Answer on Question #48613 – Math - Calculus

d/dx tan−1(1-x/1+x)w.r.t. √(1-x^2)

Solution.

$$\sqrt{1-x^2} = y \rightarrow \quad x = \sqrt{1-y^2} \ .$$

$$\frac{df}{dy} = \frac{df}{dx}\frac{dx}{dy} = \frac{df}{dx}\left(-\frac{y}{\sqrt{1-y^2}}\right) = \frac{df}{dx}\left(-\frac{\sqrt{1-x^2}}{x}\right)$$

$$\frac{d}{d\sqrt{1-x^2}}\left[tan^{-1}\left(\frac{1-x}{1+x}\right)\right] = \frac{d}{dx}\left[tan^{-1}\left(\frac{1-x}{1+x}\right)\right]\left(-\frac{\sqrt{1-x^2}}{x}\right) =$$

$$= \frac{1}{1+\left(\frac{1-x}{1+x}\right)^2} * \frac{d}{dx}\left(\frac{1-x}{1+x}\right) * \left(-\frac{\sqrt{1-x^2}}{x}\right) =$$

$$= \frac{(1+x)^2}{2(1+x^2)} * \left(-\frac{2}{(1+x)^2}\right) * \left(-\frac{\sqrt{1-x^2}}{x}\right) =$$

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