$$A \times (B \times C) = (C \times B) \times A = B(A \cdot C) - C(A \cdot B)$$

$$\nabla(uv) = u\nabla v + v\nabla u$$

$$\nabla(A \cdot B) = A \times (\nabla \times B) + (A \cdot \nabla)B + B \times (\nabla \times A) + (B \cdot \nabla)A$$

$$\nabla \cdot uA = u\nabla \cdot A + A \cdot \nabla u$$

$$\nabla \cdot (A \times B) = B \cdot \nabla \times A - A \cdot \nabla \times B$$

$$\nabla \times (uA) = u\nabla \times A - A \times \nabla u$$

$$\nabla \times (A \times B) = (B \cdot \nabla)A + A(\nabla \cdot B) - (A \cdot \nabla)B - B(\nabla \cdot A)$$

$$\overline{(\nabla \cdot A)B} = (A \cdot \nabla)B + B(\nabla \cdot A)$$

$$\nabla \times (\nabla \times A) = \nabla(\nabla \cdot A) - (\nabla \cdot \nabla)A$$

$\nabla t \cdot (\nabla \times \vec{B}) = \vec{B}(\nabla t \times \nabla)$

$\mathbf{a} \cdot (\mathbf{b} \times \mathbf{c}) = \mathbf{c} \cdot (\mathbf{a} \times \mathbf{b}) = \mathbf{b} \cdot (\mathbf{c} \times \mathbf{a})$.

$\mathbf{a} \times (\mathbf{b} \times \mathbf{c}) = (\mathbf{a} \cdot \mathbf{c})\,\mathbf{b} - (\mathbf{a} \cdot \mathbf{b})\,\mathbf{c}$.

$(\mathbf{a} \times \mathbf{b}) \cdot (\mathbf{c} \times \mathbf{d}) = (\mathbf{a} \cdot \mathbf{c})(\mathbf{b} \cdot \mathbf{d}) - (\mathbf{a} \cdot \mathbf{d})(\mathbf{b} \cdot \mathbf{c})$.

$\nabla(f g) = f\,\nabla g + g\,\nabla f$ or, equivalently, grad (f g) = f grad g + g grad f

$\nabla(\mathbf{v} \cdot \mathbf{w}) = (\mathbf{v} \cdot \nabla)\mathbf{w} + (\mathbf{w} \cdot \nabla)\mathbf{v} + \mathbf{v} \times (\nabla \times \mathbf{w}) + \mathbf{w} \times (\nabla \times \mathbf{v})$

$\nabla \cdot (f\mathbf{v}) = f\,\nabla \cdot \mathbf{v} + \nabla f \cdot \mathbf{v}$ or, equivalently, div(f **v**) = f div **v** + grad f . **v**

$\nabla \times (f\mathbf{v}) = f\,\nabla \times \mathbf{v} + \nabla f \times \mathbf{v}$ or, equivalently, curl(f **v**) = f curl **v** + grad f X **v**

$\nabla \cdot (\mathbf{v} \times \mathbf{w}) = \mathbf{w} \cdot (\nabla \times \mathbf{v}) - \mathbf{v} \cdot (\nabla \times \mathbf{w})$

$\nabla \times (\mathbf{v} \times \mathbf{w}) = \mathbf{v}\,(\nabla \cdot \mathbf{w}) - \mathbf{w}\,(\nabla \cdot \mathbf{v}) + (\mathbf{w} \cdot \nabla)\mathbf{v} - (\mathbf{v} \cdot \nabla)\,\mathbf{w}$

$i \quad j \quad k$

$\partial_x t \quad \partial_y t \quad \partial_z t$

$\partial_x \quad \partial_y \quad \partial_z$

$\partial_{yz} t - \partial_{yz} t$

1.

Green's identities:

1. $\int_\Omega f\nabla^2 g \; d^n x = \int_{\partial\Omega} f \; \mathbf{n} \cdot \nabla g \; d^{n-1}x - \int_\Omega \nabla f \cdot \nabla g \; d^n x$
2. $\int_\Omega f\nabla^2 g - g\nabla^2 f \; d^n x = \int_{\partial\Omega} f \; \mathbf{n} \cdot \nabla g - g \; \mathbf{n} \cdot \nabla f \; d^{n-1}x$

Gauss's divergence theorem:

- $\int_\Omega \nabla \cdot \mathbf{F} \; d^n x = \int_{\partial\Omega} \mathbf{F} \cdot \mathbf{n} \; d^{n-1}x$

Stokes's theorem:

- $\int_\Sigma \nabla \times \mathbf{F} \cdot \mathbf{n} \; d^{n-1}x = \int_{\partial\Sigma} \mathbf{F} \cdot d\mathbf{l}$