Tarea 3

Metodos Matemáticos II

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1.- Utilice la siguiente grafica para calcular

a. $\lim_{x \to 12^+} f(x)$,

b. $\lim_{x \to 12^-} f(x)$

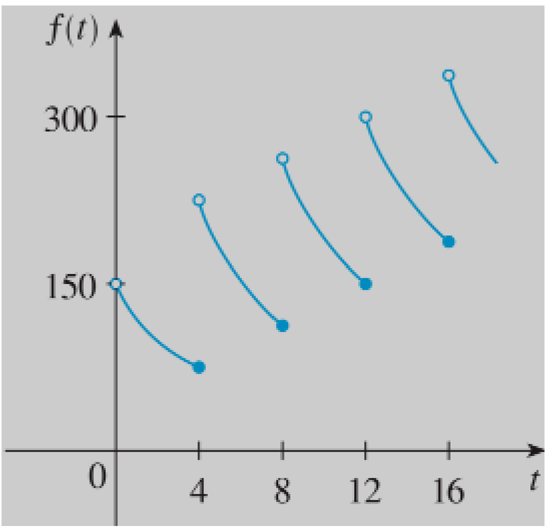

Figura 1: Grafica para pregunta 1

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a. $\lim_{x \to 12^+} f(x) = 300$

b. $\lim_{x \to 12^-} f(x) = 150$

Calcule los siguientes límites laterales. Use estos resultados para determinar si el límite existe.

2.- $\lim_{x \to 0^+} 1/(1 + e^{1/x})$ y $\lim_{x \to 0^-} 1/(1 + e^{1/x})$

$$\lim_{x \to 0^+} \frac{1}{1 + e^{1/x}} = \frac{\lim_{x \to 0^+} 1}{\lim_{x \to 0^+} 1 + e^{1/x}}$$

$$\frac{\lim\limits_{x \to 0^+} 1}{\lim\limits_{x \to 0^+} 1 + e^{1/x}} = \frac{1}{1 + e^{1/0.0000001}}$$

$$\frac{\lim\limits_{x \to 0^+} 1}{\lim\limits_{x \to 0^+} 1 + e^{1/x}} = \frac{1}{1 + e^{\infty}} = 0$$

$$\frac{\lim\limits_{x \to 0^+} 1}{\lim\limits_{x \to 0^+} 1 + e^{1/x}} = \frac{1}{1 + \infty} = 0$$

$$\frac{\lim\limits_{x \to 0^+} 1}{\lim\limits_{x \to 0^+} 1 + e^{1/x}} = \frac{1}{\infty} = 0$$

$$\lim_{x \to 0^+} \frac{1}{1 + e^{1/x}} = 0$$

$$\lim_{x \to 0^-} \frac{1}{1 + e^{1/x}} = \frac{\lim\limits_{x \to 0^-} 1}{\lim\limits_{x \to 0^-} e^{1/x}}$$

$$\frac{\lim\limits_{x \to 0^-} 1}{\lim\limits_{x \to 0^-} 1 + e^{1/x}} = \frac{1}{1 + e^{1/-0.0000001}}$$

$$\frac{\lim\limits_{x \to 0^-} 1}{\lim\limits_{x \to 0^-} 1 + e^{1/x}} = \frac{1}{1 + e^{-\infty}}$$

$$\frac{\lim\limits_{x \to 0^-} 1}{\lim\limits_{x \to 0^-} 1 + e^{1/x}} = \frac{1}{1 + \frac{1}{e^{\infty}}}$$

$$\frac{\lim\limits_{x \to 0^-} 1}{\lim\limits_{x \to 0^-} 1 + e^{1/x}} = \frac{1}{1 + \frac{1}{\infty}}$$

$$\frac{\lim\limits_{x \to 0^-} 1}{\lim\limits_{x \to 0^-} 1 + e^{1/x}} = \frac{1}{1 + 0} = 1$$

$$\lim_{x \to 0^-} \frac{1}{1 + e^{1/x}} = 1$$

$$\lim_{x \to 0^+} \frac{1}{1 + e^{1/x}} = \text{No existe}$$

3.- $\lim\limits_{x \to -1^+} f(x)$ y $\lim\limits_{x \to -1^-} f(x)$, donde

$$f(x) = \begin{cases} 1+x & x < -1 \\ x^2 & -1 \leq x < 1 \\ 2-x & x \geq 1 \end{cases}$$

$$\lim_{x \to -1^-} x+1$$
$$\lim_{x \to -1^-} (-1)+1 = 0$$

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

$$\lim_{x \to -1} f(x) = \text{No existe}$$

4.- $\lim_{x \to 1^+} f(x)$ y $\lim_{x \to 1^-} f(x)$, donde $f(x)$ es la misma funcion del inciso 3.

