CONJUGADA HOJA 1

$$(a+b)(a-b)=a^2-b^2$$

① $a-b=\dfrac{a^2-b^2}{a+b}$

③ $\boxed{\sqrt{a}-b=\dfrac{a-b^2}{\sqrt{a}+b}}$

② $\boxed{\sqrt{a}-\sqrt{b}=\dfrac{a-b}{\sqrt{a}+\sqrt{b}}}$

④ $\boxed{a-\sqrt{b}=\dfrac{a^2-b}{a+\sqrt{b}}}$

EJERCICIOS:

1) $$\lim_{x\to+\infty} \underbrace{\sqrt{x^2+5x}}_{+\infty}-\underbrace{\sqrt{x^2+10x}}_{+\infty} = \lim_{x\to+\infty} \frac{x^2+5x-(x^2+10x)}{\sqrt{x^2+5x}+\sqrt{x^2+10x}} =$$

INDETERMINADO

$$= \lim_{x\to+\infty} \frac{\cancel{x^2}+5x-\cancel{x^2}-10x}{\underbrace{\sqrt{x^2+5x}}_{\sim x}+\underbrace{\sqrt{x^2+10x}}_{\sim x}} = \lim_{x\to+\infty} \frac{-5x}{2x} = -\frac{5}{2}$$

$x^2+5x \sim x^2$ $\quad \sqrt{x^2} \sim x$ CUANDO $x\to+\infty$

$x^2+10x \sim x^2$

2) $$\lim_{x\to-\infty} \underbrace{\sqrt{x^2+5x}}_{+\infty}-\underbrace{\sqrt{x^2+10x}}_{+\infty} = \lim_{x\to-\infty} \frac{x^2+5x-x^2-10x}{\sqrt{x^2+5x}+\sqrt{x^2+10x}} =$$

$$= \lim_{x\to-\infty} \frac{-5x}{\sqrt{x^2}+\sqrt{x^2}} = \lim_{x\to-\infty} \frac{-5x}{-2x} = \frac{5}{2}$$

PORQUE AHORA $\sqrt{x^2}=-x$ PORQUE $x\to-\infty$

$\sqrt{3^2} = 3$

$\sqrt{(-3)^2} = 3$

$$\boxed{\begin{array}{ll} \sqrt{x^2} = x & \text{si } x \geq 0 \\ \sqrt{x^2} = -x & \text{si } x < 0 \end{array}}$$

HOJA 2

ENTONCES, si $x \to +\infty$, $\sqrt{x^2 + 187x} \sim \sqrt{x^2} = x$

si $x \to -\infty$, $\sqrt{x^2 + 187x} \sim \sqrt{x^2} = -x$

CONJUGADA

3) $$\lim_{x \to 4} \frac{\sqrt{x+1} - \sqrt{5}}{2x-8} = \lim_{x \to 4} \frac{\frac{x+1-5}{\sqrt{x+1}+\sqrt{5}}}{2x-8} =$$

$$= \lim_{x \to 4} \frac{x-4}{\sqrt{x+1}+\sqrt{5}} \cdot \frac{1}{2x-8} = \lim_{x \to 4} \frac{\cancel{x-4}}{\sqrt{x+1}+\sqrt{5}} \cdot \frac{1}{2(\cancel{x-4})}$$

$$= \lim_{x \to 4} \frac{1}{\underbrace{\sqrt{x+1}}_{\sqrt{5}}+\sqrt{5}} \cdot \frac{1}{2} = \frac{1}{4\sqrt{5}}$$

(PORQUE $\sqrt{5}+\sqrt{5} = 2\sqrt{5}$)

$2\sqrt{5}$

4) $$\lim_{x \to -2} \frac{\sqrt{x+5} - \sqrt{2x+7}}{\sqrt{3x+7} - \sqrt{4x+9}} = \lim_{x \to -2} \frac{\frac{x+5-2x-7}{\sqrt{x+5}+\sqrt{2x+7}}}{\frac{3x+7-4x-9}{\sqrt{3x+7}+\sqrt{4x+9}}} =$$

($\sqrt{x+5} \to \sqrt{3}$, $\sqrt{2x+7} \to \sqrt{3}$, $\sqrt{3x+7} \to 1$, $\sqrt{4x+9} \to 1$)

$$\lim_{x \to -2} \frac{\cancel{-x-2}}{\sqrt{x+5}+\sqrt{2x+7}} \cdot \frac{\sqrt{3x+7}+\sqrt{4x+9}}{\cancel{-x-2}} = \frac{1+1}{\sqrt{3}+\sqrt{3}} = \frac{2}{2\sqrt{3}} = \boxed{\frac{1}{\sqrt{3}}}$$

ES MEJOR RACIONALIZAR EL DENOMINADOR.

$$\frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

HOJA 3

5) $\lim\limits_{x \to +\infty} \overset{\nearrow +\infty}{2x} + \overset{\nearrow +\infty}{\sqrt{4x^2-5x+6}} = +\infty$

NO ES UN LÍMITE INDETERMINADO.

6) $\lim\limits_{x \to -\infty} \overset{\nearrow -\infty}{2x} + \overset{\nearrow +\infty}{\sqrt{4x^2-5x+6}}$ = USAMOS FÓRMULA CON "+"

$$a - \sqrt{b} = \frac{a^2 - b}{a + \sqrt{b}} \Rightarrow a + \sqrt{b} = \frac{a^2 - b}{a - \sqrt{b}}$$

$$= \lim_{x \to -\infty} \frac{(2x)^2 - (4x^2 - 5x + 6)}{2x - \sqrt{4x^2-5x+6}} =$$

$$= \lim_{x \to -\infty} \frac{\cancel{4x^2} - \cancel{4x^2} + 5x - 6}{2x - \sqrt{4x^2-5x+6}} =$$

ADEMÁS $\sqrt{4x^2-5x+6} \sim \sqrt{4x^2} = -2x$ $\quad x \to -\infty$

PORQUE $x < 0$

$$= \lim_{x \to -\infty} \frac{5x - 6}{2x - \underbrace{\sqrt{4x^2-5x+6}}_{\sim -2x}} = \lim_{x \to -\infty} \frac{5x}{2x - (-2x)} =$$

$$= \lim_{x \to -\infty} \frac{5x}{4x} = \boxed{\frac{5}{4}}$$