$$\frac{dy}{dx}\text{ impl diff}$$

$${}^{x+y}\mathfrak{c}\,y + {}^{y}\mathfrak{e}\,x = y^2 \Longrightarrow dy/dx$$

$$1+\ln\left(\frac{x}{y}\right) = y^2\,e^{2x} \Longrightarrow \frac{d}{dx}\text{ LHS } = \frac{y}{x}\frac{1y-xy'}{y^2} = \frac{1}{x}-\frac{y'}{y} = \frac{d}{dx}\text{ RHS } = 2y\,y'\,e^{2x} + 2\,y^2\,e^{2x} \Longrightarrow y' = \frac{1/x-2y^2e^{2x}}{1/y+2ye^{2x}}$$

$${}^{y}\mathfrak{s} = {}^{x^2+y}\mathfrak{c}\,x \Longrightarrow \frac{d}{dx}\text{ LHS } = {}^{y}\mathfrak{c}\,y' = \frac{d}{dx}\text{ RHS } = {}^{x^2+y}\mathfrak{c} - {}^{x^2+y}\mathfrak{s}\,x\underbrace{2x+y'} \Longrightarrow y' = \frac{{}^{x^2+y}\mathfrak{c} - 2^{x^2+y}\mathfrak{s}x^2}{{}^{y}\mathfrak{c} + {}^{x^2+y}\mathfrak{s}x}$$

equ tang line to graph

$$y = \frac{{}^{\sqrt{x}}\not{\mathfrak{e}}}{{}^{x^2-1}\mathfrak{c}}\text{ at } (1{:}0)$$

$$y = {}^{x^2}\mathfrak{e}\,{}^{\sqrt{x}}\not{\mathfrak{e}}\text{ at } (1{:}0) \Longrightarrow y' = {}^{x^2}\mathfrak{e}\,2x\,{}^{\sqrt{x}}\not{\mathfrak{e}} + {}^{x^2}\mathfrak{e}\,\frac{1}{\sqrt{x}}\frac{1}{2\sqrt{x}} \underset{x=1}{=} \frac{e}{2} \Longrightarrow y = \frac{e}{2}x+b \underset{y=0}{\Longrightarrow} b = -\frac{e}{2} \Longrightarrow y = \frac{e}{2}x - \frac{e}{2}$$