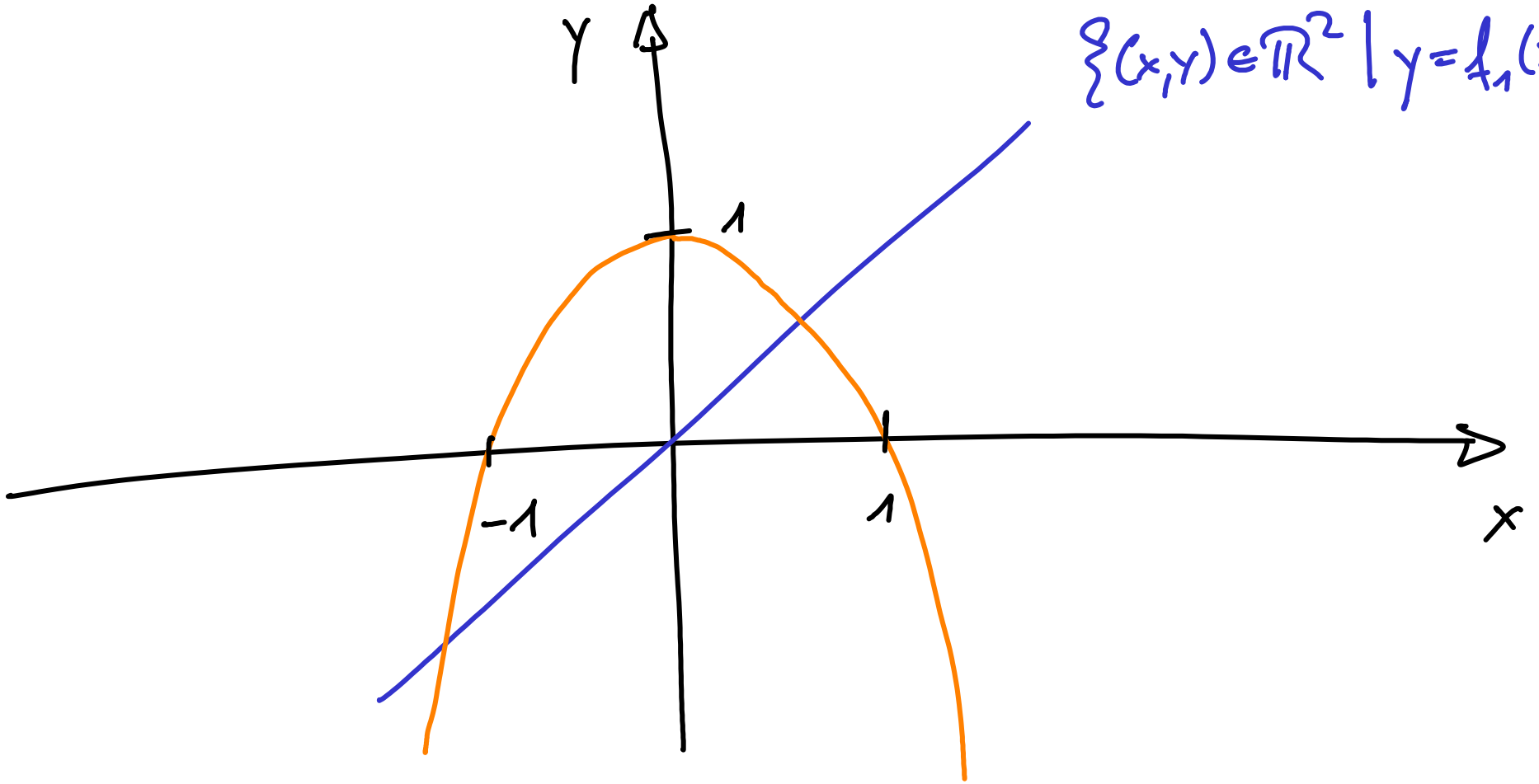
