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DEBER No.2 Límite de funciones

NOTA: LA RESOLUCION DE LOS EJERCICIOS ESTA AL FINAL DE LOS EJERCICIO PROPUESTOS

1. En los ejercicios siguientes, evalúe el límite (si existe):

$$\lim_{x \rightarrow 2} (3x^3 - x + 4)$$

$$\lim_{y \rightarrow 1} \frac{y^2 - 2}{2y + 3}$$

$$\lim_{z \rightarrow -3} \frac{z^2 + z - 9}{z + 2}$$

$$\lim_{x \rightarrow -2} \frac{x^2 - 3x - 4}{x^2 - 4x - 14}$$

$$\lim_{x \rightarrow 1} \frac{2x^2 + x - 4}{3x^3 + 2x - 6}$$

$$\lim_{t \rightarrow 4} \sqrt{\frac{t - 4}{t^2 - 1}}$$

$$\lim_{x \rightarrow 4} \frac{2x}{16 - x^2}$$

$$\lim_{x \rightarrow 0} \frac{x^2 - 5}{2x^3 - 3x + 1}$$

$$\lim_{t \rightarrow 2} \frac{\sqrt{t} - \sqrt{4}}{t^2 - 16}$$

$$\lim_{s \rightarrow 0} \frac{\sqrt{9 - s} - 2}{1 - s}$$

$$\lim_{x \rightarrow 1} \frac{x^4 - 6x^2 + 8x - 4}{x^4 - 2x^3 + 2x - 1}$$

$$\lim_{x \rightarrow 1} \frac{x^2 - 4}{x^2 - 2|x - 1| - 3}$$



$$\lim_{x \rightarrow 2} \left(\frac{3x-2}{2x^2-4} - \frac{4x^2-1}{3x-2} \right)$$

$$\lim_{x \rightarrow 1} \frac{\sqrt{2x+1} + 3\sqrt{2x-1}}{3\sqrt{x+1} - \sqrt{2x-1}}$$

$$f(x) = \begin{cases} x^2 + 4x - 8, & \text{si } x \geq -3 \\ x + 4, & \text{si } x \leq -3 \end{cases} \quad \lim_{x \rightarrow -3} f(x) = ?$$

EJERCICIOS RESUELTOS

1) $\lim_{x \rightarrow 2} (-3x^2 - x + 4)$ MJ (1) $\lim_{x \rightarrow 2} (-3(2)^2 - 2 + 4) = -12 - 2 + 4 = -10$

2) $\lim_{z \rightarrow -3} \frac{z^2 + z - 9}{z + 2}$ MJ (1) $\lim_{z \rightarrow -3} \frac{-3 + (-3) - 9}{-3 + 2} = \frac{-15}{-1} = 15$

3) $\lim_{x \rightarrow 1} \frac{2x^2 + x - 4}{3x^2 + 2x - 6}$ MJ (1) $\lim_{x \rightarrow 1} \frac{2(1)^2 + 1 - 4}{3(1)^2 + 2(1) - 6} = \frac{-1}{-1} = 1$

4) $\lim_{x \rightarrow 4} \frac{2x}{16 - x^2}$ MJ (1) $\lim_{x \rightarrow 4} \frac{2(4)}{16 - 4^2} = \frac{8}{0}$ Indeterminación Tipo $\frac{K}{0}$

5) $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{4}}{x^2 - 16}$ MJ (1) $\lim_{x \rightarrow 2} \frac{\sqrt{2} - \sqrt{4}}{2^2 - 16} = \frac{\sqrt{2} - 2}{4 - 16} = \frac{\sqrt{2} - 2}{-12}$

6) $\lim_{x \rightarrow 1} \frac{x^4 - 6x^2 + 8x - 4}{x^4 - 2x^3 + 2x - 1}$ MJ (1) $\lim_{x \rightarrow 1} \frac{1^4 - 6(1)^2 + 8(1) - 4}{1^4 - 2(1)^3 + 2(1) - 1} = \frac{1 - 6 + 8 - 4}{1 - 2 + 2 - 1} = \frac{0}{0}$ indeterminación

7) $\lim_{x \rightarrow 1^+} \frac{x^4 - 6x^2 + 8x - 4}{x^4 - 2x^3 + 2x - 1} = -\infty$

8) $\lim_{x \rightarrow 1^-} \frac{x^4 - 6x^2 + 8x - 4}{x^4 - 2x^3 + 2x - 1} = +\infty$

