Formler og konvensjoner

$$\begin{aligned} x = r\cos(\theta) &= \varrho\cos(\theta)\sin(\varphi), & 0 \le r, \varrho \\ y = r\sin(\theta) &= \varrho\sin(\theta)\sin(\varphi), & 0 \le \theta < 2\pi \\ z = z \qquad &= \varrho\cos(\varphi), & 0 \le \varphi \le \pi. \end{aligned}$$

$$\mathrm{d}s = |\mathbf{r}'(t)|\mathrm{d}t$$

$$\mathrm{d}A = \mathrm{d}x\,\mathrm{d}y = r\,\mathrm{d}r\,\mathrm{d}\theta$$

$$\mathrm{d}S = |\mathbf{r}_x \times \mathbf{r}_y|\,\mathrm{d}x\,\mathrm{d}y$$

$$(\mathrm{d}S = |(z_x, z_y, -1)|\,\mathrm{d}x\,\mathrm{d}y \quad \text{for} \quad z = z(x,y))$$

$$\mathrm{d}V = \mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z = r\,\mathrm{d}r\,\mathrm{d}\theta\,\mathrm{d}z = \varrho^2\sin(\varphi)\,\mathrm{d}\varrho\,\mathrm{d}\varphi\,\mathrm{d}\theta$$

$$\mathrm{d}\mathbf{r} = \mathbf{r}'(s)\,\mathrm{d}s = \mathbf{T}\,\mathrm{d}s = \frac{\mathbf{r}'(t)}{|\mathbf{r}'(t)|}|\mathbf{r}'(t)|\,\mathrm{d}t$$

$$(\mathrm{d}\mathbf{r} = (\mathrm{d}x, \mathrm{d}y) = (\tfrac{dx}{dt}, \tfrac{dy}{dt})\mathrm{d}t \quad \text{for} \quad \mathbf{r} = (x,y))$$

$$\mathrm{curl}(\mathbf{F}) = \nabla \times \mathbf{F} = \left(\tfrac{\partial F_3}{\partial x_2} - \tfrac{\partial F_2}{\partial x_3}, \tfrac{\partial F_1}{\partial x_3} - \tfrac{\partial F_3}{\partial x_1}, \tfrac{\partial F_2}{\partial x_1} - \tfrac{\partial F_1}{\partial x_2}\right)$$

$$\iint_A \left(\tfrac{\partial Q}{\partial x} - \tfrac{\partial P}{\partial y}\right)\mathrm{d}A = \int_{\partial A} P\,\mathrm{d}x + Q\,\mathrm{d}y$$

$$\iiint_V \mathrm{div}(\mathbf{F})\,\mathrm{d}V = \iint_{\partial V} \mathbf{F}\cdot\mathbf{n}\,\mathrm{d}S$$

$$\iint_S \mathrm{curl}(\mathbf{F})\cdot\mathbf{n}\,\mathrm{d}S = \int_{\partial S} \mathbf{F}\cdot\mathbf{T}\,\mathrm{d}s$$