Convert the equation $ydx - xdy = 0$ into exact form.

1) Identify M. This is usually the function in front of the dx: $M = y$

2) Differentiate M with respect to y: $M_y = \frac{\partial}{\partial y}(y) = 1$

3) Identify N. This is usually the function in front of dy: $N = -x$

4) Differentiate N with respect to x: $N_x = \frac{\partial}{\partial x}(-x) = -1$

5) Compare the results of steps 2) and 4) above.

$M_y \neq N_x$

This means the equation is not exact.

6) Form the integrating factor as shown below.

$\frac{1}{M}\left(N_x - M_y\right) = \frac{1}{y}(-1 - 1) = \frac{1}{y} \cdot (-2) = \frac{-2}{y}$ This is a function of y only. It's $\frac{-2}{y}$

So the integrating factor is $e^{\int \frac{-2}{y} dx} = e^{-2\ln(y)} = e^{\ln\left(y^{-2}\right)} = y^{-2}$

Remember that e and ln are inverses, so they cancel, leaving only $y^{-2} = \frac{1}{y^2}$

7) Multiply the original equation by the integrating factor.

$\frac{1}{y^2}(ydx - xdy) = \frac{1}{y^2}(0)$

$\frac{y}{y^2}dx - \frac{1}{y^2} \cdot x\,dy = 0$ Distribute into the terms

$\frac{1}{y}dx - \frac{x}{y^2}dy = 0$ Simplify

8) Now the equation is ready to be solved as is usual for exact equations.