$$(3-2t)\,dx-(3-2t)\,dt=(1+t)\,dx$$

$$(2-3t)\,dx=(3-2t)\,dt$$

$$\int dx=\int\frac{3-2t}{2-3t}$$

$$x=\int\left(\frac{2}{3}\,dt-\frac{t}{3}^{-\frac{5}{3}}\right)dt+\int\frac{-3}{2-3t}\,dt$$

$$x=\frac{2t}{3}+\frac{5}{9}\ln|2-3t|-C$$

$$C+x=\frac{2}{3}(x-y)+\frac{5}{9}\ln|2-3x+3y|$$

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(31)

$$(3x^2y+2x)\,dx+(x^3-1)\,dy=0$$

$$\frac{\partial P}{\partial y}=3x^2\qquad\frac{\partial Q}{\partial x}=3x^2\qquad \text{Exacta}$$

$$\int(3x^2y+2x)\,dx=x^3y+x^2+C(y)=C$$

$$x^3+C'(y)=x^3-1$$

$$C(y)=-y$$

$$x^3y+x^2-y=C$$

(32)

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

$$\frac{\partial P}{\partial y}=1 \qquad \frac{\partial Q}{\partial x}=1$$

$$\int (x^2+y)\,dx = \frac{x^3}{3}+yx+C(y) = C$$

$$\cancel{x}+C'(y) = y^2+\cancel{x}$$

$$C'(y)=y^2$$

$$C(y)=\frac{y^3}{3}$$

$$\frac{x^3}{3}+yx+\frac{y^3}{3}=C$$

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(33)

$$(x+e^{-x}\operatorname{sen}y)\,dx-(y+e^{-x}\cos y)\,dy=0$$

$$\frac{\partial P}{\partial y}=e^{-x}\cos y \;;\; \frac{\partial Q}{\partial x}=e^{-x}\cos y \qquad \text{Exacta}$$

$$(x+e^{-x}\operatorname{sen}y)\,dx+(-y-e^{-x}\cos y)\,dy$$

$$\int (x+e^{-x}\operatorname{sen}y)\,dx = \frac{x^2}{2}-e^{-x}\operatorname{sen}y+C(y)=C$$

$$\cancel{-e^{-x}\cos y}+C'(y) = -y\cancel{-e^{-x}\cos y}$$

$$C'(y)=-y$$

$$C(y)=-\frac{y^2}{2}$$

$$-\frac{1+y\,e^{xy}\cos e^{xy}}{1+x\,e^{xy}\cos e^{xy}}=\frac{dy}{dx}$$

$$(1+y\cdot e^{xy}\cos e^{xy})\,dx+(1+x\,e^{xy}\cos e^{xy})\,dy=0$$

$$\frac{\partial P}{\partial y}=e^{xy}\cos e^{xy}+yx\,e^{xy}\cos e^{xy}-y\,e^{xy}e^{xy}\operatorname{sen} e^{xy}$$

$$\frac{\partial Q}{\partial x}=e^{xy}\cos e^{xy}+xy\,e^{xy}\cos e^{xy}-y\,e^{xy}e^{xy}\operatorname{sen} e^{xy}$$

$$\int(1+\cos e^{xy}\cdot e^{xy}\cdot y)\,dx=x+\operatorname{sen} e^{xy}+C(y)=C \quad \text{Exacta}$$

$$\cos e^{xy}\cdot e^{xy}\cdot x+C'(y)=1+\cos e^{xy}e^{xy}x$$

$$C(y)=y$$

$$\boxed{x+y+\operatorname{sen} e^{xy}=C}$$

examen junio 78 IMPORTANT

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(34)

$$x\,dy-y\,dx=(1-x^2)\,dx$$

$$(1-x^2+y)\,dx-x\,dy=0$$

$$\frac{\partial P}{\partial y}=1 \qquad \frac{\partial Q}{\partial x}=-1 \qquad \text{no exacta}$$

factor integrante

$$\frac{1}{Q}\left(\frac{\partial P}{\partial y}-\frac{\partial Q}{\partial x}\right)=\frac{1}{-x}\left(1-(-1)\right)=-\frac{2}{x}=f(x)$$

