

$$\begin{aligned}
 f'(x) &= -\frac{1}{\sqrt{1 - \frac{(1-x)^2}{(1+x)^2}}} \cdot \frac{-(1+x) - (1-x)}{(1+x)^2} = -\frac{1+x}{\sqrt{(1+x)^2 - (1-x)^2}} \cdot \frac{-2}{(1+x)^2} = \\
 &= \frac{2}{(1+x)\sqrt{4x}} = \frac{1}{(1+x)\sqrt{x}} = \frac{\sqrt{x}}{x(1+x)}
 \end{aligned}$$