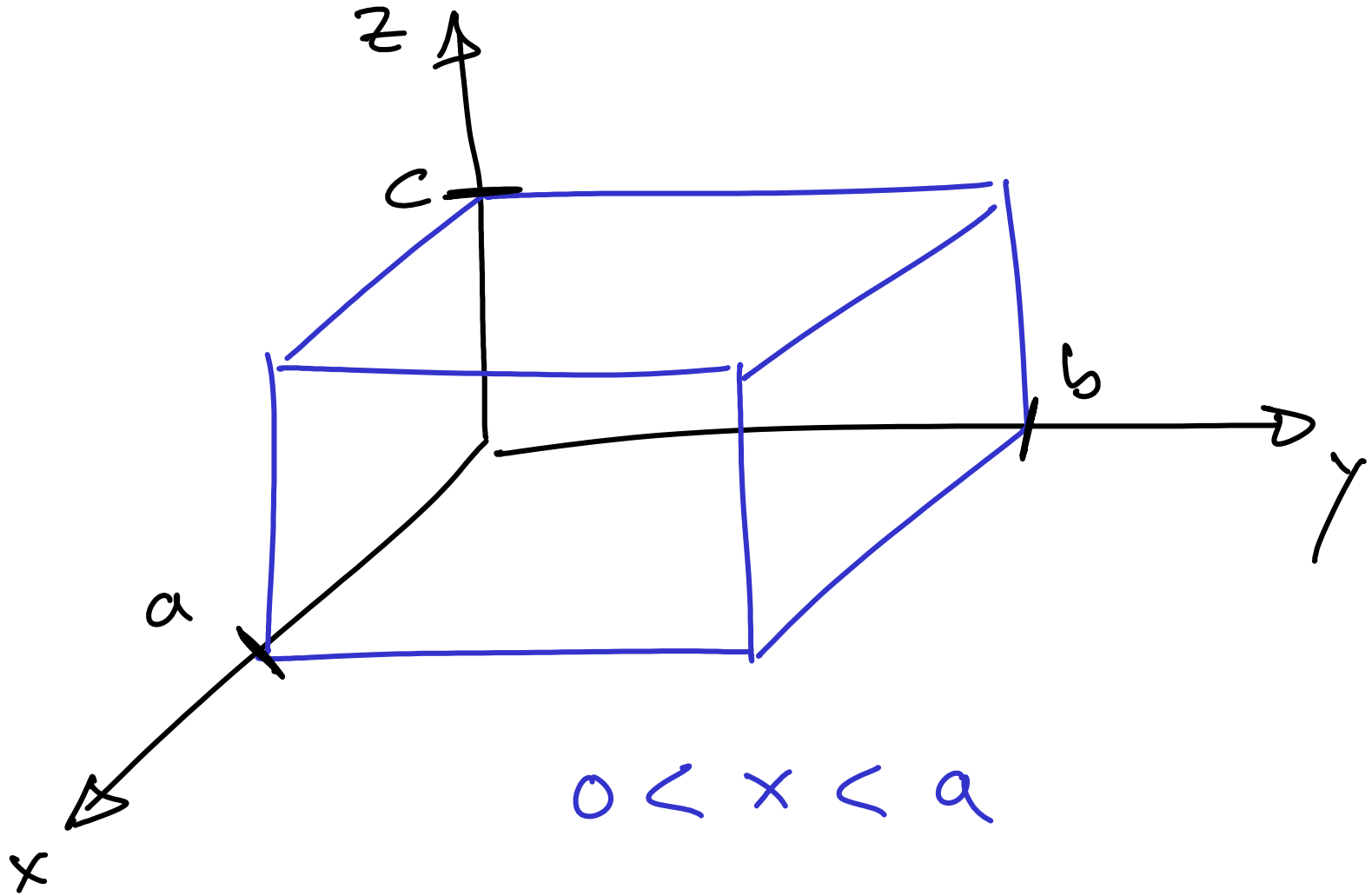
$f_1(x) = x$, $f_2(x) = 1 - x^2$

