Analogy between line and surface integrals

parametrized curve $\vec{r}(t) = x(t)\mathbf{i} + y(t)\mathbf{j} + z(t)\mathbf{k}$ **one** parameter t	parametrized surface $\vec{r}(u,v) = x(u,v)\mathbf{i} + y(u,v)\mathbf{j} + z(u,v)\mathbf{k}$ **two** parameters u, v
vector line element $d\vec{r} = \frac{d\vec{r}}{dt}dt$ direction **tangent** to curve	vector surface element $d\vec{S} = \frac{\partial \vec{r}}{\partial u} \times \frac{\partial \vec{r}}{\partial v} du dv$ direction **perpendicular** to surface
length of curve C $\int_C \lvert d\vec{r}\rvert$	area of surface Σ $\iint_\Sigma \lvert d\vec{S}\rvert$
integral of scalar field f over C $\int_C f \lvert d\vec{r}\rvert$	integral of scalar field f over Σ $\iint_\Sigma f \lvert d\vec{S}\rvert$
work done by $\vec{F}$ moving particle along C $\int_C \vec{F} \cdot d\vec{r}$	flux of $\vec{F}$ through Σ $\iint_\Sigma \vec{F} \cdot d\vec{S}$
If C closed and $\vec{F}$ conservative, then $\int_C \vec{F} \cdot d\vec{r} = 0.$	If S closed and $\nabla \cdot \vec{F} = 0$, then $\iint_\Sigma \vec{F} \cdot d\vec{S} = 0.$