Differential Equations Homework

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1. What order and degree are each of the following differential equations?

   (a) $\frac{dy}{dx} = y^2 - x^3$

   (b) $\left(\frac{dy}{dx}\right)^2 \frac{d^2y}{dx^2} = x^5 y$

   (c) $\frac{dy}{dx} + xy = 0$

2. Solve the following differential equation using separation of variables:

$$\frac{dy}{dt} = \frac{t}{y^2}$$

   Give the general solution and then give the unique solution which corresponds to the initial condition $y(0) = 3$

3. Solve the following differential equation using integration factors:

$$\frac{dy}{dx} + 2xy = x$$

   Find the general solution and then find the unique solution that corresponds to the initial condition $y(0) = 3$