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1) $2x(y^{x^2}-1)dx + e^{x^2}dy = ?$

$(2yxe^{x^2}-2x)dx + e^{x^2}dy$

$P_y = 2xe^{x^2} = Q_x = e^{x^2}2x$

$\frac{\partial f}{\partial x} = 2xye^{x^2}-2x \to f(x,y) = \int 2xy^{u}\frac{1}{2x}u - \int 2x\,dx$ 　 $u = x^2$, $\frac{du}{dx} = 2x$

$\frac{\partial f}{\partial y} = e^{x^2}$ 　 $f(x,y) = ye^{u} - x^2 = ye^{x^2} - x^2 + h(y)$ 　 $dx = \frac{1}{2x}du$

$\frac{\partial f}{\partial y} = e^{x^2} + h'(y)$, 　 $h'(y) = 0 \to h(y) = c$

$f(x,y) = ye^{x^2} - x^2 + c \Rightarrow ye^{x^2} - x^2 = c$

2) $(\cos x\cos y + 2x)dx - (\sin x\sin y + 2y)dy = ?$

$(\cos x\cos y + 2x)dx + (-\sin x\sin y - 2y)dy \Rightarrow P_y = -\sin y\cos x = Q_x = -\cos x\sin y$

$\frac{\partial f}{\partial x} = \cos x\cos y + 2x \Rightarrow f(x,y) = \cos y\sin x + x^2 + h(y)$

$\frac{\partial f}{\partial y} = -\sin x\sin y - 2y$ 　 $\frac{\partial f}{\partial y} = -\sin x\sin y + h'(y)$

$\Rightarrow h'(y) = -2y \Rightarrow h(y) = -y^2 + c$

$\cos y\sin x + x^2 - y^2 = c$