

$$\lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} \cos x \cdot \ln(\tan x) = (0 \cdot \infty) = \lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} \frac{\ln(\tan x)}{\frac{1}{\cos x}} = \left(\frac{\infty}{\infty}\right) \stackrel{\text{L'Hôpital}}{=}$$

$$= \lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} \frac{\frac{1}{\tan x} \cdot \frac{1}{\cos^2 x}}{\frac{-\sin x}{\cos^2 x}} = \lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} \frac{1}{\frac{\sin x}{\cos x} \cdot \sin x} = \lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} \frac{\cos x}{\sin^2 x} = \frac{0}{1} = 0$$

$$\lim_{x \rightarrow \frac{\pi}{4}} \left(\frac{1}{\cos 2x} - \frac{\tan x}{1 - \left(\frac{4x}{\pi}\right)} \right) = \frac{1}{\cos 2\left(\frac{\pi}{4}\right)} - \frac{\tan \frac{\pi}{4}}{1 - \frac{4\left(\frac{\pi}{4}\right)}{\pi}} = \frac{1}{0} - \frac{1}{0} = (\infty - \infty) =$$

$$= \lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \frac{4x}{\pi} - \cos 2x \cdot \tan x}{\cos 2x \left(1 - \frac{4x}{\pi}\right)} \stackrel{\text{L'Hôpital}}{=} \frac{1 - \frac{4}{\pi} \cdot \frac{\pi}{4} - \cos\left(2 \cdot \frac{\pi}{4}\right) \cdot \tan \frac{\pi}{4}}{\cos 2\left(\frac{\pi}{4}\right) \left(1 - \frac{4}{\pi} \cdot \frac{\pi}{4}\right)} = \frac{0}{0} =$$

$$= \lim_{x \rightarrow \frac{\pi}{4}} \frac{-\frac{4}{\pi} - (-\sin 2x) \cdot 2 \cdot \tan x + \cos 2x \cdot \frac{1}{\cos^2 x}}{-\sin 2x \cdot 2 \left(1 - \frac{4x}{\pi}\right) + \cos 2x \cdot \left(-\frac{4}{\pi}\right)} = \lim_{x \rightarrow \frac{\pi}{4}} \frac{-\frac{4}{\pi} + 2 \sin 2x \tan x + \frac{\cos 2x}{\cos^2 x}}{-2 \sin 2x \left(1 - \frac{4x}{\pi}\right) - \frac{4}{\pi} \cos 2x}$$

$$= \frac{-\frac{4}{\pi} + 2 \cdot 1 \cdot 1 + \frac{0}{\left(\frac{\sqrt{2}}{2}\right)^2}}{-2 \cdot 1 \cdot 0 - \frac{4}{\pi} \cdot 0} = \frac{-\frac{4}{\pi} + 2}{0} \text{ (Indeterminación } 0/0 \text{) Planteamos límites laterales:}$$

$$\lim_{x \rightarrow \left(\frac{\pi}{4}\right)^-} \left(\frac{1}{\cos 2x} - \frac{\tan x}{1 - \left(\frac{4x}{\pi}\right)} \right) = -\infty \quad \lim_{x \rightarrow \left(\frac{\pi}{4}\right)^+} \left(\frac{1}{\cos 2x} - \frac{\tan x}{1 - \left(\frac{4x}{\pi}\right)} \right) = +\infty$$

luego no existe el límite.

$$\lim_{x \rightarrow 1} \left(\frac{e}{e^x - e} - \frac{1}{x-1} \right) = \frac{e}{e^1 - e} - \frac{1}{0} = (\infty - \infty) = \lim_{x \rightarrow 1} \frac{e(x-1) - (e^x - e)}{(e^x - e)(x-1)} =$$

$$= \lim_{x \rightarrow 1} \frac{ex - \cancel{e} - e^x + \cancel{e}}{(e^x - e) \cdot (x-1)} = \frac{e \cdot 1 - e^1}{(e^1 - e)(1-1)} = \left(\frac{0}{0}\right) \stackrel{\text{L'Hôpital}}{=}$$

$$= \lim_{x \rightarrow 1} \frac{e - e^x}{e^x(x-1) + (e^x - e) \cdot 1} \stackrel{\text{L'Hôpital}}{=} \lim_{x \rightarrow 1} \frac{-e^x}{e^x(x-1) + e^x + e^x} = \frac{-e}{2e} =$$

$$= \boxed{-\frac{1}{2}}$$