These problems are due on Friday, March 12. Late papers will not be accepted.

1. Evaluate the iterated integral \( \int_0^4 \int_0^{4 \sqrt{x}} 3y \, dy \, dx \).

2. Evaluate the integral \( \iint_D y \, dA \) where \( D \) is the region in the first quadrant bounded by the curves \( x = 1 + y^2 \), \( y = 0 \), and \( x = 2 \).

3. Sketch the region of integration corresponding to \( \int_0^4 \int_0^{x^2} f(x,y) \, dy \, dx \), then express as an equivalent iterated integral with the order of integration reversed.

4. Use polar coordinates to evaluate the integral \( \int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} (x^2+y^2) \, dx \, dy \).

5. The integral \( \int_0^1 \int_0^{1-x} \int_0^{1-x-y} dz \, dy \, dx \) represents the volume of a region in three dimensions. Describe the region (i.e. sketch it) and evaluate the integral.

6. Set up limits of integration for the integral \( \iiint_E z \, dz \, dy \, dx \) where \( E \) is the region above the cone \( z = \sqrt{x^2+y^2} \) and inside the sphere \( x^2 + y^2 + z^2 = 2 \). DO NOT EVALUATE.

7. Transform the integral in Problem 6 to an iterated integral in cylindrical coordinates. DO NOT EVALUATE THE INTEGRAL.

8. Transform the integral in Problems 6, 7 to an iterated integral in spherical coordinates, then evaluate the integral.