The region of integration is given in spherical coordinates by $E = \{(\rho, \theta, \phi) | 0 \leq \rho \leq 2, 0 \leq \theta \leq 3\pi/2, 0 \leq \phi \leq \pi/4\}$. This represents the solid region in the octants $\{1, 2, 3\}$ bounded above by the sphere $\rho = 2$ and below by the cone $\phi = \pi/4$.

$$\begin{aligned}
\int_0^{\pi/4} \int_0^{3\pi/2} \int_0^2 \rho^2 \sin(\phi)\, d\rho\, d\theta\, d\phi &= \int_0^{\pi/4} \sin(\phi)\, d\phi \int_0^{3\pi/2} d\theta \int_0^2 \rho^2\, d\rho \\
&= [-\cos(\phi)]_0^{\pi/4} \, [\theta]_0^{3\pi/2} \left[\tfrac{1}{3}\rho^3\right]_0^2 \\
&= \left(1 - \tfrac{\sqrt{2}}{2}\right) \left(\tfrac{3\pi}{2}\right) (8/3) = (2)(2 - \sqrt{2})\pi
\end{aligned}$$