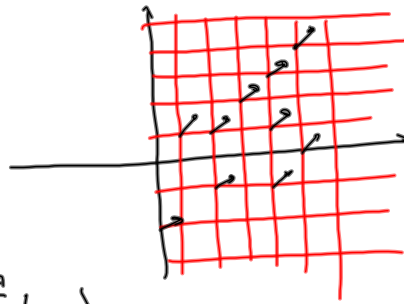
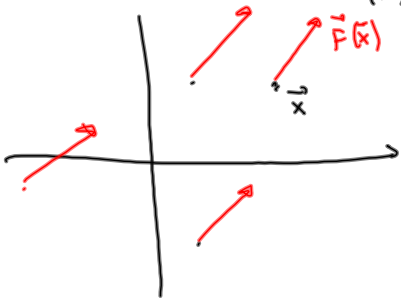


Vektorfeld
 $\vec{F}: \mathbb{R}^2 \rightarrow \mathbb{R}^2$

Beispiele:

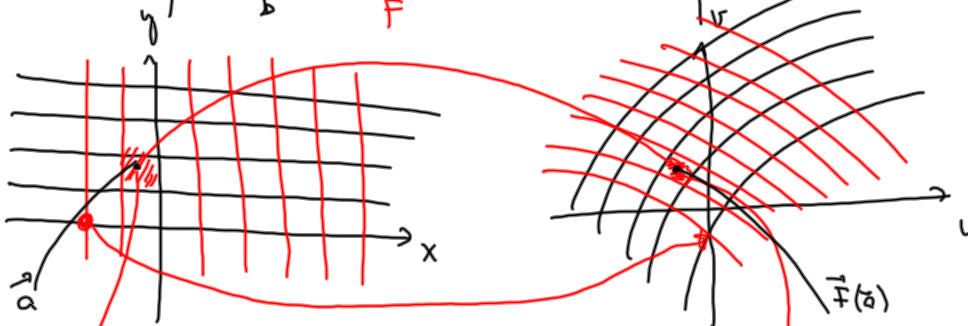
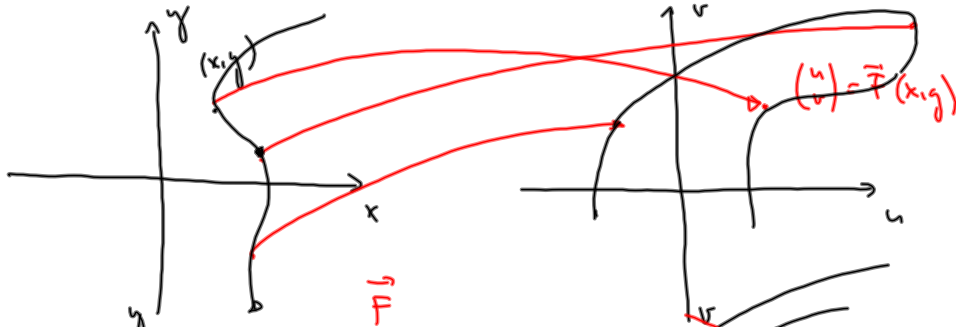
- (i) $\vec{F}(\vec{x})$ vinkelrechtlich: punkt \vec{x}
- (ii) $\vec{F}(\vec{x})$ in geraden Linien: punkt \vec{x}



quiver (x, y, u, v) $\begin{pmatrix} u \\ v \end{pmatrix} = \vec{F}(x, y)$

$\vec{F}(x, y) = -(x+y)\vec{i} + x\vec{j}$

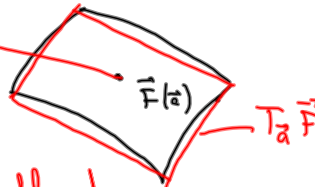
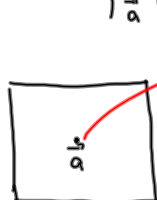
Alternatives BelegmäÙe: $\begin{pmatrix} u \\ v \end{pmatrix} = \vec{F}(x, y)$