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

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

$$\lim_{x \to 1} f(x) = 1$$

Calcule si existen los siguientes límites

5.- $\lim_{x \to -2} \frac{x+2}{x^2+8}$

$$\lim_{x \to -2} \frac{x+2}{x^2+8} = \frac{(-2)+2}{(-2)^2+8}$$
$$\lim_{x \to -2} \frac{x+2}{x^2+8} = \frac{0}{12} = 0$$

$$\lim_{x \to -2} \frac{x+2}{x^2+8} = 0$$

6.- $\lim_{x \to -6} \frac{2x+12}{|x+6|}$

$$\lim_{x\to -6} \frac{2x+12}{|x+6|} = \frac{2(-6)+12}{|(-6)+6|}$$
$$\lim_{x\to -6} \frac{2x+12}{|x+6|} = \frac{0}{|0|} = \text{indeterminado}$$

$$\lim_{x\to -6^+} \frac{2x+12}{|x+6|} = \lim_{x\to -6^+} \frac{2x+12}{x+6}$$

$$\lim_{x\to -6^+} \frac{2x+12}{x+6} = \frac{2\cancel{(x+6)}}{\cancel{x+6}} = 2$$

$$\lim_{x\to -6^-} \frac{2x+12}{-(x+6)} = \frac{2\cancel{(x+6)}}{-\cancel{(x+6)}} = -2$$

$$\lim_{x\to -6} \frac{2x+12}{|x+6|} = \text{No existe}$$

7.- $\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}}$

$$\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \frac{e^{3(\infty)}-e^{-3(\infty)}}{e^{3(\infty)}+e^{-3(\infty)}}$$

$$\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \frac{e^{\infty}-e^{-\infty}}{e^{\infty}+e^{-\infty}}$$

$$\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \frac{\infty-\frac{1}{e^{\infty}}}{\infty+\frac{1}{e^{\infty}}}$$

$$\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \frac{\infty-\frac{1}{\infty}}{\infty+\frac{1}{\infty}}$$

$$\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \frac{\infty-0}{\infty+0} = 1$$

$$\lim_{x\to\infty} \frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = 1$$

8.- $\lim_{x\to -4} \frac{\frac{1}{4}+\frac{1}{x}}{|4+x|}$

$$\lim_{x\to -4} \frac{\frac{1}{4}+\frac{1}{x}}{|4+x|} = \lim_{x\to -4} \frac{\frac{1}{4}+\frac{1}{-4}}{|4+(-4)|}$$

$$\lim_{x\to -4} \frac{\frac{1}{4}+\frac{1}{x}}{|4+x|} = \lim_{x\to -4} \frac{\frac{1}{4}-\frac{1}{4}}{|0|} = \text{indeterminado}$$

$$\lim_{x\to -4^+} \frac{\frac{1}{4}+\frac{1}{x}}{4+x} = \lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(4+x)}$$

$$\lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(4+x)} = \frac{\frac{4x}{4}+\frac{4x}{x}}{4x(4+x)}$$

$$\lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(4+x)} = \frac{\cancel{x+4}}{4x\ \cancel{(4+x)}} = \frac{1}{4x}$$

$$\lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(4+x)} = \frac{1}{4(-4)} = -\frac{1}{16}$$

$$\lim_{x\to -4^-} \frac{\frac{1}{4}+\frac{1}{x}}{-(4+x)} = \lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(-4-x)}$$

$$\lim_{x\to -4^-} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(-4-x)} = \frac{\frac{4x}{4}+\frac{4x}{x}}{4x(-4-x)}$$

$$\lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(-4-x)} = \frac{\cancel{x+4}}{4x\ \cancel{(-4-x)}} = \frac{1}{4x}$$

$$\lim_{x\to -4^+} \frac{4x(\frac{1}{4}+\frac{1}{x})}{4x(-4-x)} = \frac{-1}{4(-4)} = \frac{1}{16}$$

$$\lim_{x\to -4} \frac{\frac{1}{4}+\frac{1}{x}}{|4+x|} = \text{No existe}$$