Saamevoltig integralen

Einhelrvralig integral $\displaystyle\int_a^b f(x)\, dx$

dubbel integral $\quad+\quad$ drievoudig integralen
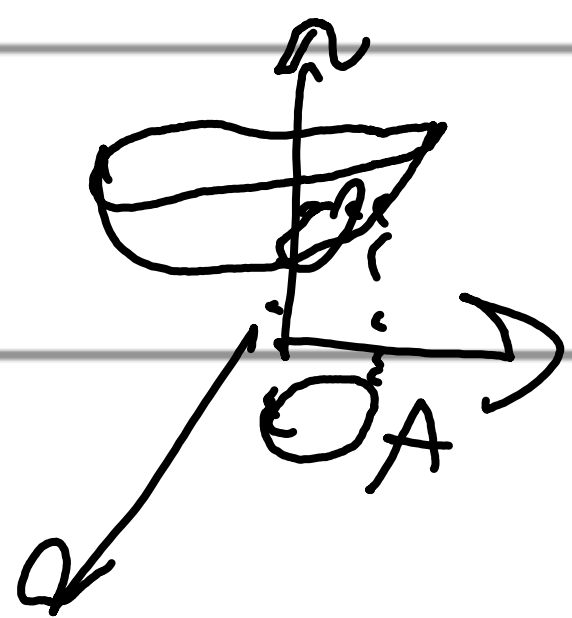
$$\iint f(x,y)\, dx\, dy \qquad \iiint f(x,y,z)\, dx\, dy\, dz$$

Inhoud onder oppervlak

niet te toen

gaan nettentije betelen

: bepalen van massaverdeeling

Lijnintegraal

$$\int_K f \, ds$$

$$K \longrightarrow \vec{z}(t)$$
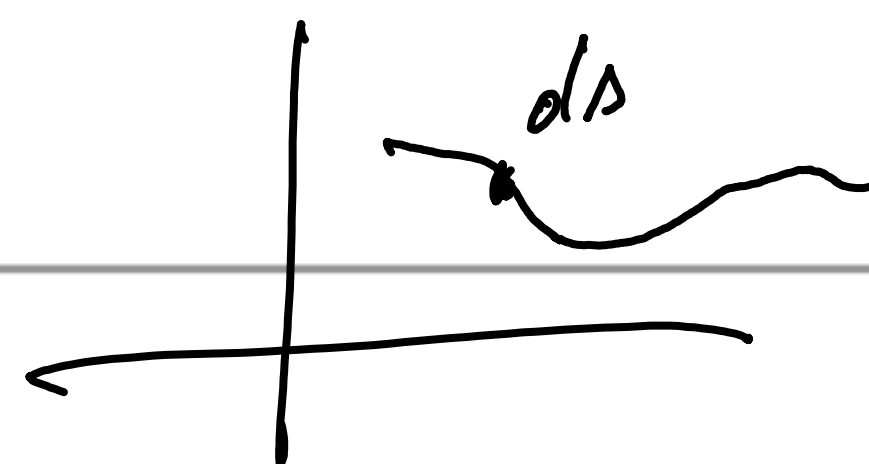
$$ds = |\vec{v}| \, dt$$

