MA 114 Worksheet #27: Separable equations

1. Use Separation of Variables to find the general solutions to the following differential equations.

   (a) $y' + 4xy^2 = 0$

   (b) $\sqrt{1 - x^2}\,y' = xy$

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

   (d) $\sqrt{1 + y^2}\,y' + \sec x = 0$

2. (Extra) A tank has the shape of the parabola $y = x^2$ revolved about the x-axis. water leaks from a hole of area $B = 0.0005\ m^2$ at the bottom of the tank. Let $y(t)$ be the water level at time t. How long does it take for the tank to empty if the initial water level is $y(0) = 1\ m$?