1. Show the equation
\[(y - xy^2)dx - xdy = 0.\]
is not exact.

2. The equation
\[(3 + 2xy^3)dx + (3x^2y^2 + \sin y)dy = 0\]
is exact. Find a general solution.

3. Consider a 100 L tank of pure water (imported from the Alps) into which a saline solution begins to flow at a constant rate of 5 L/min. The solution in the tank is well-mixed and flows out of the tank at 5 L/min. The concentration of the saline solution entering the tank is 0.5 kg/L.

Letting \(y(t)\) denote the mass of salt in the tank after \(t\) minutes, determine \(y(t)\).