

Lecture 23 – Divergence Theorem in 3D

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In this set of notes we need to make the following assumptions:

- The surface enclosing the 3D volume is continuous,
- The components of the vector valued function \mathbf{F} at each point on the surface in 3D are continuous,
- The closed surface encloses the entire region in 3D, and
- The partial derivatives of the vector valued function \mathbf{F} at every point in the region enclosed by the surface in 3D are defined.

1 Divergence Theorem

The Divergence Theorem in 3D is given by:

$$\oiint_S \mathbf{F} \cdot \mathbf{S} = \iiint_V \nabla \cdot \mathbf{F} dV \quad (1)$$

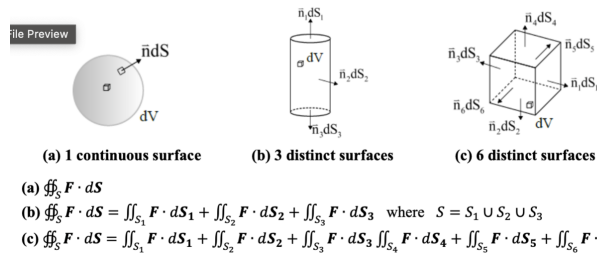


Figure 1: Three Examples of Geometrical Interpretations of the Divergence Theorem