Chapter 14. **Vector calculus.**
Section 14.9 **Divergence Theorem.**

Divergence theorem. Let E be a simple solid region whose boundary surface S has positive (outward) orientation. Let $\vec{F}$ be a vector field whose component functions have continuous partial derivatives on an open region that contains E. Then

$$\iint_S \vec{F} \cdot \vec{S} = \iiint_E \text{div } \vec{F}\, dV$$

Example 1. Use the Divergence Theorem to calculate the surface integral $\iint_S \vec{F} \cdot \vec{S}$ if $\vec{F} =< ye^{z^2}, y^2, e^{xy} >$ and S is the surface of the solid bounded by the cylinder $x^2 + y^2 = 9$ and the planes $z = 0$ and $z = y - 3$.