

> restart

>

$$\underbrace{(xy^2 - y^2 + x - 1)}_{M(x,y)} + \underbrace{(x^2y - 2xy + x^2 + 2y - 2x + 2)}_{N(x,y)} \frac{dy}{dx} = 0$$

> with(DEtools) :

> Ecuacion := (x·y(x)·2 - y(x)·2 + x - 1) + (x·2·y(x) - 2·x·y(x) + x·2 + 2·y(x) - 2·x + 2)·diff(y(x), x) = 0

$$\text{Ecuacion} := x y(x)^2 - y(x)^2 + x - 1 + (x^2 y(x) - 2 x y(x) + x^2 + 2 y(x) - 2 x + 2) \left(\frac{d}{dx} y(x) \right) = 0 \quad (1)$$

> odeadvisor(Ecuacion)

[_separable] (2)

> M := (x·y·2 - y·2 + x - 1)

$$M := x y^2 - y^2 + x - 1 \quad (3)$$

> N := (x·2·y - 2·x·y + x·2 + 2·y - 2·x + 2)

$$N := x^2 y - 2 x y + x^2 + 2 y - 2 x + 2 \quad (4)$$

> factor(M)

$$(y^2 + 1) (x - 1) \quad (5)$$

> factor(N)

$$(x^2 - 2 x + 2) (1 + y) \quad (6)$$

> P := (x - 1); Q := y^2 + 1; R := x^2 - 2 x + 2; S := (1 + y);

$$P := x - 1$$

$$Q := y^2 + 1$$

$$R := x^2 - 2 x + 2$$

$$S := 1 + y$$

(7)

> SolGeneral := int(P/R, x) + int(S/Q, y) = C₁

$$\text{SolGeneral} := \frac{1}{2} \ln(x^2 - 2 x + 2) + \frac{1}{2} \ln(y^2 + 1) + \arctan(y) = C_1 \quad (8)$$

> parametro := subs(x=0, y=5, SolGeneral)

$$\text{parametro} := \frac{1}{2} \ln(2) + \frac{1}{2} \ln(26) + \arctan(5) = C_1 \quad (9)$$

> SolParticular := subs(C₁=lhs(parametro), SolGeneral) : evalf(%, 2)

$$0.50 \ln(x^2 - 2. x + 2.) + 0.50 \ln(y^2 + 1.) + \arctan(y) = 3.3 \quad (10)$$

> with(plots) :

> implicitplot(SolParticular, x=-50..50, y=-100..20)