9) $\lim_{x \rightarrow 4^+} \frac{2x}{16 - x^2} = -\infty$

10) $\lim_{x \rightarrow 4^-} \frac{2x}{16 - x^2} = +\infty$

No existe límite de la función en $x \rightarrow 4$



$$7) \lim_{y \rightarrow 1} \frac{y^2 - 2}{2y^3 + 3}$$

$$\lim_{y \rightarrow 1} \frac{1^2 - 2}{2(1)^3 + 3}$$

$$\lim_{y \rightarrow 1} \frac{1 - 2}{2 + 3} =$$

$$\lim_{y \rightarrow 1} -\frac{1}{5} //$$

$$8) \lim_{x \rightarrow 2} \frac{x^2 - 3x - 4}{x^2 - 4x - 14}$$

$$\lim_{x \rightarrow 2} \frac{2^2 - 3(2) - 4}{2^2 - 4(2) - 14}$$

$$\lim_{x \rightarrow 2} \frac{4 - 6 - 4}{4 + 8 - 14}$$

$$\lim_{x \rightarrow 2} -\frac{6}{-12} = -3 //$$

$$9) \lim_{t \rightarrow 4} \sqrt{\frac{t-4}{t^2-1}}$$

$$\lim_{t \rightarrow 4} \sqrt{\frac{4-4}{4^2-1}}$$

$$\lim_{t \rightarrow 4} \sqrt{\frac{0}{15}}$$

$$\lim_{t \rightarrow 4} = 0 //$$

$$10) \lim_{x \rightarrow 0} \frac{x^2 - 5}{2x^3 - 3x^2 + 1}$$

$$\lim_{x \rightarrow 0} \frac{0^2 - 5}{2(0)^3 - 3(0)^2 + 1}$$

$$\lim_{x \rightarrow 0} \frac{0 - 5}{0 - 0 + 1} = -\frac{5}{1} = -5 //$$

$$11) \lim_{s \rightarrow 0} \frac{\sqrt{9-s} - 2}{1-s}$$

$$\lim_{s \rightarrow 0} \frac{\sqrt{9-0} - 2}{1-0}$$

$$\lim_{s \rightarrow 0} \frac{\sqrt{9} - 2}{1}$$

$$\lim_{s \rightarrow 0} \frac{3-2}{1} = \frac{1}{1} = 1 //$$

$$12) \lim_{x \rightarrow 1} \frac{x^2 - 4}{x^2 - 2|x-1| - 3}$$

$$\lim_{x \rightarrow 1} \frac{1^2 - 4}{1^2 - 2|1-1| - 3}$$

$$\lim_{x \rightarrow 1} \frac{1-4}{1-2|0|-3} = \frac{-3}{-2}$$

$$\lim_{x \rightarrow 1} \frac{3}{2} //$$



13) $\lim_{x \rightarrow 2} \left(\frac{3x-2}{2x^2-4} - \frac{4x^2-1}{3x-2} \right)$ (21)

$\lim_{x \rightarrow 2} \left(\frac{3(2)-2}{2(2)^2-4} - \frac{4(2)^2-1}{3(2)-2} \right)$

$\lim_{x \rightarrow 2} \left(\frac{6-2}{8-4} - \frac{16-1}{6-2} \right)$

$\lim_{x \rightarrow 2} \left(\frac{4}{4} - \frac{15}{4} \right)$

$\lim_{x \rightarrow 2} \left(\frac{4-15}{4} \right)$

$\lim_{x \rightarrow 2} -\frac{11}{4} //$

14) $\lim_{x \rightarrow 1} \frac{\sqrt{2x+1} + 3\sqrt{2x-1}}{3\sqrt{x+1} - \sqrt{2x-1}}$

$\lim_{x \rightarrow 1} \frac{\sqrt{2(1)+1} + 3\sqrt{2(1)-1}}{3\sqrt{1+1} - \sqrt{2(1)-1}}$

$\lim_{x \rightarrow 1} \frac{\sqrt{3} + 3\sqrt{1}}{3\sqrt{2} - \sqrt{1}} =$

$\lim_{x \rightarrow 1} \frac{\sqrt{3} + 3 \times 1}{3\sqrt{2} - 1}$

$\lim_{x \rightarrow 1} \frac{(\sqrt{3} + 3) \times (3\sqrt{2} + 1)}{(3\sqrt{2})^2 - 1^2}$

15) $\lim_{x \rightarrow 1} \frac{3\sqrt{6} + \sqrt{3} + 9\sqrt{2} + 3}{17}$

15)

$f(x) = \begin{cases} x^2 + 4x - 8 & \text{si } x > -3 \\ x + 4 & \text{si } x \leq -3 \end{cases}$ $\lim_{x \rightarrow -3} f(x) = \text{No existe} //$

