Makeup Test 1: Math 305, Spring Semester

NAME:

1. Draw the direction field of $y' = \frac{3-y}{2}$. Draw the solution curves for the following initial conditions: $y(1) = 3$, $y(0) = 0$, and $y(0) = 4$. For any initial condition what is $\lim_{x \to \infty} y(x)$?

2. Find the general solution of $(x^3 + 1)y' + 4x^2y' = x^2$.

3. A body of mass m falls from rest in a medium offering resistance proportional to the square of the velocity. Find the relation between the velocity v and the time t. Find the limiting velocity, v_l.

4. Find the general solution of $2x + y^2 + 2xyy' = 0$. Hint: check for exactness and don't switch M and N!

5. Solve the initial value problem

$$y' = \frac{y^2 + 2xy}{x^2},$$

with $y(1) = 2$. Solve for y in terms of x. Hint: Use $v = y/x$.