

SEBASTIAN
PAPANICOLAU

PARCIAL B ANÁLISIS
MATEMÁTICO I

HOJA N°

FECHA

$$1) \int_1^{e^x} f(\ln(\tau)) d\tau = \frac{1}{2} x^2$$

$$\left(\int_1^{e^x} f(\ln(\tau)) d\tau \right)' = x$$

$$f(\ln(e^x)) \cdot e^x = x$$

$$f(x) \cdot e^x = x$$

$$f(x) = \frac{x}{e^x}$$

$$f'(x) = \frac{e^x - x \cdot e^x}{e^{2x}}$$

$$0 = \frac{e^x(1-x)}{e^x \cdot e^x} = \frac{1-x}{e^x}$$

$$0 = 1-x$$

$$x = 1$$

f TIENE EXTREMO EN $x=1 \Rightarrow$ FALSO

REPUBLICA ARGENTINA - MERCOSUR
REGISTRO NACIONAL DE LAS PERSONAS
MINISTERIO DEL INTERIOR, OBRAS PÚBLICAS Y VIVIENDA

Apellido / Surname
PAPANICOLAU

Nombre / Name
SEBASTIAN

Sexo / Sex
M

Nacionalidad / Nationality
ARGENTINA

Ejemplar
A

Fecha de nacimiento / Date of birth
25-ENE-2002

Fecha de emisión / Date of issue
10-ABR-2017

Fecha de vencimiento / Date of expiry
10-ABR-2032

Documento / Document
43.872.171

Trámite N° / Of. Ident.
00488715210
8001

PRIMA IDENTIFICADORA SIGNATURE



2) AREA ENTRE CURVAS

$$f(x) = \frac{1}{2}x + 2$$

$$g(x) = |x - 2|$$

$$2 = |x| \Rightarrow x = 2 \wedge x = -2$$

$$f \cap g: \frac{1}{2}x + 2 = |x - 2| : \frac{1}{2}x + 2 = x - 2 \vee -\frac{1}{2}x + 2 = x - 2$$