$\lim_{x \rightarrow -3} x + 4$

$\lim_{x \rightarrow -3} -3 + 4 = 1$

$\lim_{x \rightarrow -3} x^2 + 4(x) - 8$

$\lim_{x \rightarrow -3} -3^2 + 4(3) - 8 =$

$\lim_{x \rightarrow -3} 9 + 12 - 8 = -11$

2. Calcular los siguientes límites:

$$\lim_{x \rightarrow 1} \left[\frac{3x-3}{2x-5} + \sqrt{x^2+2x+4} + (x^2-3)^4 (x^3-2)^5 \right]$$

2)

1) $\lim_{x \rightarrow 1} \left[\frac{3x-3}{2x-5} + \sqrt{x^2+2x+4} + (x^2-3)^4 (x^3-2)^5 \right]$

$\lim_{x \rightarrow 1} \left[\frac{3(1)-3}{2(1)-5} + \sqrt{1^2+2(1)+4} + (1^2-3)^4 (1^3-2)^5 \right]$

$\lim_{x \rightarrow 1} \left[\frac{3-3}{2-5} + \sqrt{1+2+4} + (1-3)^4 (1-2)^5 \right]$

$\lim_{x \rightarrow 1} \left[\frac{0}{-3} + \sqrt{7} + (16) \cdot (-1) \right]$

$\lim_{x \rightarrow 1} \left[\sqrt{7} - 16 \right]$ //

$$\lim_{x \rightarrow 1} \sqrt{\frac{3x+2}{x+1} + \frac{5x-2}{x^2+2x-1} + \frac{(x-3)(x-2)}{(x-2)(x-5)}}$$

2) $\lim_{x \rightarrow 1} \sqrt{\frac{3x+2}{x+1} + \frac{5x-2}{x^2+2x-1} + \frac{(x-3)(x-2)}{(x-2)(x-5)}}$

$\lim_{x \rightarrow 1} \sqrt{\frac{3(1)+2}{1+1} + \frac{5(1)-2}{1^2+2(1)-1} + \frac{(1-3)(1-2)}{(1-2)(1-5)}}$

$\lim_{x \rightarrow 1} \sqrt{\frac{3+2}{2} + \frac{5-2}{1+2-1} + \frac{(-3)(-1)}{(-1)(-4)}}$

$\lim_{x \rightarrow 1} \sqrt{\frac{5}{2} + \frac{3}{2} + \frac{-3}{-4}}$

$\lim_{x \rightarrow 1} \sqrt{\frac{5}{2} + \frac{3}{2} + \frac{1}{2}} = \frac{9}{2}$ //

$$\lim_{x \rightarrow 1} \frac{x^3 + 3x^2 - 4x + 2}{x + 4x - 6}$$

3) $\lim_{x \rightarrow 1} \frac{x^3 + 3x^2 - 4x + 2}{x^2 + 4x - 6}$

$\lim_{x \rightarrow 1} \frac{1^3 + 3(1)^2 - 4(1) + 2}{1^2 + 4(1) - 6}$

$\lim_{x \rightarrow 1} \frac{1 + 3 - 4 + 2}{1 + 4 - 6}$

$\lim_{x \rightarrow 1} \frac{2}{-1} = -2$ //

$$\lim_{x \rightarrow 1} \frac{x^4 + 2x^3 - 3x^2 + 4x + 2}{x + 3x - 3}$$

4) $\lim_{x \rightarrow 1} \frac{x^4 + 2x^3 - 3x^2 + 4x + 2}{x + 3x - 3}$

$\lim_{x \rightarrow 1} \frac{1^4 + 2(1)^3 - 3(1)^2 + 4(1) + 2}{1 + 3(1) - 3}$

$\lim_{x \rightarrow 1} \frac{1 + 2 - 3 + 4 + 2}{1 + 3 - 3}$

$\lim_{x \rightarrow 1} \frac{6}{1} = 6$



$$\lim_{x \rightarrow 1} \frac{x^5 + 3x^4 - 2x^3 - 2x^2 + 3x}{x^3 + x^2 + 4x}$$

4) $\lim_{x \rightarrow 1} \frac{x^5 - 3x^4 - 2x^3 + 2x^2 + 3x}{x^3 + x^2 + 4x}$

$\lim_{x \rightarrow 1} \frac{1^5 - 3(1)^4 - 2(1)^3 + 2(1)^2 + 3(1)}{1^3 + 1^2 + 4(1)}$

$\lim_{x \rightarrow 1} \frac{1 - 3 - 2 + 2 + 3}{1 + 1 + 4}$

$\lim_{x \rightarrow 1} \frac{1}{2} //$

$$\lim_{x \rightarrow 2} \frac{x^4 + 3x^3 - 2x^2 + 3x + 2}{x^4 + 2x^3 - x^2 - 4x + 2}$$

