Math 352 **Workshop 02**

February 17, 2014 Due: February 19 Name: _____

Separable equations

1. Solve the initial value problem $\frac{dy}{dx} = 2xy^2$, $y(2) = 1$.

   (a) Divide both sides by y^2 to put the equation in standard form.

   (b) Integrate each side with respect to the evident variable. (This is justified by appeal to u-substitution: $dy = y'\,dx$.)

   (c) You should now have an equation that is free of derivatives, but with a constant of integration. Plug in the initial values to find the value of this constant.

   (d) If possible, solve your equation for y.

2. Solve the initial value problem $1 + ye^{-x}y' = 0$, $y(0) = 1$.

3. Find solutions to the differential equation

$$y' = \frac{3x^2 + 4x + 2}{2(y-1)}.$$

4. Consider the initial value problem $y' = 5y^2$, $y(0) = y_0$. For what values of y_0 does the solution have a vertical asymptote at $y = 6$ and a t-interval of existence $-\infty < t < 6$?