1) $\mu(x,y) = \mu(x) \qquad \mu(\cancel{\tan^{-1}}(x))$

$$\Rightarrow \frac{\partial \mu}{\partial y} = 0 \quad y \quad \frac{\partial \mu}{\partial x} = \frac{d\mu}{dx}$$

$$N \cdot \frac{d\mu}{dx} = \mu \cdot \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right)$$

$$\frac{1}{\mu} \frac{d\mu}{dx} = \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N} = g(x)$$

$$\mu(x) = C \cdot e^{\int g(x)\,dx}$$

$$\mu(x,y) = \mu(y)$$

$$\Rightarrow \frac{\partial \mu}{\partial x} = 0, \quad \frac{\partial \mu}{\partial y} = \frac{d\mu}{dy}$$

$$-M \frac{\partial \mu}{\partial y} = \mu \cdot \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right)$$

$$\frac{1}{\mu} \cdot \frac{\partial \mu}{\partial y} = \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{-M} = h(y)$$

$$\Longrightarrow \mu(y) = \overset{1}{\cancel{C}} \cdot e^{\int h(y)\,dy}$$

$$\overbrace{(x+y)}^{M}\,dx + \overbrace{x\log x}^{N}\,dy = 0$$

1) $\dfrac{\partial M}{\partial y} = 1 \qquad \dfrac{\partial N}{\partial x} = \log x + 1$

$\Rightarrow$ no es exacta.

2) $\mu = \mu(x)$

$$\frac{1}{\mu}\frac{\partial \mu}{\partial x} = \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N} = \frac{-\log x}{x\log x} = -\frac{1}{x} = g(x)$$

$$\mu = 1\cdot e^{\int -\frac{1}{x}dx} = e^{-\ln x} = e^{\ln x^{-1}} = \frac{1}{x}$$

$$\overbrace{\left(1+\frac{y}{x}\right)}^{M}dx+\overbrace{\log x}^{N}dy=0$$

$$\frac{\partial M}{\partial y}=\frac{1}{x}\qquad\frac{\partial N}{\partial x}=\frac{1}{x}\Rightarrow \text{exact}$$

oophi!

$$\Rightarrow \overset{①}{\frac{\partial E}{\partial x}=M},\quad \overset{②}{\frac{\partial E}{\partial y}=N},\quad \overset{③}{E(x,y)=C}$$

$$② \Rightarrow E(x,y)=y\cdot\log x+g(x)$$

$$① \quad \cancel{\frac{y}{x}}+g'(x)=1+\cancel{\frac{y}{x}}\Rightarrow g(x)=x$$

$$\Rightarrow ③ \quad E(x,y)=\boxed{y\log x+x=C}$$

$$\overbrace{\left[2x - y\,\mathrm{sen}\,xy + k\cdot y^4\right]}^{M}dx + \underbrace{\left[-20xy^3 - x\,\mathrm{sen}\,xy\right]}_{N}dy$$

Exacta?

$$\frac{\partial}{\partial y}\left(2x - y\,\mathrm{sen}\,xy + ky^4\right) = -\mathrm{sen}\,xy - yx\cos xy + 4ky^3$$

$$\frac{\partial}{\partial x}\left(-20xy^3 - x\,\mathrm{sen}\,xy\right) = -20y^3 - \mathrm{sen}\,xy - xy\cos xy$$

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} \longrightarrow k = -5$$

$$C = -5xy^4 + \cos xy + (-y)$$

$$\mu(x,y) = \mu(x\cdot y) \qquad z = x\cdot y$$

$$\mu(x,y) = \mu(z)$$

$$\frac{\partial \mu}{\partial x} = \frac{\partial \mu}{\partial z}\cdot\frac{\partial z}{\partial x} = \frac{\partial \mu}{\partial z}\cdot y$$

$$\frac{\partial \mu}{\partial y} = \frac{\partial \mu}{\partial z}\cdot\frac{\partial z}{\partial y} = \frac{\partial \mu}{\partial z}\cdot x$$

$\Rightarrow$ em EDP $\mu\cdot\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right) =$

$$= (Ny - Mx)\frac{\partial \mu}{\partial z}$$

$$\frac{1}{N} \cdot \frac{\partial N}{\partial z} = \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{Ny - Mx} = g(z)$$

$$\Rightarrow N = c \cdot e^{\int g(z)\,dz} = N(x \cdot y)$$

$$\mu(x^n y^m)$$

$$\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{y^{m-1} \cdot x^{n-1}(myN - nxM)} = g(x^n y^m) \qquad \boxed{z = x^n y^m}$$

$$\frac{\partial \mu}{\partial x} = \frac{\partial \mu}{\partial z} \cdot n x^{n-1} y^m$$

$$\frac{\partial \mu}{\partial y} = \frac{\partial \mu}{\partial z} \cdot m x^n y^{m-1}$$

$$\frac{1}{\mu} \cdot \frac{\partial \mu}{\partial z} = \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N \cdot n x^{n-1} y^m - M m x^n y^{m-1}}$$

$$\underbrace{(5x^2y+6x^3y^2+4xy^2)}_{M}\,dx+\overbrace{(2x^3+3x^4y+3x^2y)}^{N}\,dy=0$$

$$\frac{\partial M}{\partial y}=5x^2+12x^3y+8xy$$

$$\frac{\partial N}{\partial x}=6x^2+12x^3y+6xy$$

$$g(z)=\frac{-x^2+2xy}{y^{m-1}x^{m-1}(my}$$

$$(5x^2y+6x^3y^2+4xy^2)\,dx+$$
$$(2x^3+3x^4y+3x^2y)\,dy=0 \quad /\cdot x^n y^m$$

$$\frac{\partial M}{\partial y}=\frac{\partial\left(5x^{n+2}y^{m+1}+6x^{n+3}y^{m+2}+4x^{n+1}y^{m+2}\right)}{\partial y}$$

$$=(m+1)5x^{n+2}y^{m}+6(m+2)x^{n+3}y^{m+1}+$$
$$4(m+2)x^{n+1}y^{m+1}$$

$$\frac{\partial N}{\partial x}=2(n+3)x^{n+2}y^{m}+3(n+4)x^{n+3}y^{m+1}$$
$$+3(n+2)x^{n+1}y^{m+1}$$

$$4(m+2)=2(n+3)$$

$$\Rightarrow 5(m+1)=2(n+3) \wedge 6(m+2)=3(n+4)$$