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IC. Tutorial - 1

Q.1

$$xy^2 \cdot \frac{dy}{dx} = 1 - x^2 + y^2 - x^2 y^2$$

$$xy^2 \cdot \frac{dy}{dx} = (1-x^2)(1+y^2)$$

$$\frac{y^2}{1+y^2} \cdot dy = \frac{1-x^2}{x} \cdot dx$$

$$\left(1 - \frac{1}{1+y^2}\right) \cdot dy = \left(\frac{1}{x} - x\right) dx$$

Integrating both sides,

$$\int \left(1 - \frac{1}{1+y^2}\right) \cdot dy = \int \left(\frac{1}{x} - x\right) \cdot dx$$

$$y - \tan^{-1}y = \log|x| - \frac{x^2}{2} + c.$$

$$\underline{}$$

Q.2.

$$\frac{dy}{dx} = xy + 2 - 2x - y$$

$$= \frac{x(-2+y)}{y(x-1)} \cancel{+} 2(x-1)$$

$$\frac{dy}{dx} = (x-1)(y-2)$$

$$\frac{dy}{y-2} = \left(\frac{x-1}{\cancel{x}}\right) dx$$

Integrating both sides,

$$\int \frac{dy}{y-2} = \int (x-1)\, dx + c$$

$$\log|y-2| = \frac{x^2}{2} - x + c$$

Q. 3.

$$\frac{dy}{dx} = \frac{3x^2 + 4x - 4}{2y - 4}$$

$$(2y-4) \cdot dy = (3x^2 + 4x - 4) \cdot dx$$

$$\frac{2y^2}{2}$$ Integrating both sides

$$\int (2y - 4) \cdot dy = \int (3x^2 + 4x - 4) \cdot dx$$

$$= \frac{2y^2}{2} - 4y = \frac{3x^3}{3} + \frac{4x^2}{2} - 4x + c$$

$$y^2 - 4y = x^3 + 2x^2 - 4x + c$$