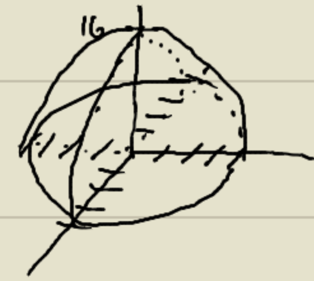
3. $$\int_{x=-4}^{x=4} \int_{y=-\sqrt{16-x^2}}^{y=\sqrt{16-x^2}} \int_{z=x^2+y^2}^{z=16} x \, dz \, dy \, dx$$



$x = r\cos\theta$
$y = r\sin\theta$
$x^2+y^2=r^2$

$$\int_{\theta=0}^{\theta=2\pi} \int_{r=0}^{r=4} \underbrace{\int_{z=r^2}^{z=16} r\cos\theta \cdot r \, dz}\, dr \, d\theta$$

$y=\sqrt{16-x^2}$
$y^2 = 16-x^2$
$x^2+y^2=16$
$r^2=16$
$r=4$

$$= \int_{\theta=0}^{\theta=2\pi} \int_{r=0}^{r=4} \Big[r^2\cos\theta \, z \Big]_{z=r^2}^{z=16} dr \, d\theta$$

$$= \int_{\theta=0}^{\theta=2\pi} \int_{r=0}^{r=4} r^2\cos\theta \left[16 - r^2\right] dr \, d\theta$$

$$= \int_{\theta=0}^{\theta=2\pi} \underbrace{\int_{r=0}^{r=4} \left(16r^2\cos\theta - r^4\cos\theta\right) dr}\, d\theta$$

$$= \int_{\theta=0}^{\theta=2\pi} \left[16 \cdot \frac{1}{3} r^3 \cos\theta - \frac{1}{5} r^5 \cos\theta\right]_{r=0}^{r=4} d\theta$$

$$= \int_{\theta=0}^{\theta=2\pi} \left[\frac{16}{3} \cdot 4^3 \cos\theta - \frac{1}{5} \cdot 4^5 \cos\theta\right] d\theta$$

$$= \int_{\theta=0}^{\theta=2\pi} \left(\frac{1024}{3}\cos\theta - \frac{1024}{5}\cos\theta\right) d\theta$$

$$= \int_{\theta=0}^{\theta=2\pi} \cos\theta \left(\frac{1024}{3} - \frac{1024}{5}\right) d\theta$$

$$= \frac{2048}{15} \int_{\theta=0}^{\theta=2\pi} \cos\theta \, d\theta$$

$$= \frac{2048}{15} \Big[\sin\theta\Big]_{\theta=0}^{\theta=2\pi}$$

$$= \frac{2048}{15} \left[\sin 2\pi - \sin 0\right]$$

$$= 0$$