areal A_1

areal A_2

$T_{\vec{a}} \vec{F}$

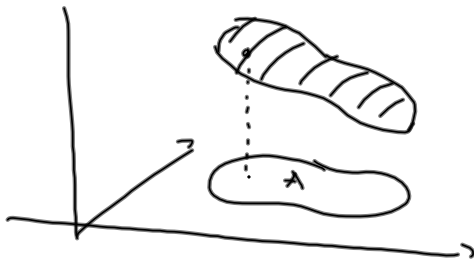


Veränderungsfaktor für $T_{\vec{a}} \vec{F}$ or $|\det(\vec{F}'(\vec{a}))|$

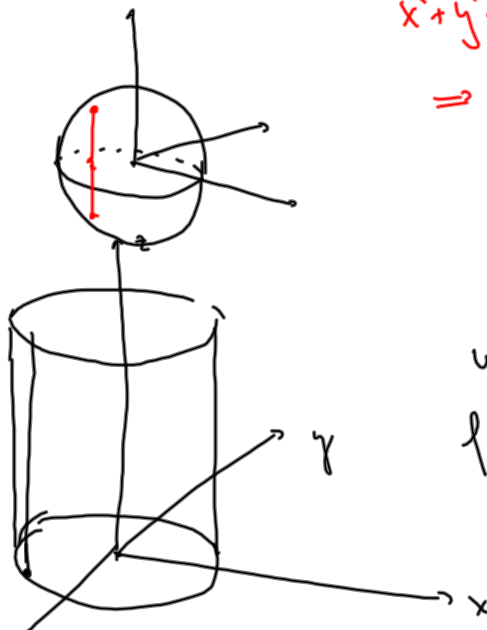
Lokal: punkt \vec{a} or $|\det(\vec{F}'(\vec{a}))|$ veränderungsfaktor für \vec{F} .

Parametriserte flater

Funksjonsgrafen til $z = f(x, y)$ er en flate



Problemer:

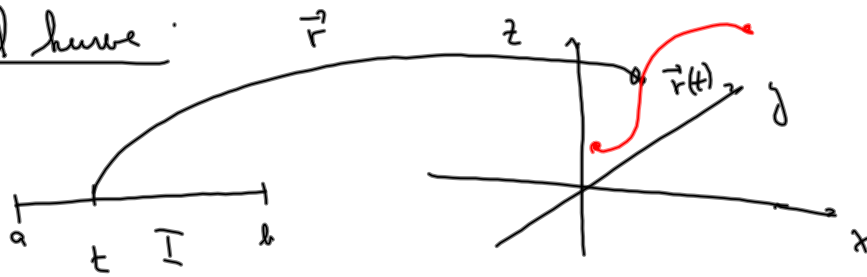


$$x^2 + y^2 + z^2 = R^2$$

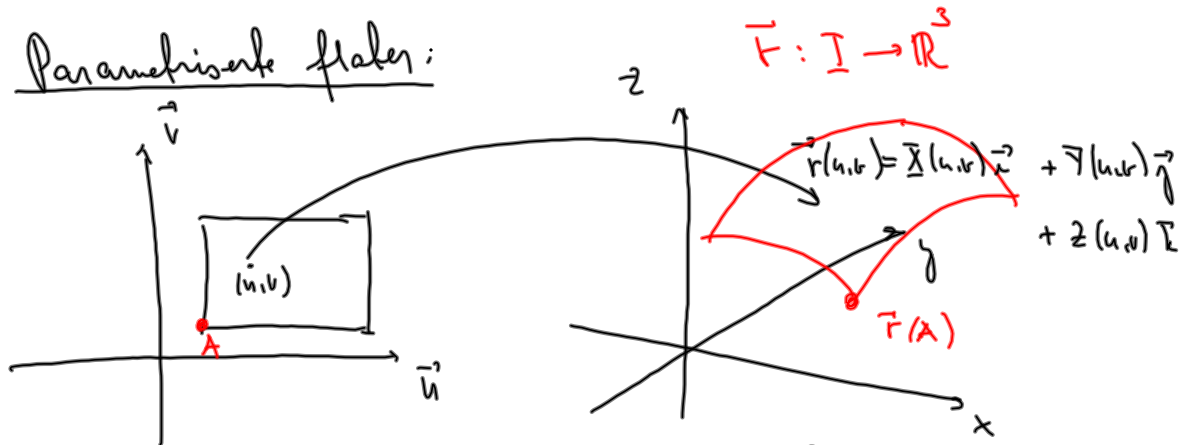
$$\Rightarrow z = \pm \sqrt{R^2 - x^2 - y^2} \quad \text{to funksjoner}$$

uendelig mange z 'er
for hvert punkt (x, y) på
sirkelen.

