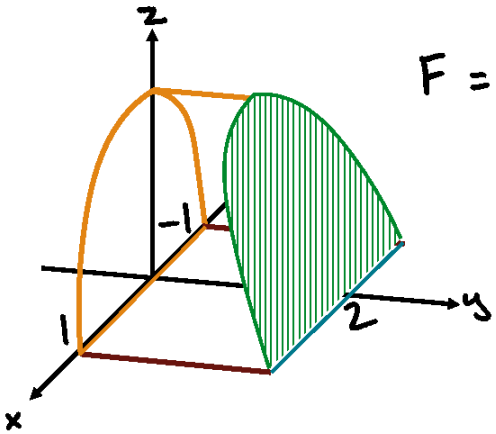
# Divergence Theorem – Example




$$F = \left(\frac{1}{2}x^2 + e^{\cos z y}\right)i + \left(yx + \ln|z|\right)j + \tan(xy)k$$

$$\iint_S \vec{F}\, ds = ? = \iiint_R \operatorname{div}\vec{F}\, dV$$

$$\operatorname{div}\vec{F} = x + x + 0 = 2x$$

$0 \le y \le 2 - z$

$0 \le z \le 1 - x^2$

$-1 \le x \le 1$

$$= \int_{-1}^{1} \int_{0}^{1-x^2} \int_{0}^{2-z} 2x \, dy \, dz \, dx$$

$$= \int_{-1}^{1} \int_{0}^{1-x^2} 2x(2 - z) \, dz \, dx$$

$$= \int_{-1}^{1} \left(3x - 2x^3 - x^5\right) dx = 0$$