In each of the following problems, if the equation is not exact, the integrating factor is either a function of x, y (you must choose the right one). Check if the equation is exact or not, find the integrating factor if needed, and in ether case solve the bloody thing!

Problem 1

$$\Big(x^2 + y\cos(x)\Big)\,dx + \Big(y^3 + \sin(x)\Big)\,dy = 0$$

Problem 2

$$(x^2 + y^2 + x)\,dx + xy\,dy = 0$$

Problem 3

$y(2x + y^3)\ dx - x(2x - y^3)\ dy = 0$

Problem 4

$(y^2 - 3xy - 2x^2)\ dx + (xy - x^2)\ dy = 0$