$$x > 0$$

$$\frac{1}{2}x + 2 = x - 2$$

$$-\frac{1}{2}x + 4 = 0$$

$$-\frac{x}{2} = -4$$

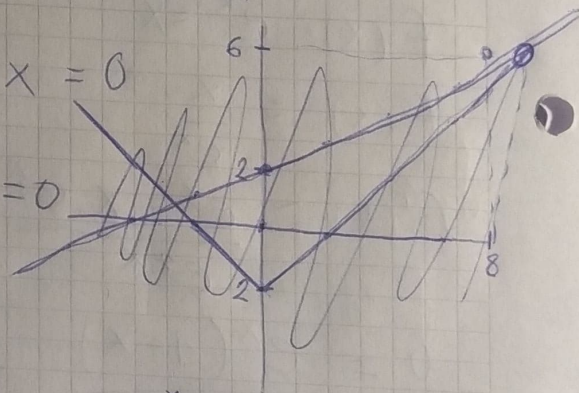
$$x = +8$$

$$x < 0$$

$$-\frac{1}{2}x - 2 = x - 2$$

$$-\frac{3}{2}x = 0$$

$$x = 0$$



$$f(8) = 4 + 2 = 6$$

$$f(0) = 2$$

$$(8, 6)$$

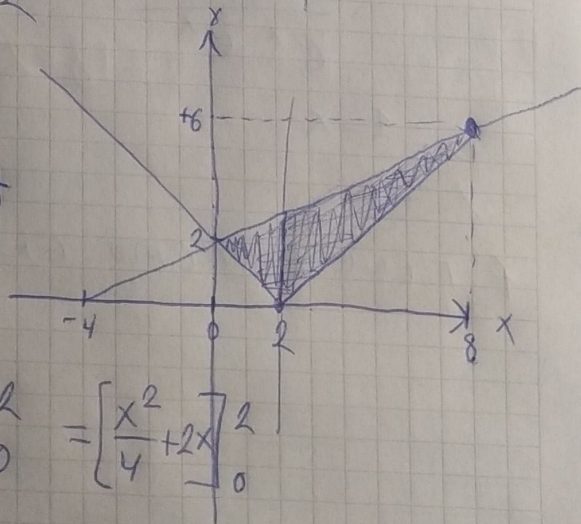
$$(0, 2)$$

$$AREA = \int_0^2 \left(\frac{1}{2}x + 2\right) dx - \int_0^2 (-x + 2) dx$$

$$\int_2^8 \left(\frac{1}{2}x + 2\right) dx - \int_2^8 (x - 2) dx$$

$$\int_0^2 \left(\frac{1}{2}x + 2\right) dx = \left[\frac{1}{2} \cdot \frac{x^2}{2} + 2x\right]_0^2 = \left[\frac{x^2}{4} + 2x\right]_0^2$$

$$\frac{4}{4} + 4 = 1 + 4 = 5 - 0 = 5$$



$$\int_2^8 (-x + 2) dx = \left[-\frac{x^2}{2} + 2x\right]_2^8 = -\frac{64}{2} + 16 = -32 + 16 = -16$$

$$\int_2^8 \left(\frac{1}{2}x + 2 \right) dx = \left[\frac{x^2}{4} + 2x \right]_2^8 = \frac{64}{4} + 16 - \left[\frac{4}{4} + 8 \right] = 32 - 9 = 23$$

$$\int_2^8 (x - 2) dx = \left[\frac{x^2}{2} - 2x \right]_2^8 = \frac{64}{2} - 16 - \left[\frac{4}{2} - 4 \right] = 16 + 2 = 18$$

$$\text{AREA} = 23 - 18 = 5$$

$$3) h(x) = \int_0^{\ln(x^2+1)} f(t) dt + x$$

$$h(0) = \int_0^0 f(t) dt + 0 = 0$$

$$\boxed{h(0) = 0}$$

$$h'(x) = \left(\int_0^{\ln(x^2+1)} f(t) dt \right)' + 1$$

$$h'(x) = f(\ln(x^2+1)) \cdot \frac{2x}{x^2+1} + 1$$

$$h'(0) = f(\ln(1)) \cdot \frac{0}{1} + 1$$

$$\boxed{h'(0) = 1}$$

$$h''(x) = f'(\ln(x^2+1)) \cdot \frac{2x}{x^2+1} \cdot \frac{2x}{x^2+1} + f(\ln(x^2+1)) \cdot \frac{2 \cdot (x^2+1) - 2x \cdot 2x}{(x^2+1)^2}$$

$$\frac{2 \cdot (x^2+1) - 2x \cdot 2x}{(x^2+1)^2}$$

$$h''(0) = f'(0) \cdot 0 + f(0) \cdot 2$$

$$f(x) = -2x + 5$$

$$f(0) = 5$$

$$f'(x) = -2$$

$$\boxed{h''(0) = 10}$$

$$T(x) = h(0) + h'(0) \cdot x + \frac{h''(0)}{2} \cdot x^2$$

$$T(x) = x + 5x^2$$

$$4) f(x) = \frac{1}{(x-8)^{2/3}} ; y=0 ; 0 \leq x \leq 8$$

$$\int_0^8 \frac{1}{(x-8)^{2/3}} dx = \int_0^8 (x-8)^{-2/3} dx \quad \begin{matrix} u = x-8 \\ du = dx \end{matrix}$$

$$\int_0^8 u^{-2/3} du = u^{1/3} \cdot 3 = \left[\sqrt[3]{x-8} \cdot 3 \right]_0^8 =$$