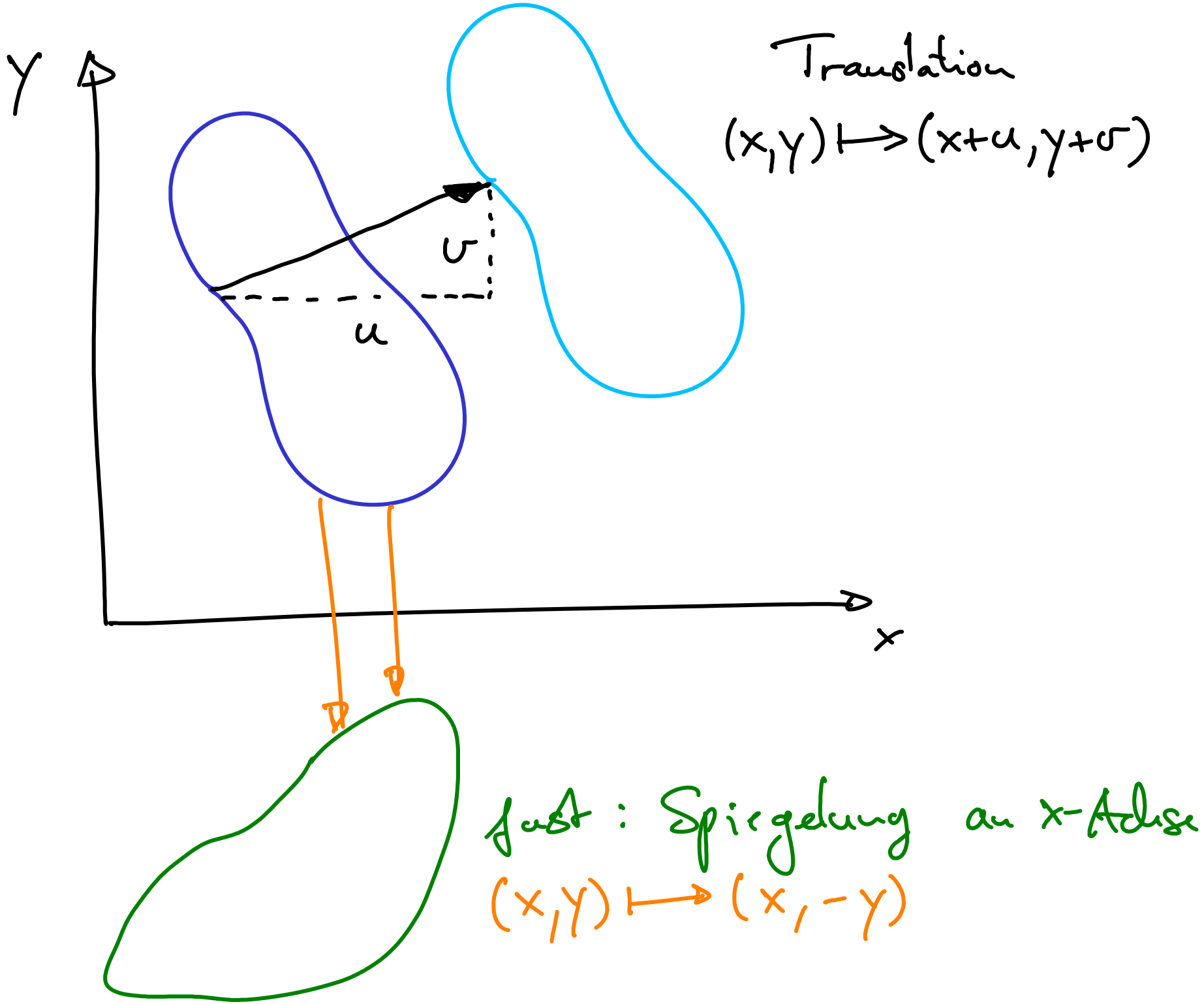


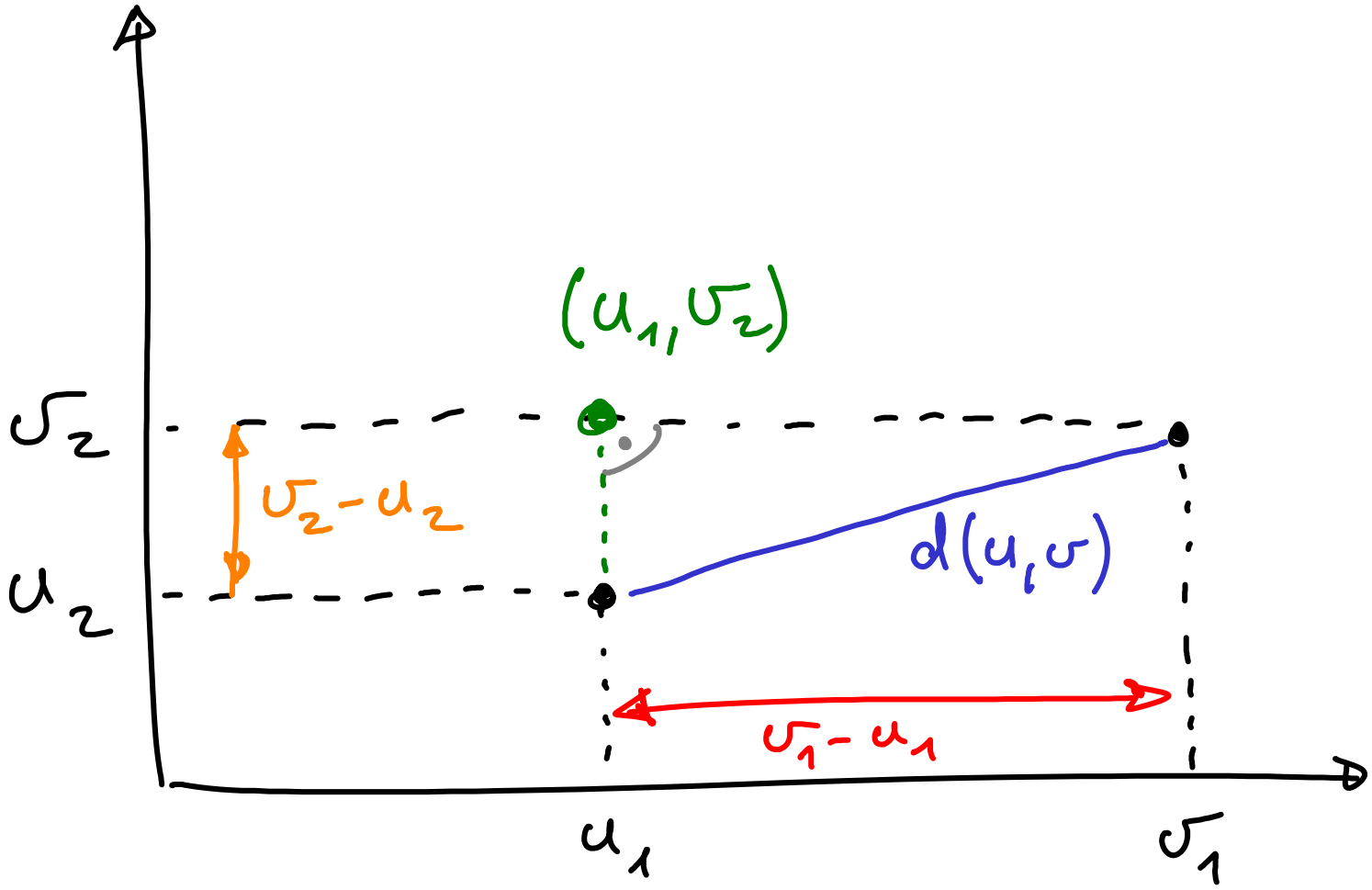
$\{(x,y) \in \mathbb{R}^2 \mid y = f_1(x)\}$

