



$$\begin{aligned}
 \oiint_{\partial\Omega_+} \vec{F} \cdot d\vec{S} &= \oiint_{\partial\Omega_+} (X, Y, Z) \cdot (dy \wedge dz, dz \wedge dx, dx \wedge dy) \\
 &= \oiint_{\partial\Omega_+} X dy \wedge dz + Y dz \wedge dx + Z dx \wedge dy \\
 &= \iiint_{\Omega} \left( \frac{\partial X}{\partial x} + \frac{\partial Y}{\partial y} + \frac{\partial Z}{\partial z} \right) dV = \iiint_{\Omega} \vec{\nabla} \cdot \vec{F} dV
 \end{aligned}$$