

1. One of these equations is exact and the other is not. Test them both, and then solve the exact equation. Leave your answer in implicit form.

a.  $(e^x \sin y + 3y)dx + (3x + e^x \sin y)dy = 0$

b.  $(2xy^2 + 2y) + (2x^2y + 2x + y)\frac{dy}{dx} = 0$

2. Consider the equation  $x^2y^3dx + x(1 + y^2)dy = 0$ .

a. Show the equation is *not* exact.

b. Multiply the equation by the integrating factor  $\mu(x, y) = \frac{1}{xy^3}$ , and show the new equation *is* exact. (If you have time, solve the new equation.)