6) $\lim_{x \rightarrow 2} \frac{x^4 + 3x^3 - 2x^2 + 3x + 2}{x^4 + 2x^3 - x^2 - 4x + 2}$

$\lim_{x \rightarrow 2} \frac{2^4 + 3(2)^3 - 2(2)^2 + 3(2) + 2}{2^4 + 2(2)^3 - 2^2 - 4(2) + 2}$

$\lim_{x \rightarrow 2} \frac{16 + 24 - 4 + 6 + 2}{16 + 16 - 4 - 8 + 2} = \frac{44}{20} = \frac{11}{5} //$

$$\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 3x + 4} + \sqrt{x^2 + 3x + 4}}{\sqrt{x + 16} - 2}$$

7) $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 3x + 4} + \sqrt{x^2 + 3x + 4}}{\sqrt{x + 16} - 2}$

$\lim_{x \rightarrow 0} \frac{\sqrt{0^2 + 3(0) + 4} + \sqrt{0^2 + 3(0) + 4}}{\sqrt{0 + 16} - 2}$

$\lim_{x \rightarrow 0} \frac{\sqrt{0 + 4} + \sqrt{4}}{\sqrt{16} - 2}$

$\lim_{x \rightarrow 0} = \frac{2 + 2}{4 - 2} = \frac{4}{2} = 2 //$



$$\lim_{x \rightarrow -5} \frac{x^5 + 2x^4 - 3x^3 - \sqrt{x^2 - 9x} - x^2 + 2(x^4 - x^3 + 9)}{x^{-3} + \frac{x^2}{2-3x} - x^3 + 2x - \sqrt{x^2 - 1}}$$

8) $\lim_{x \rightarrow -5} \frac{x^5 + 2x^4 - 3x^3 - \sqrt{x^2 - 9x} - x^2 + 2(x^4 - x^3 + 9)}{x^{-3} + \frac{x^2}{2-3x} - x^3 + 2x - \sqrt{x^2 - 1}} \cdot (x^4 - x^3 + 9)$

$\lim_{x \rightarrow -5} \frac{-5^5 + 2(-5)^4 - 3(-5)^3 - \sqrt{(-5)^2 - 9(-5)} - (-5)^2 + 2((-5)^4 - (-5)^3 + 9)}{(-5)^{-3} + \frac{(-5)^2}{2-3(-5)} - (-5)^3 + 2(-5) - \sqrt{(-5)^2 - 1}} \cdot ((-5)^4 - (-5)^3 + 9)$

$\lim_{x \rightarrow -5} \frac{-3125 + 2(625) - 3(-125) - \sqrt{25 - 9(-5)} - (25) + 2 \cdot 625 - (-125) + 18}{-125 + \frac{25}{2-(-15)} - (-125) + (-10) - \sqrt{5}} \cdot 625 - (-125) + 18$

$\lim_{x \rightarrow -5} \frac{-3125 + 1250 + 375 - \sqrt{70} - 23 \cdot 759}{-125 + \frac{25}{17} + 125 - 10 - \sqrt{24}} \cdot 759$

$\lim_{x \rightarrow -5} \frac{-1523 - \sqrt{70}}{-145 - \sqrt{24}} \cdot 759$

$\lim_{x \rightarrow -5} \frac{-1523 - \sqrt{70}}{-145 - \sqrt{24}} = \frac{17(-1159957 - 759\sqrt{70})}{-145 - 17\sqrt{24}}$

$\lim_{x \rightarrow -5} \frac{19651269 - 759\sqrt{70}}{-145 - 17\sqrt{24}} //$

$$\lim_{x \rightarrow 4} \sqrt{x^3 + x^2 + x - 5} - \sqrt{3x^2 + 4x + 10} - \frac{6x^2 + 3x - 5}{x^2 - 1}$$

9) $\lim_{x \rightarrow 4} \sqrt{x^3 + x^2 + x - 5} - \sqrt{3x^2 + 4x + 10} - \frac{6x^2 + 3x - 5}{x^2 - 1}$

$\lim_{x \rightarrow 4} \sqrt{4^3 + 4^2 + 4 - 5} - \sqrt{3(4)^2 + 4(4) + 10} - \frac{6(4)^2 + 3(4) - 5}{4^2 - 1}$

$\lim_{x \rightarrow 4} \sqrt{64 + 16 + 4 - 5} - \sqrt{48 + 16 + 10} - \frac{96 + 12 - 5}{16 - 1}$

$\lim_{x \rightarrow 4} \sqrt{79} - \sqrt{74} - \frac{103}{15}$

$\lim_{x \rightarrow 4} \frac{\sqrt{79} - \sqrt{74}}{15} - \frac{103}{15} //$