Name:

1. Let D be the region bounded by the curves $y = x^2$, $y = 2x^2$, $x = y^2$, and $x = 4y^2$. Find a rectangle R in the (u, v)-plane and transformation $(x, y) = T(u, v)$ defined on R such that the range of T is D.

   Hint: Describe the boundary of D in terms of level curves: $a \leq f(x, y) \leq b$ and $c \leq g(x, y) \leq d$ for functions f and g of x and y.

2. Calculate the Jacobian of the tranformation T from Problem 1. (You might find it easier to work with T^{-1}.)

3. Evaluate $\displaystyle\int_0^1 \int_0^x x^2 y \, dy \, dx$.