Homework 6

1. Check if each of the following ODEs is exact. If it is, then find the general solution. If it is not, then try to solve it by finding an integrating factor to make an exact ODE. In case you cannot find an integrating factor, show your attempt and leave it on your paper.

   (a) $2x + y + (x + 2y)y' = 0$

   (b) $x^2y^3 + x(1 + y^2)y' = 0$

   (c) $(x + 2)\sin y dx + x\cos y dy = 0$

   (d) $ye^{xy}\cos 2x - 2e^{xy}\sin 2x + 2x + (xe^{xy}\cos 2x - 3)y' = 0$

2. Find the solution to the the IVP

$$2x - y + (2y - x)y' = 0, y(1) = 3$$

and *approximately* determine the interval of existence.