derivative

$$y = \ln\left(\frac{1-x}{1+x}\right)$$

domain of $y \Rightarrow x \in (-1, +1)$

range of $y \Rightarrow y \in (-\infty, +\infty)$

Chain rule:

$$h'(x) = f'(g(x)) \cdot g'(x)$$

Quotient rule:

$$\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$$

1. outer $f(u) = \ln(u)$

   inner $g(x) = \left(\frac{1-x}{1+x}\right)$

2. $f'(u) = \frac{1}{u}$, because $\boxed{\ln'(x) = \frac{1}{x}}$

3. $u = 1-x$; $u' = 0-1 = -1$

   $v = 1+x$; $v' = 0+1 = 1$

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

4. $$y' = \frac{1}{\frac{1-x}{1+x}} \cdot \frac{-2}{(1+x)^2} = \frac{\cancel{(1+x)}}{1-x} \cdot \frac{-2}{\cancel{(1+x)}(1+x)} =$$

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

$$y' = \frac{2}{x^2-1}$$