Estudando funções matemáticas

Deise Freire

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Se $f(x) = \frac{x-1}{x+1}$, determine o valor de y tal que:

$$y = \frac{f(x) - f(-x)}{1 + f(x) \bullet f(-x)}$$

$$f(x) = \frac{x-1}{x+1} \qquad (1) \qquad\qquad y = \frac{f(x) - f(-x)}{1 + f(x) \bullet f(-x)} \qquad (2)$$

Cálculo de $f(-x)$: $f(-x) = \frac{-x-1}{-x+1} \Rightarrow f(-x) = \frac{-(x+1)}{-(x-1)} \Rightarrow f(-x) = \frac{x+1}{x-1}$

Logo: $y = \frac{f(x) - f(-x)}{1 + f(x) \bullet f(-x)} \Rightarrow y = \frac{\frac{x-1}{x+1} - \frac{x+1}{x-1}}{1 + \cancel{\frac{x-1}{x+1}} \bullet \cancel{\frac{x+1}{x-1}}} \Rightarrow y = \frac{\frac{(x-1)^2 - (x+1)^2}{(x-1) \bullet (x+1)}}{1+1}$

$$y = \frac{\frac{\left(x^2 - 2x + 1\right) - \left(x^2 + 2x + 1\right)}{x^2 - 1}}{2} \Rightarrow y = \frac{\cancel{x^2} - 2x + \cancel{1} - \cancel{x^2} - 2x - \cancel{1}}{x^2 - 1} \bullet \frac{1}{2}$$

$$y = \frac{-4x}{2 \bullet (x^2 - 1)} \Rightarrow y = \frac{-2x}{(x^2 - 1)} \Rightarrow y = \frac{-2x}{-(1 - x^2)} \Rightarrow y = \frac{2x}{1 - x^2}$$