$\{(x,y) \in \mathbb{R}^2 \mid y = f_2(x)\}$



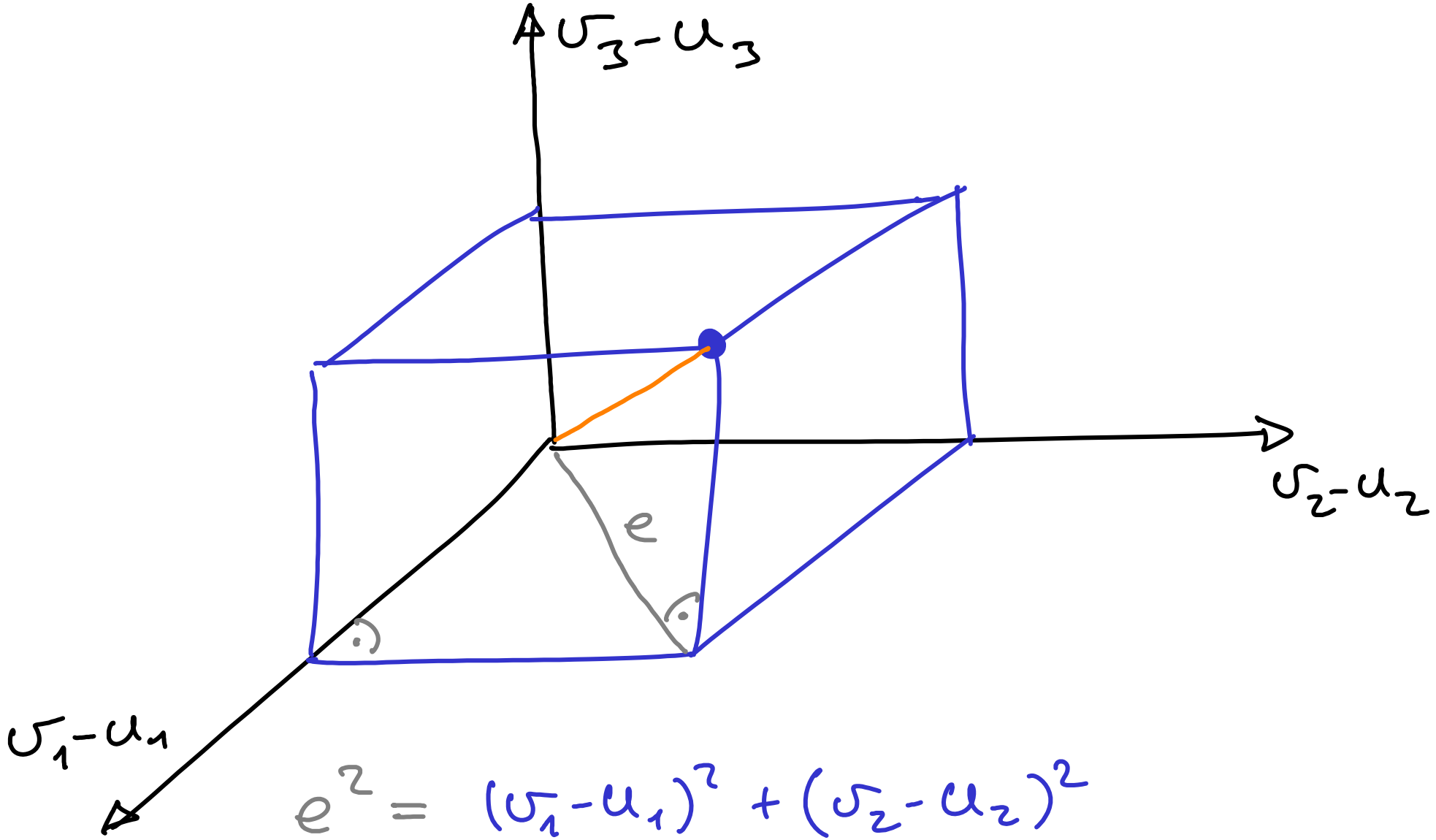
$0 < x < a$


Translation
$(x,y) \mapsto (x+u, y+v)$
y
x
u
v
fast : Spiegelung an x-Achse
$(x,y) \mapsto (x,-y)$



