Name: Solution:

Math 221, Section 3

Quiz number 1

Show all work. How you get your answer is just as important, if not more important, than the answer itself. If you think it, write it!

1. Show that the equation $x^3 + y + y^3 = \overset{11}{\cancel{10}}$ is an (implicit) solution to the initial value problem

$$\frac{dy}{dx} = -\frac{3x^2}{3y^2+1} \quad , \quad y(1) = 2$$

$$\frac{d}{dx}(x^3+y+y^3) = \frac{d}{dx}(10)$$

$$3x^2 + y' + 3y^2y' = 0$$

$$y'(1+3y^2) = -3x^2$$

$$y' = \frac{-3x^2}{1+3y^2} = \frac{-3x^2}{3y^2+1} \quad \checkmark$$

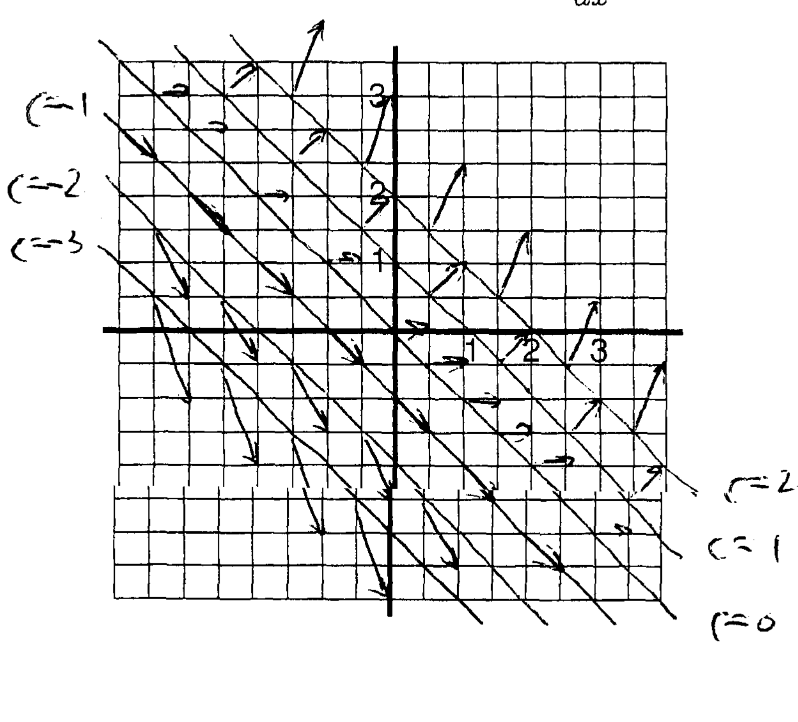
[Two arithmetic errors by the instructor in setting up the problem - everyone gets full credit.]

$y=2$ when $x=1$?

$$1^3 + 2 + (2)^3 = 1+2+8 = 11$$

2. Use isoclines to sketch the direction field for the differential equation

$$\frac{dy}{dx} = x + y$$



$x + y = c$ = constant

$y = -x + c$

lines with slope $= -1$