# Problem 6

Determine whether each of the equations in Problems 1 through 12 is exact. If it is exact, find the solution.

$$\frac{dy}{dx} = -\frac{ax - by}{bx - cy}$$

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**Solution**

Multiply both sides by $bx - cy$.

$$(bx - cy)\frac{dy}{dx} = -(ax - by)$$

Add $ax - by$ to both sides.

$$(ax - by) + (bx - cy)\frac{dy}{dx} = 0$$

The ODE is not exact because

$$\frac{\partial}{\partial y}(ax - by) = -b \neq \frac{\partial}{\partial x}(bx - cy) = b.$$