Math 121A. Midterm #2. 2 April 2003.
Choose 3 of 4 problems: ☐ ☐ ☐

1. Let $x^2u - y^2v = 1$ and $x + y = uv$.
Find $\left(\frac{\partial y}{\partial u}\right)_v$ and $\left(\frac{\partial y}{\partial v}\right)_x$.

2. Find the shortest distance from the origin to the line of intersection of the planes

$2x + y - z = 1$ and $x - y + z = 2$.

3. Let $f(z) = \dfrac{z^2}{(z-\pi)\sin^2(z)}$. Determine the poles of f, the order of each pole, and the residue at each pole.

4. Evaluate by direct integration the line integral

$$\int_{2}^{2+i\pi} z e^{iz}\, dz.$$