1. Give qualitative analysis of the following autonomous differential equations. That is, determine the equilibrium solutions, classify each as stable, unstable, or semistable, and sketch the solutions. Include a phase line.

   (a) $\frac{dy}{dt} = y^2(y^2 - 1)$

   (b) $\frac{dy}{dt} = \sin y$

2. Find an implicit general solution to the following exact equation: $(2xy+\cos x)+(x^2+4y)y' = 0$.

3. Find an appropriate integrating factor μ for $(5x^4y + 4xy^2) + (3x^5 + 8x^2y)y' = 0$ and solve. (Hint: look for $\mu = \mu(y)$.)