Determine if each differential equation is exact. If so, solve it.

Problem 1

$(3x^2y + 8xy^2)\ dx + (x^3 + 8x^2y + 12y^2)\ dy = 0$

Problem 2

$\dfrac{2xy+1}{y}\ dx + \dfrac{y-x}{y^2}\ dy = 0$ (careful about regions/domains here)

Problem 3

$$x\sqrt{x^2+y^2}\,dx - \frac{x^2y}{y-\sqrt{x^2+y^2}}\,dy = 0$$