TRIPLE INTEGRALS

For each of the following problems write a triple integral and evaluate it.

1. Find the volume of the solid in the first octant bounded above by the plane $x + y + z = 1$ and below by the *xy*-plane.

2. Find the volume of the solid between $z = x^2 + y^2 + 1$ and $z = -x^2 - y^2 - 1$ where $-1 \le x \le 1$ and $-1 \le y \le 1$.

3. Evaluate $\iiint_V xe^{xy}\, dV$ where V is the solid bounded by the planes $x = -1$, $x = 1$, $y = 0$, $y = 2$, $z = 0$, and $z = 3$.

4. Evaluate $\int_5^6 \int_3^4 \int_1^2 \cos(x)\cos(y)\cos(z)\, dzdydx$.

5. Evaluate $\int_0^1 \int_0^z \int_0^y ze^{y^2}\, dxdydz$.

6. Evaluate $\int_0^{\pi/2} \int_0^{\sin\theta} \int_0^{r\sin\theta} r\cos\theta\, dzdrd\theta$.

7. Find the volume of the solid region bounded by $z = |x| + |y|$ and $z = 2$.

8. Use a triple integral to find the volume of the great pyramid of Cheops given that it is 482 feet tall and has a square base that is 754 feet on each side. (HINT: Take advantage of symmetry.)

9. Find the mass of a cube with edge length 2 and density equal to the square of the distance from one of the corners.

10. Find the mass of a cube with edge length 2 and density equal to the square of the distance from one of the edges.