This assignment is due under your TA’s office door by 4:00pm on Friday, November 13th. Remember that you are encouraged to discuss the problems with your classmates, but all work turned in must be your own.

1. Work the following problems from the text:
   (a) Section 12.7: 24, 33, 37
   (b) Section 12.8: 23, 26, 27
   (c) Section 13.2: 40, 44

2. Consider evaluating the integral

   \[ I = \int_{y=0}^{2} \int_{x=y/2}^{(y+4)/2} y^3 (4x^2 + y^2 - 4xy) e^{(2x-y)^3} \, dx \, dy \]

   (a) Draw the region of integration in the \( xy \)-plane
   (b) Select a transformation \( u = u(x, y) \) and \( v = v(x, y) \) that maps the region of integration into a rectangle in the \( uv \)-plane, and sketch the region in the \( uv \)-plane.
   (c) Rewrite the integral in terms of \( u \) and \( v \).
   (d) Evaluate the integral in part (c).

3. Consider evaluating the integral

   \[ I = \iint_{D} \frac{xy}{y^2 - x^2} \, dA, \]

   where \( D \) is the region in the first quadrant bounded by the hyperbolas \( x^2 - y^2 = 1 \), \( x^2 - y^2 = 4 \), and the ellipses \( x^2/4 + y^2/4 = 1 \), \( x^2/16 + y^2/4 = 1 \).

   (a) Draw the region of integration in the \( xy \)-plane
   (b) Select a transformation \( u = u(x, y) \) and \( v = v(x, y) \) that maps the region of integration into a rectangle in the \( uv \)-plane, and sketch the region in the \( uv \)-plane.
   (c) Rewrite the integral in terms of \( u \) and \( v \).
   (d) Evaluate the integral in part (c).