Math 305 Homework Set 2 Fall 2012

Due Wednesday, Sept 5

I. Solve the following separable differential equations. Find the general solution if no initial condition is present. These problem are based on Section 2.2.

1. $y' = y$ and $y(0) = -6$.
2. $y' = y$ and $y(1) = e^2$.
3. $y' = \cos(2x) + 2$ and $y(\pi) = 8$.
4. $y' = y^2 e^x$ and $y(0) = 2$.
5. $y' = e^{x+y}$.
6. $y' = x^2 \cos^2(y)$
7. $y' = y^2 e^x$
8. $y' = x \sin(x) \cot(y)$ and $y(\pi/4) = 6$.
9. $y' = x^3 y^2 + xy^2 + 2y^2 + x^3 + x + 2$ and $y(0) = 1$.
10. $y' = xy^3\sqrt{1 + x^2}$ and $y(0) = 1$.

II. Describe the set of initial conditions for which each differential equation below is guaranteed to satisfy Theorem 2.4.2. Do not try to solve them.

1. $y' = \frac{x+2}{2-y}$
2. $y' = \frac{x^3}{x+2y}$
3. $y' = \frac{y}{x-3} + \frac{x^2}{y+4}$
4. $y' = \frac{\tan(x)}{y^2-1}$
5. $y' = \cot(xy)$
6. $y' = \frac{\sqrt{y}}{x+y^3}$
7. $y' = (xy)^{2/3}$

III. Draw the direction field by hand for the following differential equations. Use graph paper with grid locations from -5 to 5 for x and y. Do not solve these equations.

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