The notation $\overset{\text{PR}}{\Rightarrow}$ indicates the use of the Product Rule.

$$F(y) = \left(\frac{1}{y^2} - \frac{3}{y^4}\right)(y + 9y^3) = (y^{-2} - 3y^{-4})(y + 9y^3) \quad \overset{\text{PR}}{\Rightarrow}$$

$$\begin{aligned} F'(y) \quad &= (y^{-2} - 3y^{-4})(1 + 27y^2) + (y + 9y^3)(-2y^{-3} + 12y^{-5}) \\ &= (y^{-2} + 27 - 3y^{-4} - 81y^{-2}) + (-2y^{-2} + 12y^{-4} - 18 + 108y^{-2}) \\ &= 9 + 26y^{-2} + 9y^{-4} \quad \text{or} \quad 9 + 26/y^2 + 9/y^4 \end{aligned}$$