$$\mu=e^{\int-\frac{2}{x}\,dx}=e^{-2\ln x}=e^{\ln x^{-2}}=\frac{1}{x^2}$$

$$\left(\frac{1}{x^2} - 1 + \frac{y}{x^2}\right)dx - \frac{1}{x}\,dy = 0$$

$$-\int \frac{1}{x}\,dy = -\frac{y}{x} + C(x)$$

$$\frac{y}{x^2} + C'(x) = \frac{1}{x^2} - 1 + \frac{y}{x^2}$$

$$C(x) = -\frac{1}{x} - x$$

$$\boxed{\frac{y}{x} + \frac{1}{x} + x = C}$$

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(35)

$$\left(2xy + x^2y + \frac{y^3}{3}\right)dx + (x^2+y^2)\,dy = 0$$

$$\frac{\partial P}{\partial y} = 2x + x^2 + y^2 \qquad \frac{\partial Q}{\partial x} = 2x$$

$$\frac{1}{x^2+y^2}\left(2x + x^2+y^2 - 2x\right) = \frac{x^2+y^2}{x^2+y^2} = 1 = f(x)$$

$$\mu = e^{\int 1dx} = e^x$$

$$\left(2xye^x + x^2ye^x + \frac{y^3e^x}{3}\right)dx + (x^2e^x + y^2e^x)\,dy = 0$$

$$\int (x^2e^x + e^xy^2)\,dy = x^2e^xy + \frac{e^xy^3}{3} + C(x)$$

$$2xe^xy + x^2e^xy + \frac{e^xy^3}{3} + C'(x) =$$
$$2xye^x + x^2ye^x + \frac{y^3e^x}{3}$$

$$C'(x) = 0$$

$$C(x) = k$$

$$\boxed{y e^x \left(x^2 + \frac{y^2}{3} \right) = C}$$

$$4 \ln a \; x y \, a^{2x^2 y} \, dx + 2 \ln a \; x^2 a^{2x^2 y} \, dy = 0$$

$$\frac{\partial P}{\partial y} = 4 \ln a \; x \left[a^{2x^2 y} + y \, a^{2x^2 y} \ln a \cdot 2x^2 \right]$$

$$\frac{\partial Q}{\partial x} = 2 \ln a \left[2x a^{2x^2 y} + x^2 a^{2x^2 y} \ln a \; 4xy \right]$$

$$= 4 \ln a \; x \left[a^{2x^2 y} + y a^{2x^2 y} \ln a \; 2x^2 \right]$$

Exacta

$$\int a^{2x^2 y} \ln a \; 4xy \, dx = a^{2x^2 y} + C(y)$$

$$a^{2x^2 y} \ln a \; 2x^2 + C'(y) = a^{2x^2 y} \ln a \; 2x^2$$

$$C'(y) = 0$$

$$C(y) = k$$

$$a^{2x^2 y} + k = C$$

$$a^{2x^2 y} = C - k \qquad C - k = a^{2c}$$

$$2x^2 y = 2c$$

$$\boxed{x^2 y = C}$$

otra resolución que da variables separadas

$$\overset{2}{\cancel{4}} \cancel{\ln a}\; x y\, \cancel{a^{2x^2y}}\, dx + 2 \cancel{\ln a}\, x^2 \cancel{a^{2x^2y}}\, dy = 0$$

$$2y\,dx + x\,dy = 0$$

$$2y\,dx = -x\,dy$$

$$\int \frac{2}{x} dx = -\int \frac{dy}{y}$$

$$2 \ln x = -\ln y + \ln C$$

$$\ln x^2 + \ln y = \ln C$$

$$\ln x^2 y = \ln C$$

$$\boxed{x^2 y = C}$$

<u>Nota</u>: Esta resolución en v.s. valió un suspenso en el examen de febrero 78. No obstante lleva a una solución correcta

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(44) $\operatorname{tg}x\, y' - 2y = 2$

$$y' - \frac{2}{\operatorname{tg}x} y = \frac{2}{\operatorname{tg}x}$$

1º) $\displaystyle\int -\frac{2}{\operatorname{tg}x} dx = -2\int \frac{1}{\operatorname{tg}x} dx = -2\int \frac{\cos x}{\operatorname{sen}x} dx$

$$= -2 \ln \operatorname{sen}x = \ln (\operatorname{sen}x)^{-2}$$