$$\int_{t_0}^{t_1} f(\vec{z}(t)) \, |\vec{v}| \, dt$$

$$\int_K (\vec{F} \cdot \vec{T}) \, ds \qquad \text{arbeidsintegraal}$$

$$K \Leftrightarrow \vec{z}(t)$$

$$\int_K \vec{F}(\vec{z}(t)) \, \frac{d\vec{z}}{dt} \cdot dt$$

$$\int_{t_0}^{t_1} \left(F_x \frac{dx}{dt} + F_y \frac{dy}{dt} + F_z \frac{dz}{dt} \right) dt$$
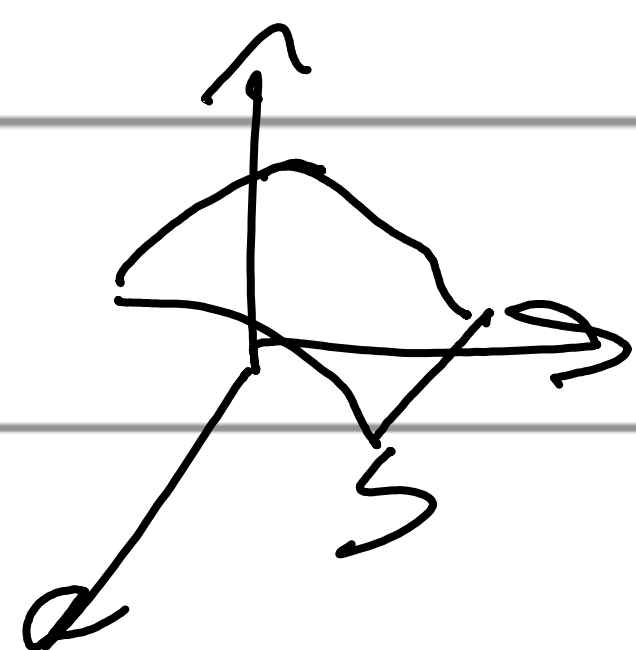
$$\int_{K^+} (\vec{F} \cdot \vec{N}) \, ds \qquad \text{Fluxintegral}$$

$$\hookrightarrow \quad \vec{T} \times \vec{1_2}$$

$$\hookrightarrow \quad \frac{dy}{ds}, \; \frac{-dx}{ds}, \; 0$$

$$\int_{t_0}^{t_1} \left(F_x \frac{dy}{dt} - F_y \frac{dx}{dt} \right) dt$$
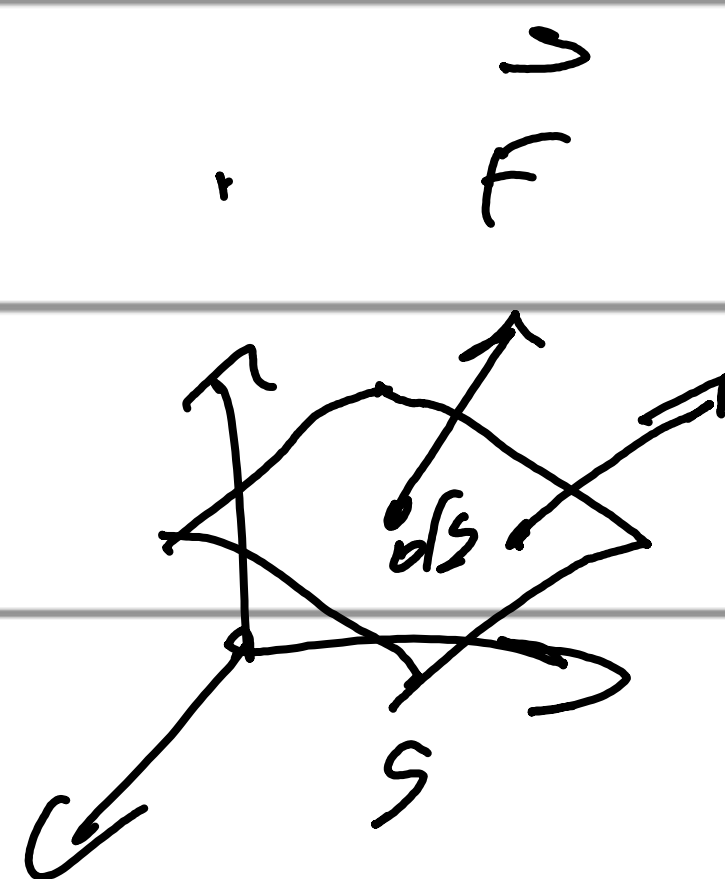
Opperlohte integraal

$$- \iint f \, dS$$

$$S \to z = z(x, y)$$

$$= \iint f \, \sqrt{1 + \left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2} \, dx \, dy$$

$$- \iint_S \vec{F} \cdot \vec{dS}$$

$$\vec{n} \cdot dS$$

$$= \iint_{S_{xy}} \left(F_x \frac{\partial z}{\partial x} + F_y \frac{\partial z}{\partial x} - F_z \right) dx \, dy$$

$\hookrightarrow$ propetie S op x y vlak

Green : in vlak   → gesloten lijnintegraal en dubbel integraal

divergentie / gauss   → gesloten Oppervlakte integraal en 3 voudige

Stoke   →   lijnintegraal (gesloten) en oppervlakte