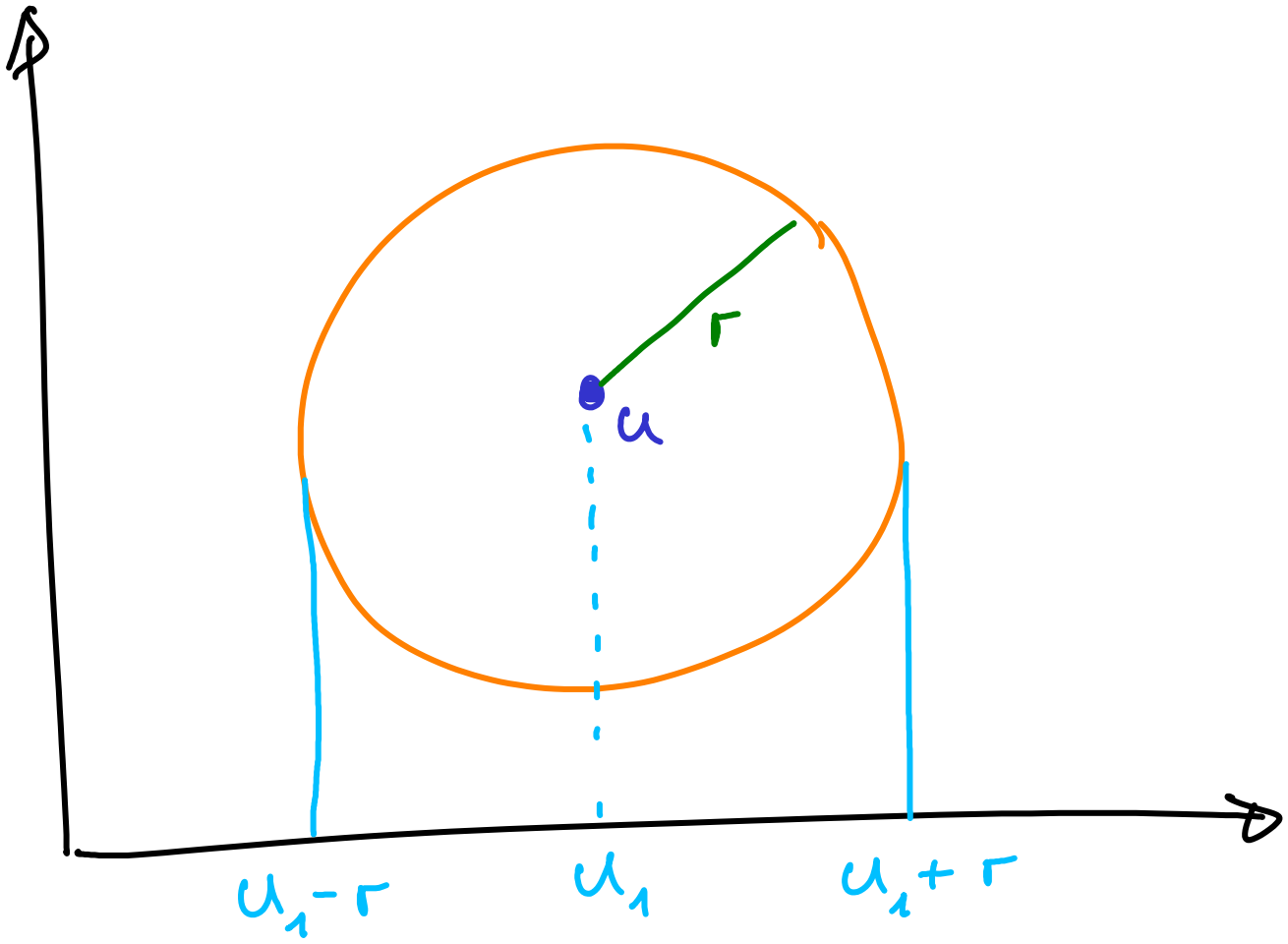
$$[d(u,v)]^2 = (v_1 - u_1)^2 + (v_2 - u_2)^2$$

