

Ejercicios 1.5

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Cálculo I

3-750-1980

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$$1) f(x) = \frac{1}{x-4} = \lim_{x \rightarrow 4} \frac{1}{x-4} = \frac{1}{0} = \text{no existe}$$

$$\lim_{x \rightarrow 4^+} \frac{1}{x-4} = \frac{1}{4.001-4} = \frac{1}{0} = \infty$$

$$\lim_{x \rightarrow 4^-} \frac{1}{x-4} = \frac{1}{3.99-4} = \frac{1}{-0} = -\infty$$

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

$$\lim_{x \rightarrow 4^+} \frac{1}{(x-4)^2} = \frac{1}{(4.001-4)^2} = \frac{1}{(0)^2} = \frac{1}{0} = \infty$$

$$\lim_{x \rightarrow 4^-} \frac{1}{(x-4)^2} = \frac{1}{(3.99-4)^2} = \frac{1}{(-0)^2} = \frac{1}{0} = \infty$$

$$7) f(x) = \tan \frac{\pi x}{4} = \lim_{x \rightarrow -2} \tan \frac{\pi x}{4} = -\infty$$

$$\lim_{x \rightarrow -2^+} \tan \frac{\pi x}{4} = \frac{\tan \pi(-1.999)}{4} = \tan \frac{-\pi}{2} = -\infty$$

$$\lim_{x \rightarrow -2^-} \tan \frac{\pi x}{4} = \frac{\tan \pi(-2.001)}{4} = \tan \frac{-\pi}{2} = -\infty$$

$$11) f(x) = \frac{x^2}{x^2-9} = \lim_{x \rightarrow 3} \frac{x^2}{x^2-9} = \infty$$

$$\lim_{x \rightarrow 3^-} \frac{-2.99^2}{-2.99^2-9} = \frac{9}{0} = \infty$$

$$\lim_{x \rightarrow 3^+} \frac{-3.001^2}{-3.001^2-9} = \frac{9}{0} = \infty$$

$$5) f(x) = 2 \left| \frac{x}{x^2-4} \right| = \lim_{x \rightarrow 2} 2 \left| \frac{x}{x^2-4} \right| = \infty$$

$$\lim_{x \rightarrow 2^-} 2 \left| \frac{x}{x^2-4} \right| = 2 \left| \frac{-2.001}{-2.001^2-4} \right| = 2 \left| \frac{2}{0} \right| = \infty$$

$$\lim_{x \rightarrow 2^+} 2 \left| \frac{x}{x^2-4} \right| = 2 \left| \frac{1.999}{1.999^2-4} \right| = 2 \left| \frac{2}{-0} \right| = \infty$$

$$9) f(x) = \frac{1}{x^2-9} = \lim_{x \rightarrow 3} \frac{1}{x^2-9} = \infty$$

$$\lim_{x \rightarrow 3^+} \frac{1}{x^2-9} = \frac{1}{-2.99^2-9} = \frac{1}{0} = \infty$$

$$\lim_{x \rightarrow 3^-} \frac{1}{x^2-9} = \frac{1}{-3.001^2-9} = \frac{1}{0} = \infty$$

$$13) f(x) = \frac{1}{x^2}$$

$$x^2 = 0$$

$x=0 \leftarrow$ Asintota vertical

$$15) f(x) = \frac{x^2}{x^2-4}$$

$$x^2-4=0$$

$$x^2=4$$

$$x=\pm 2$$

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$$x=-2 \text{ y } x=2$$

$$17) g(t) = \frac{t-1}{t^2+1} = \text{No tiene asintotas verticales}$$

$$19) h(x) = \frac{x^2-2}{x^2-x-2}$$

$$x^2-x-2=0$$

$$(x-2)(x+1) \Rightarrow$$

$$x=2 \quad x=-1$$

$$21) T(t) = 1 - \frac{4}{t^2} \rightarrow 23) f(x) = \frac{3}{x^2+x-2}$$

$$t^2=0$$

$$t=0$$

$$x^2+x-2=0$$

$$(x+2)(x-1)=0$$

$$x=-2 \quad x=1$$

$$27) f(x) = \frac{x^2-2x-15}{x^3-5x^2+x-5}$$

$$\frac{(x-5)(x+3)}{x^2(x-5) + (x-5)} = 0$$

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

$$\frac{x+3}{x^2+1} = 0$$

No tiene asintota vertical

$$25) g(x) = \frac{x^3+1}{x+1}$$

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

No tiene asintotas verticales