x \in \mathbb{R} \wedge 0 < |x - 1| < \delta \Rightarrow$

$|x^2 - 1| < \varepsilon$

$|(x - 1)(x + 1)| < \varepsilon$

$|x - 1|\,|x + 1| < \varepsilon$

Repaso de límites (chungara)

Teoremas de los límites

- El límite es único!!!
- $\lim_{x \to a} C = C$
- $\lim_{x \to a} c f(x) = c \lim$

límites al infinito

Demostrar $\lim_{x \to 2} (2x-1) = 3$

$|(2x-1)-3| < \varepsilon$

$|2x-1-3| < \varepsilon$

$|2x-4| < \varepsilon$

$|2(x-2)| < \varepsilon$

$|2|\,|x-2| < \varepsilon$

$2\,|x-2| < \varepsilon$

$|x-2| < \frac{\varepsilon}{2}$

Demostrar $\lim_{x \to 3} x^2 = 9$

$|x^2-9| < \varepsilon$

$|(x+3)(x-3)| < \varepsilon$

$|x+3|\,|x-3| < \varepsilon$

$|x-3| < \frac{\varepsilon}{|x+3|}$

$\frac{\varepsilon}{|4+3|} = \frac{\varepsilon}{|7|} = \frac{\varepsilon}{7}$ //

$|x-3| < \delta \quad | \quad \delta = \{1, \frac{\varepsilon}{7}\}$

$|x-3| < 1$

$-1 < |x-3| < 1$

$-1 < x-3 \leq 1$

$-1+3 < x \quad | \quad x-3 \leq 1$

$x \leq 4$

$2 < x \leq 4$

Demostrar $\lim_{x \to 5} (x^2+3x+5) = 45$

$|(x^2+3x+5)-45| < \varepsilon$

$|x^2+3x+5-45| < \varepsilon$

$|x^2+3x-40| < \varepsilon$

$|(x+8)(x-5)| < \varepsilon$

$|x+8|\,|x-5| < \varepsilon$

$|x-5| < \frac{\varepsilon}{|x+8|}$

$\delta = \{1, \dots\}$

$|x-5| < 1$

$-1 < x-5 < 1$

$4 < x < 6$

$\frac{\varepsilon}{|x+8|} = \frac{\varepsilon}{|6+8|} = \frac{\varepsilon}{14}$ //

② Sea $S = \mathbb{R} - \{-1\}$ Consideremos a la siguiente operacion en $\mathbb{R}$

$$a * b = a + b + ab$$

Demostrar que $*$ es una operación binaria en S y que $(S, *)$ es un grupo abeliano

Clausura

$\forall a, b \in S : a \wedge b \neq -1 \Rightarrow a * b = a + b + ab$

$\Rightarrow a + b + ab \neq -1$

$\therefore a * b \in S$ (V)

② Asociatividad

$\forall a, b, c \in S \wedge \neq -4 : (a * b) * c = a * (b * c)$

$(a * b) * c = a * (b * c)$

$(a + b + ab) * c = a * (b + c + bc)$

$(a + b + ab) + c + (a + b + ab) \cdot c = a + (b + c + bc) + a \cdot (b + c + bc)$

$a + b + ab + c + ac + bc + abc = a + b + c + bc + ab + ac + abc$ (V)

1.672×10^{-27}

9.109×10^{-31}