1. $\int\int\int_E (9-x^2-y^2)dV, Ex^2+y^2+z^2 \leq 9 \wedge z \leq 0$

   E describe en cordenadas esfericas

   $$\begin{cases} x = \rho\cos(\theta)\sin(\phi) & 0 \leq \rho \leq 3 \\ y = \rho\sin(\theta)\sin(\phi) & \theta \in [0, 2\pi] \\ z = \rho\cos(\phi) & \phi \in [\frac{\pi}{2}, \pi] \end{cases}$$

   $f(x,y) = 9 - x^2 - y^2$

   $T(\rho\cos(\theta)\sin(\phi), \rho\sin(\theta)\sin(\phi), \rho\cos(\phi)) = 9 - (\rho\cos(\theta)\sin(\phi))^2 - (\rho\sin(\theta)\sin(\phi))^2 =$

   $9 - \rho^2\sin^2(\phi)(\cos^(\theta) + \sin^2(\theta)) =$

   $9 - \rho^2\sin^2(\phi)$

   $\int_0^3(\int_0^{2\pi}(\int_{\frac{\pi}{2}}^{\pi} 9 - x^2 - y^2 d\phi)d\theta)d\rho =$

   $\int_0^3(\int_0^{2\pi}(\int_{\frac{\pi}{2}}^{\pi} (9 - \rho^2\sin^2(\phi))\rho^2\sin(\phi)d\phi)d\theta)d\rho =$

   $\int_0^3(\int_0^{2\pi}(\int_{\frac{\pi}{2}}^{\pi} 9\rho^2\sin(\phi) - \rho^4\sin^3(\phi)d\phi)d\theta)d\rho =$

   - $\int_{\frac{\pi}{2}}^{\pi} 9\rho^2\sin(\phi) - \rho^4\sin^3(\phi)d\phi$
     $\int \sin^3(\phi)d\phi =$
     $\int(1-\cos^2(\phi))\sin(\phi)d\phi =$
     $-\cos(\phi) + \frac{\cos^3(\phi)}{3} + C$
     $\int_{\frac{\pi}{2}}^{\pi} 9\rho^2\sin(\phi) - \rho^4\sin^3(\phi)d\phi$
     $9\rho^2\cos(\phi) + \cos(\phi) + \frac{\cos^3(\phi)}{3}\Big|_{\frac{\pi}{2}}^{\pi} =$
     $9\rho^2 + 1 + \frac{1}{3} = 9\rho^2 + \frac{4}{3}$
   - $\int_0^{2\pi} 9\rho^2 + \frac{4}{3}d\theta =$
     $18\pi\rho^2 + \frac{8\pi}{3}$
   - $\int_0^3 18\pi\rho^2 + \frac{8\pi}{3}d\rho =$
     $9\pi\rho + \frac{8\pi\rho}{3}\Big|_0^3$
     $27\pi + 8\pi = 35\pi$

   $\int\int\int_E xe^{x^2+y^2+z^2}dV, E: x^2+y^2+z^2 \leq 1$ en el primer octante

   $$\begin{cases} x = \rho\cos(\theta)\sin(\phi) & 0 \leq \rho \leq 1 \\ y = \rho\sin(\theta)\sin(\phi) & 0 \leq \theta \leq \frac{\pi}{2} \\ z = \rho\cos(\phi) & 0 \leq \phi \leq \frac{\pi}{2} \end{cases}$$

   $\int_0^1(\int_0^{\frac{\pi}{2}}(\int_0^{\frac{\pi}{2}} \rho\cos(\theta)\sin^2(\phi)e^{\rho^2}\rho^2 d\phi)d\theta)d\rho$

   - $\int_0^{\frac{\pi}{2}} \rho\cos(\theta)\sin^2(\phi)e^{\rho^2}\rho^2 d\phi =$
     $\rho\cos(\theta)(1-\sin(\phi))e^{\rho^2}\rho^2\Big|_0^{\frac{\pi}{2}} =$
     $\frac{\pi}{4}\cos(\theta)e^{\rho^2}\rho^3$
   - $\frac{\pi}{4}e^{\rho^2}\rho^3\int_0^{\frac{\pi}{2}}\cos(\theta)d\theta =$
     $\frac{\pi}{4}e^{\rho^2}\rho^3 - \sin(\theta)|_0^{\frac{\pi}{2}} =$
     $-\frac{\pi}{4}e^{\rho^2}\rho^3$
   - $-\frac{\pi}{4}\int_0^1 e^{\rho^2}\rho^3 d\rho =$
     $-\frac{\pi}{4}\cdot\frac{1}{2} =$
     $-\frac{\pi}{8}$