

Answer on Question #48615 – Math – Calculus

Task:

if $y = \frac{1}{\sin\left(\frac{1}{\sqrt{1+x^2}}\right)} + \frac{1}{\tan\left(\sqrt{1+x^2} - \frac{1}{x}\right)}$, find dy/dx .

Solution:

$$\begin{aligned} y &= \frac{1}{\sin\left(\frac{1}{\sqrt{1+x^2}}\right)} + \frac{1}{\tan\left(\sqrt{1+x^2} - \frac{1}{x}\right)} \Rightarrow \\ \frac{dy}{dx} &= \frac{(-1) \cdot \cos\left(\frac{1}{\sqrt{1+x^2}}\right) \left(\frac{-2x}{2(\sqrt{1+x^2})^3}\right)}{\sin^2\left(\frac{1}{\sqrt{1+x^2}}\right)} + \frac{(-1) \cdot \left(\frac{2x}{2\sqrt{1+x^2}} + \frac{1}{x^2}\right)}{\tan^2\left(\sqrt{1+x^2} - \frac{1}{x}\right) \cdot \cos^2\left(\sqrt{1+x^2} - \frac{1}{x}\right)} = \\ &= \frac{\frac{x}{(\sqrt{1+x^2})^3} \cos\left(\frac{1}{\sqrt{1+x^2}}\right)}{\sin^2\left(\frac{1}{\sqrt{1+x^2}}\right)} + \frac{(-1) \cdot \left(\frac{x}{\sqrt{1+x^2}} + \frac{1}{x^2}\right)}{\sin^2\left(\sqrt{1+x^2} - \frac{1}{x}\right)} = \\ &= \frac{x \cdot \cos\left(\frac{1}{\sqrt{1+x^2}}\right)}{(\sqrt{1+x^2})^3 \sin^2\left(\frac{1}{\sqrt{1+x^2}}\right)} - \frac{x^3 + \sqrt{1+x^2}}{x^2 \sqrt{1+x^2} \sin^2\left(\sqrt{1+x^2} - \frac{1}{x}\right)} \end{aligned}$$