Divergence Theorem

Idea: Fundamental Theorem of Calculus

$\vec{F} : R^3 \to R^3$

$$\iint_S \vec{F} \cdot \vec{n} ds = \iiint_E (\nabla \cdot \vec{F}) dE$$

where E is the 3D region (volume) enclosed by the surface S.

$\vec{n}$ is the unit normal vector of $\mathrm{d}S$. (see: Orientation > Surface)

(see: Divergence)

Special case: Fundamental Theorem of Calculus > Collecting Normal component along Curve

Geometric Intuition

Sum up expansion inside = expansion of the outside (boundary)