Math 217 - September 3, 2010

- Slope fields
- Existence and Uniqueness
- Separation of Variables

1. Draw a slope field for the differential equations. Be sure to draw some possible solution curves.

   (a) $y' = x + 2$

   (b) $y' = \frac{1}{x}$

   (c) $y' = 2\sqrt{y}$

   (d) $y' = y^2$

   (e) $y' = \frac{1}{y^2}$

   (f) $y' = \frac{1}{x^2-1}$

   (g) $y' = \frac{1}{x^2+1}$

   (h) $y' = (y-1)(y-2)(y-3)$

Lecture Problems

2. Determine what, if anything, the Existence and Uniqueness Theorem say for the following initial value problems.

   (a) $\dfrac{dy}{dx} = xy^2 \qquad y(0) = 0$

   (b) $\dfrac{dy}{dx} = xy \qquad y(0) = 0$

   (c) $\dfrac{dy}{dx} = x\sqrt{y} \qquad y(0) = 0$

3. Solve $\dfrac{dy}{dx} = xe^{x^2 - \ln y^2}$

4. Solve $\dfrac{dy}{dx} = \dfrac{x^2y - 4y}{x+2}$

5. Solve $x\dfrac{dy}{dx} = 2(y-4)$