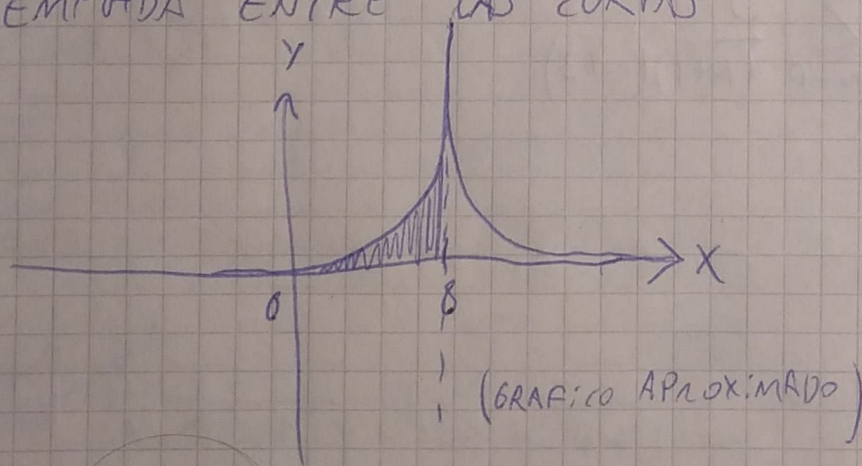
$$3\sqrt[3]{0} \cdot 3 - 3\sqrt[3]{-8} \cdot 3 = 0 - (-2) \cdot 3 = 6$$

$$(x-8)^{2/3} \neq 0$$

$$x-8 \neq 0$$

$$x \neq 8$$

f PRESENTA UNA DISCONTINUIDAD EN $x=8$, POR LO QUE NO PODEMOS DEFINIR EL AREA COTEMPORADA ENTRE LAS CURVAS



$$5) \sum_{N=0}^{\infty} \frac{3^N \cdot (x-7)^N}{(N+1)(N+3)}$$

por critério de D'ALAMBERT

$$\lim_{N \rightarrow \infty} \left| \frac{3^N \cdot (x-7)^N}{(N+1)(N+3)} \cdot \frac{(N-2)(N-4)}{3^{N-1} \cdot (x-7)^{N-1}} \right| =$$

$$\lim_{N \rightarrow \infty} \left| \frac{3^N \cdot \cancel{(x-7)^N} \cdot (N-2)(N-4)}{(N+1)(N+3) \cdot 3^N \cdot 3^{-1} \cdot \cancel{(x-7)^N} \cdot (x-7)^{-1}} \right|$$

$$\lim_{N \rightarrow \infty} \left| \frac{(N^2 - 6N + 8) \cdot (x-7)}{(N^2 - 4N + 3)} \right| = \left| \frac{1}{1} \cdot x - 7 \right| = |x - 7|$$

$$|x - 7| < 1 \Rightarrow \begin{array}{ll} x - 7 < 1 & x - 7 > -1 \\ x < 8 & x > 6 \end{array}$$

INTERVALO DE CONV: $(8; 6)$ $R = 1 = 8 - 6 = 1$

$$\sum_{n=0}^{\infty} \frac{3^n \cdot (-1)^n}{(n+1)(n+3)}$$

ANÁLIZO C.V. EN SERIE
CON TÉRMINOS EN VAL. ABS

$$\sum_{n=0}^{\infty} \frac{3^n}{(n+1)(n+3)}$$

$$\lim_{n \rightarrow \infty} \frac{3^n \cdot n \cdot (n+2)}{3^n \cdot 3^{-1} \cdot (n+1)(n+3)} = \frac{n^2 + 2n}{\frac{1}{3} \cdot n^2 + 4n + 3} = 3 > 1$$

LA SERIE DIVERGE

$$x=8 \quad \sum_{n=0}^{\infty} \frac{3^n \cdot (8-7)^n}{(n+1)(n+3)} = \sum_{n=0}^{\infty} \frac{3^n \cdot 1^n}{(n+1)(n+3)} = \sum_{n=0}^{\infty} \frac{3^n}{(n+1)(n+3)}$$

$$\lim_{n \rightarrow \infty} \frac{3^n \cdot n \cdot (n+2)}{3^n \cdot 3^{-1} \cdot (n+1)(n+3)} = \lim_{n \rightarrow \infty} \frac{3n^2 + 6n}{n^2 + 4n + 3} = \boxed{3}$$

LA SERIE DIVERGE

INTERVALO DE CONVERGENCIA

$$x \in (6, 8) \quad (\text{SIN LOS EXTREMOS } 6 \text{ Y } 8)$$

$$R = 1$$