

Problem 8

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

$$(e^x \sin y + 3y) - (3x - e^x \sin y)y' = 0$$

Solution

Distribute the minus sign in front of the second term.

$$(e^x \sin y + 3y) + (-3x + e^x \sin y)y' = 0$$

The ODE is not exact because

$$\frac{\partial}{\partial y}(e^x \sin y + 3y) = e^x \cos y + 3 \neq \frac{\partial}{\partial x}(-3x + e^x \sin y) = -3 + e^x \sin y.$$