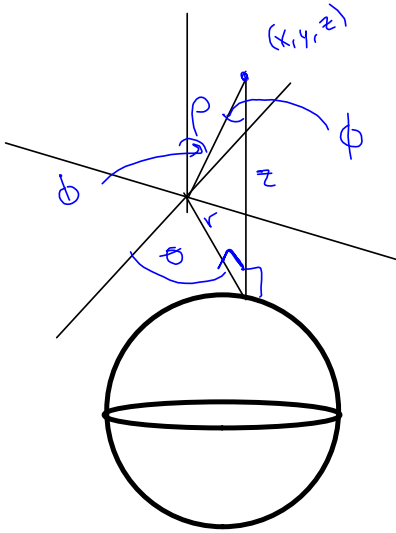


7. (5 pts) Use spherical coordinates to evaluate

$$\int_{-2}^2 \int_0^{\sqrt{4-y^2}} \int_{-\sqrt{4-x^2-y^2}}^{\sqrt{4-x^2-y^2}} y^2 \sqrt{x^2 + y^2 + z^2} dz dx dy$$



$$x = r \cos \theta$$

$$= \rho \sin \theta \cos \theta$$

$$y = r \sin \theta$$

$$= \rho \sin \theta \sin \theta$$

$$\frac{r}{\rho} = \sin \theta$$

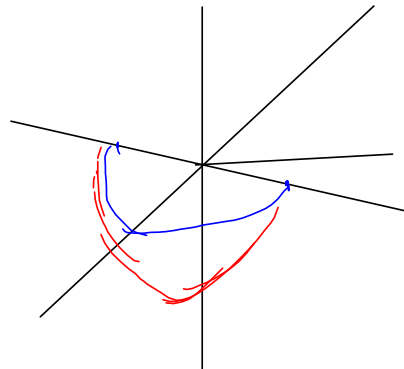
$$\rho = r \sin \theta$$



$$-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$

$$\frac{\pi}{2} \leq \phi \leq \pi$$

$$0 \leq \rho \leq 2$$



$$\int_0^2 \int_{\pi/2}^{\pi} \int_0^{\pi} \rho^2 \sin^2 \theta \sin^2 \theta \cdot \rho \cdot \rho^2 \sin \theta d\theta d\phi d\rho$$

$$= \frac{64\pi}{9}$$