Name: _____

Section: 8:00-9:30 11:00-12:30

Math 1B Quiz 9

November 8, 2007

GSI: Rob Bayer

You have twenty minutes to complete this quiz. You must justify all your answers.

1. (3 pts) For what values of r does $y = e^{rt}$ satisfy the differential equation $y'' + y' - 6y = 0$?

   If $y = e^{rt}$, then $y' = re^{rt}$ and $y'' = r^2 e^{rt}$. Then to be a solution we must have:

$$r^2 e^{rt} + re^{rt} - 6e^{rt} = 0$$
$$(r^2 + r - 6)e^{rt} = 0$$

   But since $e^{rt} \neq 0$, we must have $r^2 + r - 6 = 0$. So we must have $r = -3$ or $r = 2$.

2. (3 pts) Find the general solution to the differential equation $y'' = \frac{1}{x^2}$

$$\begin{aligned} y'' &= \frac{1}{x^2} \\ y' &= \int \frac{1}{x^2} = -\frac{1}{x} + C \\ y &= \int -\frac{1}{x} + C = -\ln(x) + Cx + D \end{aligned}$$

3. (4 pts) Which direction field corresponds with each of the following differential equations?

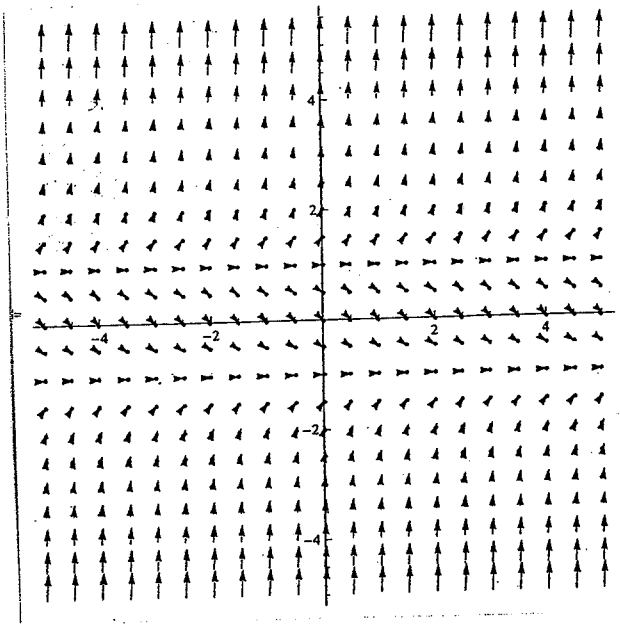
   a) $y' = y^2 - 1$ I

   b) $y' = x^2 - y^2$ IV

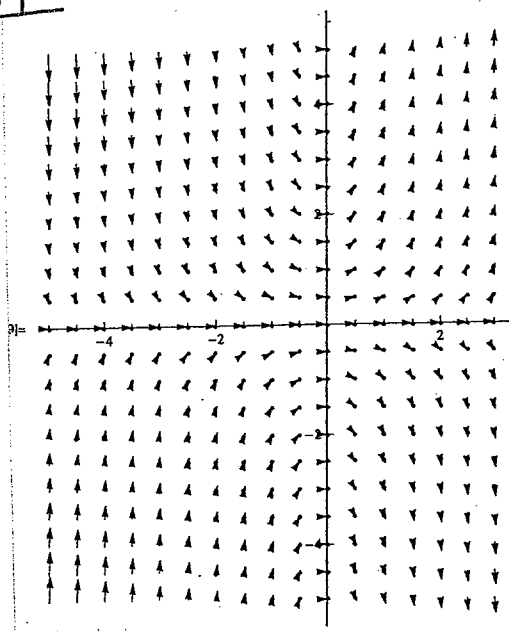
   c) $y' = xy$ II

   d) $y' = x + y$ III

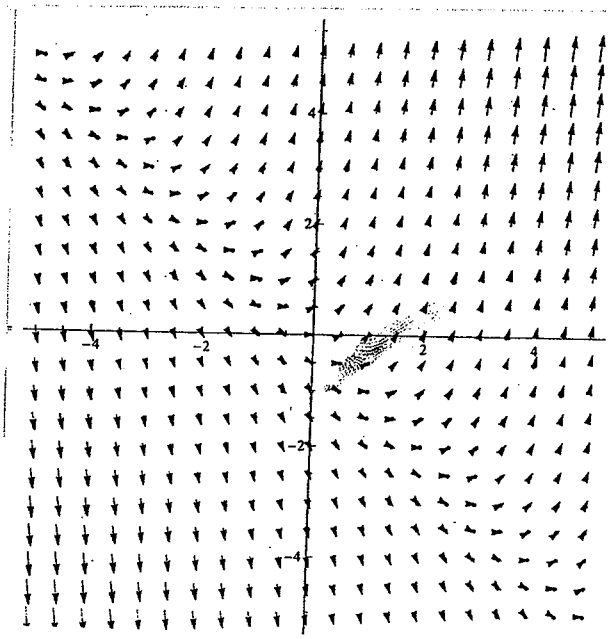
I



II



III



IV