1. Evaluate $\iiint_E x \, dV$ .

a) $E$ is bounded by the coordinate planes and the plane $3x + 2y + z = 6$. 

b) $E$ is the solid tetrahedron with vertices $(0,0,0), (0,1,0), (1,1,0)$ and $(0,1,1)$.

2. Find the volume of the solid enclosed by 

a) $z = x^2 + y^2$ and $z = 18 - x^2 - y^2$ 

b) $9x^2 + 4y^2 = 36$ and $y - z = 1$ and $z = 2$ 

3. Sketch the solid whose volume is given by $\iiint_{000} dV$.

4. Write each equation in cylindrical coordinates and in spherical coordinates.

a) $x^2 + y^2 = 4$ 

b) $x^2 + y^2 - z^2 = 9$ 

c) $y^2 + z^2 = 16$ 

d) $z^2 = x^2 + y^2$ 

e) $z^2 = 3x^2 + 3y^2$

5. Describe the solid region above $\sqrt{x^2 + y^2} = z$ and below $x^2 + y^2 + z^2 = 2z$ using spherical coordinates.

6. Sketch the solid with the given volume and find the volume.

\[
\begin{align*}
\text{a)} & \quad \int_0^4 \int_0^{\sqrt{16-x^2}} \int_0^{\sqrt{16-x^2-y^2}} dV \\
\text{b)} & \quad \int_0^3 \int_0^{\sqrt{9-x^2}} \int_0^{\sqrt{18-x^2-y^2}} dzdydx \\
\text{c)} & \quad \int_0^{2\pi} \int_0^{\pi/3} \int_0^{2\pi} \rho^2 \sin \phi d\phi d\rho d\theta
\end{align*}
\]

7. Find the centroid of the region bounded by $z = 36 - 3x^2 - 3y^2$ and $z = x^2 + y^2$. 
8. Determine whether to use cylindrical or spherical coordinates and evaluate:

\[ \int_{0}^{2} \int_{0}^{\sqrt{4-x^2}} \int_{0}^{\sqrt{8-x^2}} xyz \, dz \, dy \, dx \]
\[ \int_{0}^{4} \int_{0}^{2\sqrt{x^2+y^2}} \int_{0}^{\sqrt{16-x^2-y^2}} \left( x^2 + y^2 + z^2 \right) \, dz \, dy \, dx \]

\[ E \]

\[ \iiint_{E} z \, dV \quad E \text{ is the region below the sphere of radius 7 centered at (0,0,0)} \]

\[ \text{and above the plane } z = 5. \]

9. Evaluate a) \( \iint_{R} \frac{(x+y)^2}{(x-y)^3} \, dA \) where \( R \) is the region \( 0 \leq x + y \leq 4, \quad 1 \leq x - y \leq 3 \)

b) \( \iint_{R} (x^2 - xy + y^2) \, dA \) where \( R \) is \( 0 \leq x^2 - xy + y^2 \leq 2 \)