$y = x^{\tan x}$ $\qquad x = e^{\ln x}$

$\ln y = \ln x^{\tan x} = \tan x \ln x$

$\frac{d}{dx}(\ ) = \frac{1}{y}\frac{dy}{dx} = \sec^2 x \ln x + \frac{\tan x}{x}$

$\frac{dy}{dx} = x^{\tan x}\left(\sec^2 x \ln x + \frac{\tan x}{x}\right)$

$= \left(\frac{\pi}{3}\right)^{\sqrt{3}}\left(4 \ln \frac{\pi}{3} + \frac{\sqrt{3}}{\frac{\pi}{3}}\right)$