Power Series method

1. Use the Power Series method to solve the following differential equations. (Taken from Chapter 3 of Simmons' book on differential equations.)

    (a) $dy/dx = 2xy$. Also solve this as a linear homogeneous equation and compare the solution.

    (b) $dy/dx = x - y$ and $y(0) = 0$. Also solve this as a linear inhomogeneous equation and compare the solution.

    (c) $dy/dx = 1 + y^2$. It may not be easy to find a recursion formula for the n-th coefficient so just calculate the first 5 coefficients.

    (d) $d^2y/dx^2 = -xy$.

    (e) $(d^2y/dx^2) - 2x(dy/dx) + 2ay = 0$.