Differential Equations

A. Find the general solutions of the following differential equations.

1. $xy^2 - y'x^2 = 0$

2. $y' + 3x^2y = e^{-x^3}$

3. $y'' + 8y + 16 = 0$

4. $y'' + 4y = 0$

B. Word Problems

1. If the half-life of a radioactive substance is 10 years, how long will it take to decay by 80% assuming the rate of change of this substance is directly proportional to the amount present?