$$d(u,v) = \sqrt{(v_1 - u_1)^2 + (v_2 - u_2)^2}$$



$$e^2 = (v_1 - u_1)^2 + (v_2 - u_2)^2$$

$$[d(u,v)]^2 = e^2 + (v_3 - u_3)^2$$


r
u
$u_1 - r$
u_1
$u_1 + r$

$$(v_1 - u_1)^2 + (v_2 - u_2)^2 = r^2$$

$$\Leftrightarrow \quad (v_2 - u_2)^2 = r^2 - (v_1 - u_1)^2$$

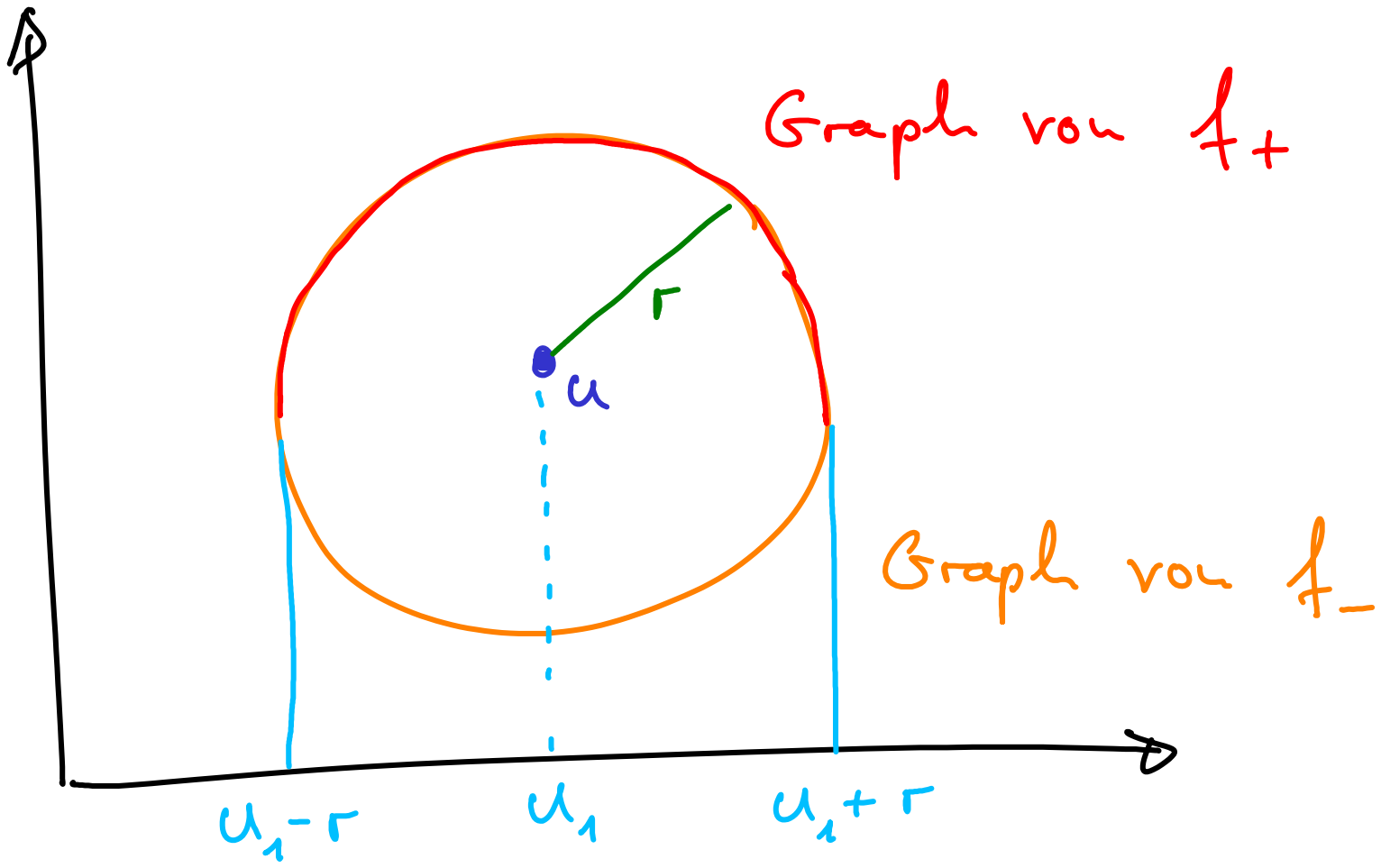
$$\overset{(*)}{\Leftrightarrow} \quad v_2 - u_2 = \pm\sqrt{r^2 - (v_1 - u_1)^2}$$

