

### Tutorial Worksheet

Show all your work.

1. Find the maximum value of the function  $f(x, y, z) = x + 2y$  on the curve of intersection of the plane  $x + y + z = 1$  and the cylinder  $y^2 + z^2 = 4$ .

2. The plane  $x + y + 2z = 2$  intersects the paraboloid  $z = x^2 + y^2$  in an ellipse. Find the points on this ellipse that are nearest to and farthest from the origin.

- 3.** (a) Estimate the volume of the solid that lies below the surface  $z = 1 + x^2 + 3y$  and above the rectangle  $R = [1, 2] \times [0, 3]$ . Use a Riemann sum with  $m = n = 2$  and choose the sample points to be lower left corners.
- (b) Use the Midpoint Rule to estimate the volume in part(a).

- 4.** Evaluate the double integral  $\iint_R (4 - 2y) dA$ ,  $R = [0, 1] \times [0, 1]$  by identifying it as the volume of a solid.

**5.** Calculate the iterated integral

(a)  $\int_0^2 \int_0^\pi r \sin^2(\theta) d\theta dr$

(b)  $\iint_R ye^{-xy} dA, R = [0, 2] \times [0, 3]$

**6.** Find the volume of the solid in the first octant bounded by the cylinder  $z = 16 - x^2$  and the plane  $y = 5$ .