32B Killip   Homework 5   Due February 9

(1) Determine the Jacobian of
$$x = u^2 + v^2 \qquad y = u^2 - v^2$$

(2) From Section 16.6: 24, 30, 36, 43, and 44.

(3) Let D denote the region in the half-plane $x > 0$ determined by the inequalities $1 \leq x^2 - y^2 \leq 2$. Determine
$$\iint \frac{dA}{x^2 + y^2}$$
by changing variables as follows: $x = u \cosh(t)$ and $y = u \sinh(t)$.

(4) Use the change of variables:
$$x = [1 + h \cos(\phi)] \cos(\theta) \quad y = [1 + h \cos(\phi)] \sin(\theta) \quad z = h \sin(\phi)$$
to compute the volume of the torus formed by rotating the disk $(x - 1)^2 + z^2 \leq \frac{1}{2}$ around the z-axis.