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EDO Capítulo 6

Exemplo 6.1) $2x + y^2 + 2xy\frac{dy}{dx}$

$M = 2x + y^2 \quad M_y = 2y$

$N = 2xy \quad N_x = 2y$

$$\int M(x,y)\,dx = \int 2x + y^2\,dx = x^2 + y^2x + h(y) = f(x,y)$$

$$f(x,y)_y = 2yx + h' = 2yx \qquad h' = 0$$

$$F(x,y) = x^2 + y^2x + C \Rightarrow y = \pm\sqrt{C - x^2}$$

Exemplo 6.2) $(y\cos x + 2xe^y) + (\operatorname{sen}(x) + x^2e^y - 1)y' = 0$

$M = y\cos x + 2xe^y \quad M_y = \cos x + 2xe^y$

$N = \operatorname{sen} x + x^2e^y - 1 \quad M_x = \cos x + 2xe^y$

$$\int M\,dx = \int y\cos x\,dx + \int 2xe^y\,dx$$

$$y\operatorname{sen} x + e^y x^2 + h(y) = \Psi(x,y)$$

$$\Psi(x,y)_y = \operatorname{sen} x + x^2e^y + h'(y) = \operatorname{sen} x + x^2e^y - 1$$

$$h' = -1$$

$$\Psi(x,y) = \operatorname{sen} x + x^2e^y - y + C = 0$$

$$h = y$$

$$y = -y\operatorname{sen} x - x^2e^y - C$$

Exemplo 6.3) $(3xy + y^2) + (x^2 + xy)y' = 0$

$M = (3xy + y^2)$ $\quad M_y = 3x + 2y$

$N = x^2 + xy$ $\quad N_x = 2x + y$ $\Rightarrow M_y \neq N_x$

$\Psi(x,y) = C$

$\int M_x \, dx = \int 3xy \, dx + \int y^2 \, dx = \frac{3y}{2} x^2 + y^2 x + h(y)$

$\Psi_y = \frac{3}{2} x^2 + 2yx \neq x^2 + xy$