5. Let $E = \{(x, y, z) : x^2 + y^2 \le 3,\ 0 \le x \le y,\ \text{and } 0 \le z \le 3\}$.

a. Fill in the boxes so that the following equality holds for all continuous functions f where (x, y, z) are the rectangular coordinates.

$$\iiint_E f(x,y,z)\,dV = \int_{0}^{\sqrt{3}/2} \int_{x}^{\sqrt{3-x^2}} \int_{0}^{3} f(x,y,z)\,dz\,dy\,dx$$

b. Fill in the boxes so that the following equality holds for all continuous functions f where (r, θ, z) are the cylindrical coordinates.

$$\iiint_E f(x,y,z)\,dV = \int_{\pi/4}^{\pi/2} \int_{0}^{\sqrt{3}} \int_{0}^{3} f(r\cos\theta, r\sin\theta, z)\, r\,dz\,dr\,d\theta$$

c. Fill in the boxes so that the following equality holds for all continuous functions f where (ρ, ϕ, θ) are the spherical coordinates.

$$\iiint_E f(x,y,z)\,dV$$

$$= \int_{\pi/4}^{\pi/2} \int_{0}^{\pi/6} \int_{0}^{3/\cos\phi} f(\rho\sin\phi\cos\theta, \rho\sin\phi\sin\theta, \rho\cos\phi)\,\rho^2\sin\phi\,d\rho\,d\phi\,d\theta$$

$$+ \int_{\pi/4}^{\pi/2} \int_{\pi/6}^{\pi/2} \int_{0}^{\sqrt{3}/\sin\phi} f(\rho\sin\phi\cos\theta, \rho\sin\phi\sin\theta, \rho\cos\phi)\,\rho^2\sin\phi\,d\rho\,d\phi\,d\theta$$