

MULTIVARIABLE CALCULUS

Shadow on the xy -plane is a disk of radius R :

$$-R \leq x \leq R \text{ and } -\sqrt{R^2 - x^2} \leq y \leq \sqrt{R^2 - x^2}$$

Bounds for z : $-\sqrt{R^2 - y^2} \leq z \leq \sqrt{R^2 - y^2}$

So volume =
$$\int_{-R}^R \int_{-\sqrt{R^2 - x^2}}^{\sqrt{R^2 - x^2}} \int_{-\sqrt{R^2 - y^2}}^{\sqrt{R^2 - y^2}} 1 \, dz \, dy \, dx$$

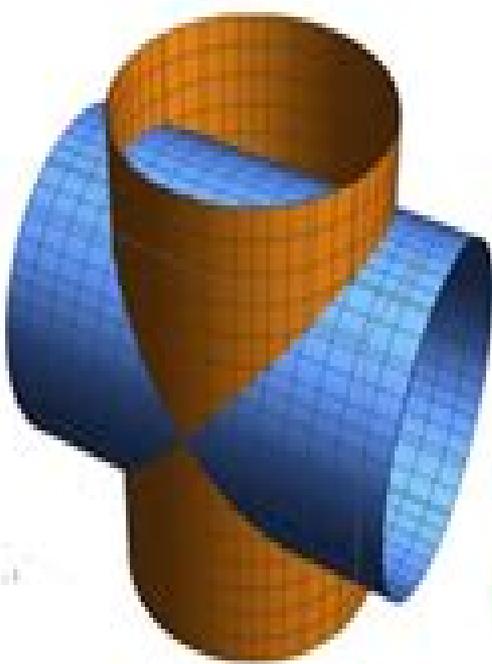
$$= \int_{-R}^R \int_{-\sqrt{R^2 - x^2}}^{\sqrt{R^2 - x^2}} 2\sqrt{R^2 - y^2} \, dy \, dx \quad \text{hmmm ...}$$

Switch to

Type II!

$$= \int_{-R}^R \int_{-\sqrt{R^2 - y^2}}^{\sqrt{R^2 - y^2}} 2\sqrt{R^2 - y^2} \, dx \, dy$$

TRIPLE INTEGRALS AND APPLICATIONS



The Integrals Of Multivariable Calculus Math Insight

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