$M\,dx + N\,dy = 0$

2.4 Ec exactas

$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

Determinar valor K

$$(6xy^3 + \cos y)\,dx + (2K\,x^2y^2 - x\,\text{sen}\,y)\,dy = 0$$

$$\frac{\partial M}{\partial y} = 18xy^2 - \text{sen}\,y = \frac{\partial N}{\partial x} = 4Kxy^2 - \text{sen}\,y$$

M

$$18 = 4K \Rightarrow \boxed{K = \frac{9}{2}}$$

9) Determinar si la ED es exacta, y resolver si lo es

$$(x - y^3 + y^2\,\text{sen}\,x)\,dx = (3xy^2 + 2y\cos x)\,dy$$

$$\frac{\partial M}{\partial y} = 0 - 3y^2 + 2y\,\text{sen}\,x = \frac{\partial N}{\partial x} = -(3y^2 - 2y\,\text{sen}\,x) = -3y^2 + 2y\,\text{sen}\,x \quad \text{cumple}$$

se elige integrar M ó N

$$F(x,y) = \int x - y^3 + y^2\,\text{sen}\,x\,dx = \frac{x^2}{2} - y^3x - y^2\cos(x) + g(y)$$

$$F_y = -3y^2x - 2y\cos x + g'(y) = N(x,y) = -3xy^2 - 2y\cos(x)$$

$\boxed{g'(y) = 0}$ $\boxed{g(y) = C}$

$-3xy^2$

$$\frac{x^2}{2} - y^3x - y^2\cos(x) + C = 0$$

$$\boxed{\frac{x^2}{2} - xy^3 - y^2\cos(x) = C}$$

1 SQUARE =

14) Resolver si la ED es exacta

$$\left(1-\frac{3}{y}+x\right)\frac{dy}{dx}+y=\frac{3}{x}-1$$

Llevar a su forma estandar

$$\overset{N}{\left(1-\frac{3}{y}+x\right)}dy\ \overset{M}{\left(+y-\frac{3}{x}+1\right)}dx=0$$

$$\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}\Rightarrow 1+0+0=0+0+1\Rightarrow 1=1 \text{ cumple}$$

$$f(x,y)=\int N(x,y)dx=\int y-\frac{3}{x}+1\,dx=\boxed{yx-3\ln|x|+x+g(y)}$$

$$\frac{\partial xy}{\partial y}=$$

$$\frac{\partial f(x,y)}{\partial y}=x-0+0+g'(y)$$

$$\frac{\partial f(x,y)}{\partial y}=N(x,y)\Rightarrow \cancel{x}+g'(y)=1-\frac{3}{y}+\cancel{x}$$

$$g'(y)=1-\frac{3}{y}$$

$$g(y)=\int 1-\frac{3}{y}\,dy$$

$$\boxed{g(y)=y-3\ln|y|}$$

reemplazando en $f(x,y)$:

$$\boxed{x+y+2xy-3\ln|xy|=C}$$

1 SQUARE =

2 #) $\left(\frac{3y^2 - t^2}{y^5}\right)\frac{dy}{dt} + \frac{t}{2y^4} = 0 \qquad y(1) = 1$

$$\overset{N}{\left(\frac{3y^2 - t^2}{y^5}\right)} dy + \overset{M}{\left(\frac{t}{2y^4}\right)} dt = 0$$

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial t} \Rightarrow 0 \; \frac{-2t}{y^5} = 0 - \frac{2t}{y5} \Rightarrow \boxed{\frac{-2t}{y^5} = \frac{-2t}{y^5}} \quad \text{Cumple}$$

$$f(t,y) = \int \frac{t}{2y^4}\, dt = \frac{t^2}{4y^4} + g(y)$$

$$\frac{\partial f(t,y)}{\partial y} = \frac{-4t^2}{4y^5} + g'(y)$$

$$\frac{\partial f(t,y)}{\partial y} = N(t,y) \Rightarrow \cancel{\frac{-t^2}{y^5}} + g'(y) = \frac{3y^2}{y^5} - \cancel{\frac{t^2}{y^5}}$$

$$g'(y) = \frac{3}{y^3} \Rightarrow g(y) = \frac{3\,y^{-2}}{-2} = \frac{-3}{2y^2}$$

$$\frac{t^2}{4y^4} - \frac{3}{2y^2} = C$$

$y(1) = 1$

$$\frac{1}{4} - \frac{3}{2} = -\frac{5}{4}$$

$$\boxed{\frac{t^2}{4y^4} - \frac{3}{2y^2} = \frac{-5}{4}}$$

1 SQUARE =

27 Determinar K | sea $f(x,y)$ una ED exacta

$$\overbrace{(y^3 + Kxy^4 - 2x)}^{M} dx + \overbrace{(3xy^2 + 20x^2y^3)}^{N} dy = 0$$

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} \Rightarrow 3y^2 + 4Kxy^3 - 0 = 3y^2 - 40xy^3$$

$$4Kx\cancel{y^3} = -40\cancel{xy^3}$$

$$\boxed{K = -10}$$

10) $(x^3 + y^3)\,dx + 3xy^2\,dy = 0$

$3y^2 = 3y^2$ cumple

$$f(x,y) = \int 3xy^2\,dy = xy^3 + g(x)$$

$$f_x = \cancel{y^3} + g'(x) = x^3 + \cancel{y^3}$$

$$g'(x) = x^3 \Rightarrow g(x) = \frac{x^4}{4} + C$$

$$\boxed{xy^3 + \frac{x^4}{4} = C}$$

1 SQUARE =