Extra Problem (implicit differentiation)

$$\sqrt{1+\sin^3(xy^2)} = y$$

$$\left[1+(\sin(xy^2))^3\right]^{1/2} = y$$

$$\boxed{\underbrace{\tfrac{1}{2}\left[1+\sin^3(xy^2)\right]^{-1/2}\cdot 3(\sin(xy^2))^2\cdot\cos(xy^2)}_{=A}}\cdot\overbrace{\left[x2yy'+y^2\right]}^{\text{P.R.}} = y'$$

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$$A\left[x2yy'+y^2\right] = y'$$

$$2Axyy' + Ay^2 = y'$$

$$Ay^2 = 1y' - 2Axyy'$$

$$Ay^2 = y'(1-2Axy)$$

$$\frac{Ay^2}{1-2Axy} = y'$$ You could leave this answer.

$$\frac{\dfrac{\frac{3}{2}\sin^2(xy^2)\cos(xy^2)}{\sqrt{1+\sin^3(xy^2)}}\,y^2}{1-\dfrac{\cancel{2}\cdot\frac{3}{\cancel{2}}\sin^2(xy^2)\cos(xy^2)}{\sqrt{1+\sin^3(xy^2)}}\,xy} = y'$$

This is a compound fraction. Multiply by 1 as

$$\frac{2\sqrt{1+\sin^3(xy^2)}}{2\sqrt{1+\sin^3(xy^2)}}.$$ We get

$$\frac{3y^2\sin^2(xy^2)\cos(xy^2)}{2\sqrt{1+\sin^3(xy^2)} - 6xy\sin^2(xy^2)\cos(xy^2)} = y'.$$