

$$\begin{aligned} f(x) = \frac{v}{v + c/v} &\Rightarrow f'(x) = \frac{(v + c/v)(1) - v(1 - c/v^2)}{\left(v + \frac{c}{v}\right)^2} = \\ &= \frac{v + c/v - v + c/v}{\left(\frac{v^2 + c}{v}\right)^2} = \frac{\frac{2c}{v}}{\frac{(v^2 + c)^2}{v^2}} \cdot \frac{v^2}{v^2} = \frac{2cv}{(v^2 + c)^2} \end{aligned}$$