Parametrisierte Kurve:



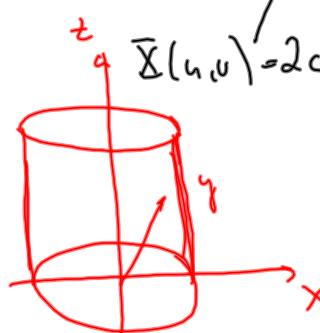
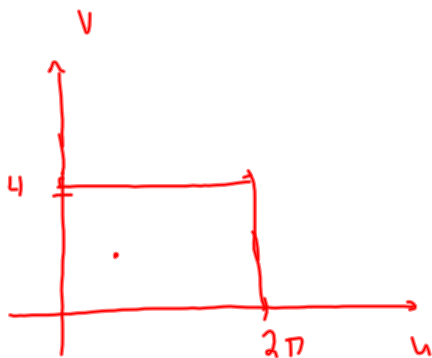
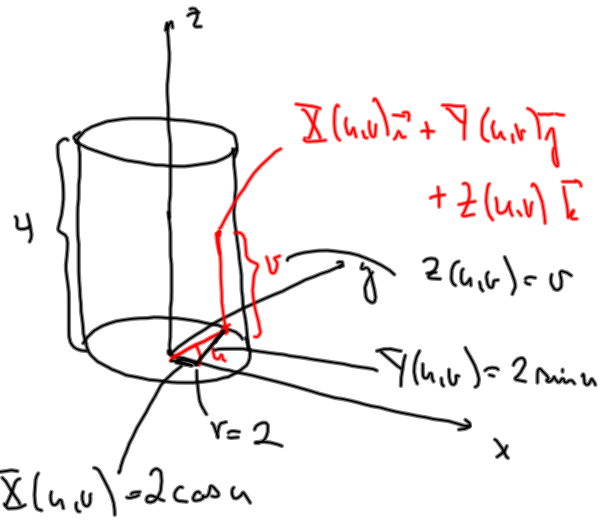
Parametrisierte Fläche:



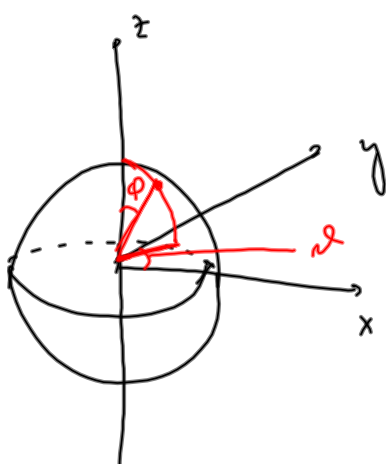
Beispiel:

$u \in [0, 2\pi), v \in [0, 4]$

$\vec{r}(u,v) = 2\cos u \vec{i} + 2\sin u \vec{j} + v \vec{k}$



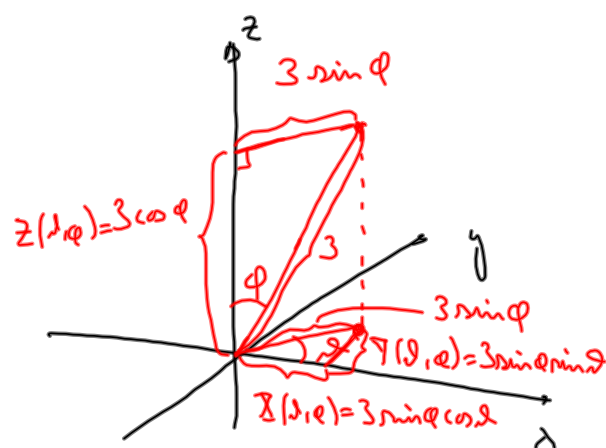
Exempel:



$$\vec{r}(\lambda, \varphi) = 3 \sin \varphi \cos \lambda \vec{i} + 3 \sin \varphi \sin \lambda \vec{j} + 3 \cos \varphi \vec{k}$$

$$u = \lambda, v = \varphi$$

Kuleflate med radius 3 om origo.



$$\lambda \in [0, 2\pi)$$

$$\varphi \in [0, \pi]$$