```
> restart
> Ecua := -y·(y^2 + 2·x^2) + 2 x·(x^2 + y^2)·y' = 0
```

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

```
> with(DEtools) :
> odeadvisor(Ecua)
```

$$[[\_homogeneous, class\ A], \_rational, \_dAlembert] \quad (2)$$

```
> EcuaSep := isolate(simplify(eval(subs(y(x) = x·u(x), Ecua))), diff(u(x), x))
```

$$EcuaSep := \frac{d}{dx}u(x) = -\frac{u(x)^3}{2x\left(1 + u(x)^2\right)} \quad (3)$$

```
> M := u^3
```

$$M := u^3 \quad (4)$$

```
> N := 2·x·(1 + u^2)
```

$$N := 2x\left(u^2 + 1\right) \quad (5)$$

```
> P := 1; Q := u^3; R := x; S := 2·(u^2 + 1)
```

$$P := 1$$

$$Q := u^3$$

$$R := x$$

$$S := 2u^2 + 2 \quad (6)$$

```
> SG := int(P/R, x) + int(S/Q, u) = _C1
```

$$SG := \ln(x) - \frac{1}{u^2} + 2\ln(u) = \_C1 \quad (7)$$

```
> SGFinal := subs(u = y(x)/x, SG)
```

$$SGFinal := \ln(x) - \frac{x^2}{y(x)^2} + 2\ln\left(\frac{y(x)}{x}\right) = \_C1 \quad (8)$$

```
> DerSG := simplify(isolate(diff(SGFinal, x), diff(y(x), x)))
```

$$DerSG := \frac{d}{dx}y(x) = \frac{y(x)\left(y(x)^2 + 2x^2\right)}{2x\left(x^2 + y(x)^2\right)} \quad (9)$$

```
> DerEcua := isolate(Ecua, diff(y(x), x))
```

$$DerEcua := \frac{d}{dx}y(x) = \frac{y(x)\left(y(x)^2 + 2x^2\right)}{2x\left(x^2 + y(x)^2\right)} \quad (10)$$

```
> restart
> Ecua := x·y' = sqrt(x^2 - y^2) + y
```

$$Ecua := x\left(\frac{d}{dx}y(x)\right) = \sqrt{x^2 - y(x)^2} + y(x) \quad (11)$$

```
> with(DEtools) :
```

> $odeadvisor(Ecua)$

$$[[\_homogeneous, class\ A], \_rational, \_dAlembert] \tag{12}$$

> $EcuaDos := simplify(isolate(eval(subs(y(x) = x \cdot u(x), Ecua)), diff(u(x), x)))$

$$EcuaDos := \frac{d}{dx} u(x) = \frac{\sqrt{x^2 \left(1 - u(x)^2\right)}}{x^2} \tag{13}$$

> $odeadvisor(EcuaDos)$

$$[[\_homogeneous, class\ G], \_rational] \tag{14}$$

> $M := -\mathrm{sqrt}\left(x^2 \left(1 - u^2\right)\right)$

$$M := -\sqrt{x^2 \left(-u^2 + 1\right)} \tag{15}$$

> $Mcuad := M^2$

$$Mcuad := x^2 \left(-u^2 + 1\right) \tag{16}$$

> $MDos := -x \cdot \mathrm{sqrt}\left(-u^2 + 1\right)$

$$MDos := -x \sqrt{-u^2 + 1} \tag{17}$$

> $N := x^2$

$$N := x^2 \tag{18}$$

> $P := -x; Q := \sqrt{-u^2 + 1}; R := x^2; S := 1$

$$P := -x$$

$$Q := \sqrt{-u^2 + 1}$$

$$R := x^2$$

$$S := 1 \tag{19}$$

> $SG := int\left(\frac{P}{R}, x\right) + int\left(\frac{S}{Q}, u\right) = \_C1$

$$SG := -\ln(x) + \arcsin(u) = \_C1 \tag{20}$$

> $SolFinal := subs\left(u = \frac{y(x)}{x}, SG\right)$

$$SolFinal := -\ln(x) + \arcsin\left(\frac{y(x)}{x}\right) = \_C1 \tag{21}$$

> $DerSolFinal := simplify(isolate(diff(SolFinal, x), diff(y(x), x)))$

$$DerSolFinal := \frac{d}{dx} y(x) = \frac{\sqrt{\frac{x^2 - y(x)^2}{x^2}}\, x + y(x)}{x} \tag{22}$$

> $DerEcua := isolate(Ecua, diff(y(x), x))$

$$DerEcua := \frac{d}{dx} y(x) = \frac{\sqrt{x^2 - y(x)^2} + y(x)}{x} \tag{23}$$

> $DerRadical := isolate\left(DerSolFinal, \sqrt{\frac{x^2 - y(x)^2}{x^2}}\right)$

$$DerRadical := \sqrt{\frac{x^2 - y(x)^2}{x^2}} = \frac{x\left(\frac{d}{dx}\,y(x)\right) - y(x)}{x} \tag{24}$$

> $DerRadCuad := simplify\left(lhs(DerRadical)^2 = rhs(DerRadical)^2\right)$

$$DerRadCuad := \frac{x^2 - y(x)^2}{x^2} = \frac{\left(x\left(\frac{d}{dx}\,y(x)\right) - y(x)\right)^2}{x^2} \tag{25}$$

> $DerSolUltima := isolate\left(lhs(DerRadCuad)\cdot x^2 = rhs(DerRadCuad)\cdot x^2, diff(y(x), x)\right)$

$$DerSolUltima := \frac{d}{dx}\,y(x) = \frac{\sqrt{x^2 - y(x)^2} + y(x)}{x} \tag{26}$$

> $DerEcua$

$$\frac{d}{dx}\,y(x) = \frac{\sqrt{x^2 - y(x)^2} + y(x)}{x} \tag{27}$$

> $Comprobar := simplify(rhs(DerSolUltima) - rhs(DerEcua) = 0)$

$$Comprobar := 0 = 0 \tag{28}$$

>

>