MAT 2384-Practice Problems on First-order Separable- Homogeneous ODE's

1. Find the general solution of each of the following ODE's.

   (a) $y' = 2\sec(2y)$

   (b) $yy' + 25x = 0$

   (c) $y'\sin(\pi x) = y\cos(\pi x)$

   (d) $y'e^{-2x} = y^2 + 1$

   (e) $(x^3 + y^3)dx - 3xy^2dy = 0$

   (f) $-(x^2 + 3y^2)\,dx + 2xydy = 0$

2. Find the particular solution of each of the following Initial Value Problems.

   (a) $\frac{dy}{dx} = -2xy,\ \ y(0) = 2$

   (b) $L\frac{dw}{dt} + Rw = 0,\ \ w(0) = w_0$ (L, R, w_0 are constants)

   (c) $y' = 2(x+2)y^3e^{-2x},\ \ y(0) = \frac{1}{\sqrt{5}}$

   (d) $y'x\ln(x) = y,\ \ y(3) = \ln(81).$

   (e) $yy'e^{y^2} = (x-1),\ \ y(0) = 1$

   (f) $(2x + 3y)dx + (y - x)dy = 0,\ \ y(1) = 0.$