5. Let $E = \{(x, y, z) : x^2 + y^2 + z^2 \leq 2z \text{ and } z \leq 1\}$.

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

$$\iiint_E f(x,y,z)\,dV = \int_{\boxed{0}}^{\boxed{2\pi}} \int_{\boxed{0}}^{\boxed{1}} \int_{\boxed{1-\sqrt{1-r^2}}}^{\boxed{1}} f(r\cos\theta, r\sin\theta, z)\,\boxed{r}\,dz\,dr\,d\theta$$

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

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

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

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

$z = 1 \pm \sqrt{1-r^2}$

$\Uparrow$

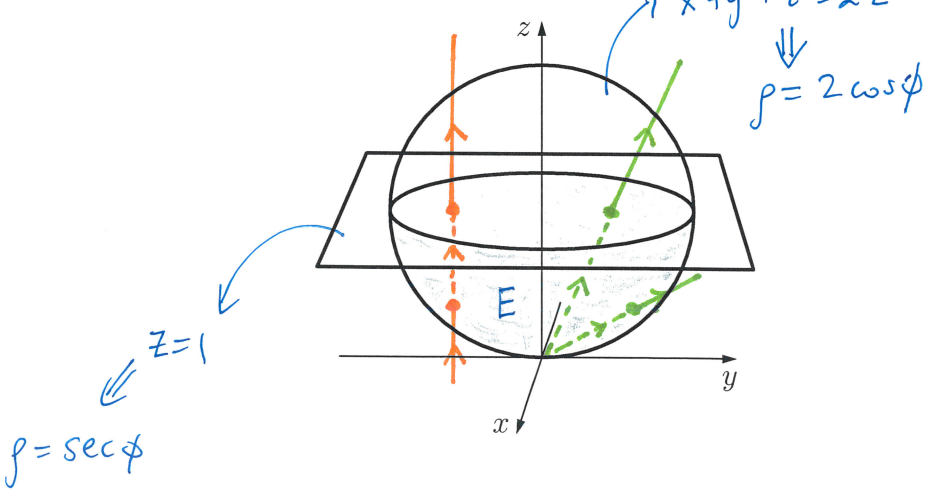
$r^2 + z^2 = 2z$

$\Uparrow$

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

$\Downarrow$

$\rho = 2\cos\phi$



$z = 1$

$\Downarrow$

$\rho = \sec\phi$