Find $\left.\frac{dy}{dx}\right|_{x=0}$ where $y = \frac{\sqrt{x^2+1}\cdot e^{\cos x}\cdot \cos^e x}{(1+x\sin x)^2 \cdot 2^{3^x}}$.

$y(0) = \frac{e}{2}$

$$\ln y = \ln \frac{\sqrt{x^2+1}\cdot e^{\cos x}\cdot \cos^e x}{(1+x\sin x)^2 \cdot 2^{3^x}}$$

$$= \frac{1}{2}\ln(x^2+1) + \cos x + e\ln(\cos x) - 2\ln(1+x\sin x) - 3^x \ln$$

$$\frac{y'}{y} = \frac{1}{2}\cdot\frac{2x}{x^2+1} - \sin x + e\cdot\frac{(-\sin x)}{\cos x} - 2\cdot\frac{(\sin x + x\cos x)}{1+x\sin x} - 3^x \cdot \ln 3 .$$

$$y'(0) = y(0)\left[\frac{1}{2}\cdot 0 - 0 + e\cdot 0 - \frac{2\cdot 0}{1+0} - 1\cdot \ln 3 \cdot \ln 2\right]$$

$$= \frac{1\cdot e\cdot 1}{2}\cdot(-\ln 3\cdot \ln 2)$$

$$= -\frac{e\cdot \ln 3\cdot \ln 2}{2}$$