

**Math 280 Section C1 Quiz 2**  
February 2, 2000

**Problem 1.**

Consider a system of equations

$$\begin{cases} ux + 5y^2 = 0 \\ v^3 + x^2 - 3uy + 1 = 0 \end{cases}$$

which defines implicit functions  $u = u(x, y)$  and  $v = v(x, y)$ .

Compute  $\partial u / \partial y$

**Solution.**

Let  $F(x, y, u, v) = ux + 5y^2$  and  $G(x, y, u, v) = v^3 + x^2 - 3uy + 1$ .

Then by the Implicit Function Theorem

$$\frac{\partial u}{\partial y} = -\frac{\frac{\partial(F,G)}{\partial(y,v)}}{\frac{\partial(F,G)}{\partial(u,v)}} = -\frac{\begin{vmatrix} 10y & 0 \\ -3u & 3v^2 \end{vmatrix}}{\begin{vmatrix} x & 0 \\ -3y & 3v^2 \end{vmatrix}} = -\frac{30yv^2}{3xv^2} = -\frac{10x}{y}$$