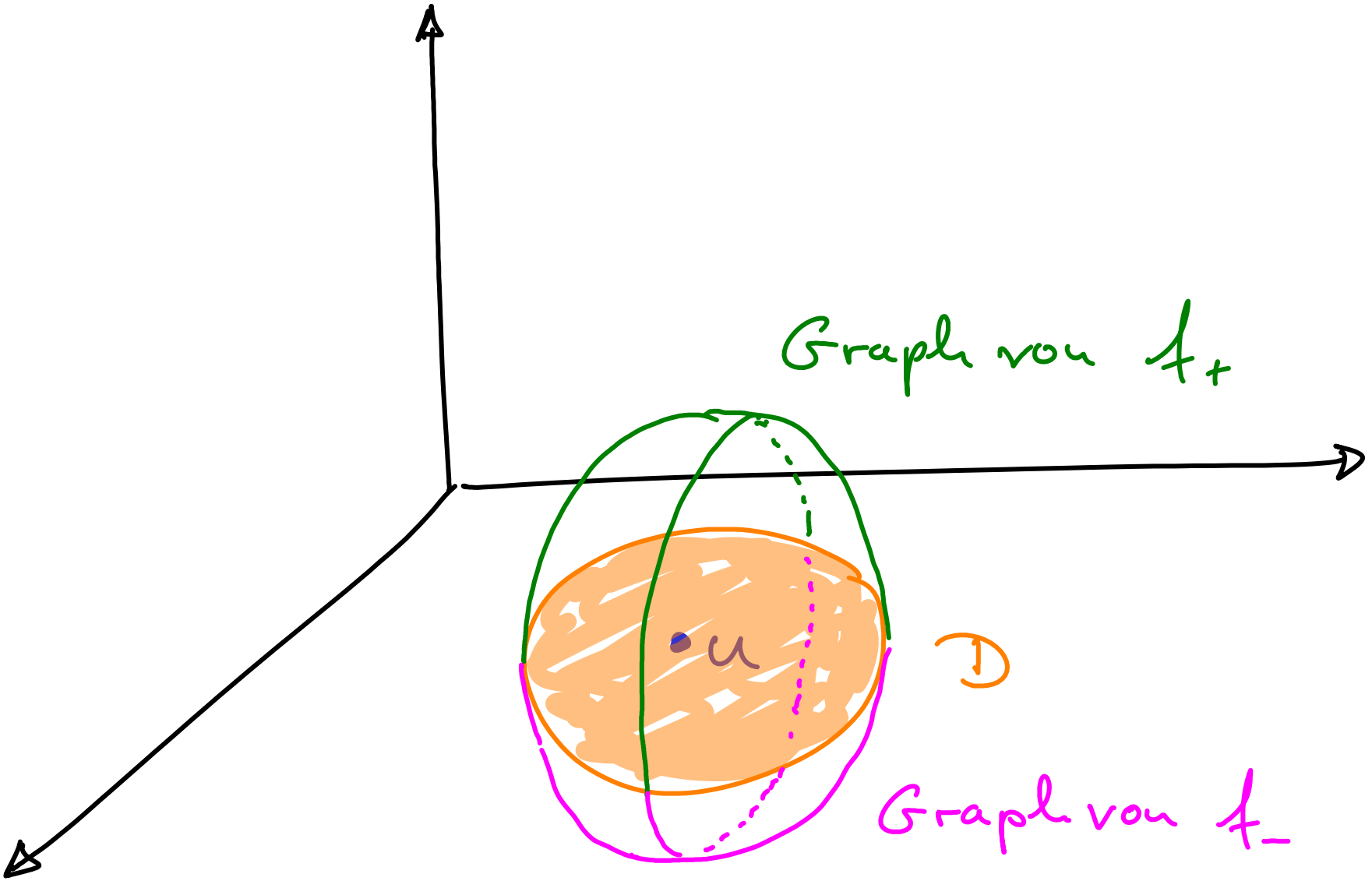
$$\Leftrightarrow \quad v_2 = u_2 \pm \sqrt{r^2 - (v_1 - u_1)^2}$$

(*) falls $(v_1 - u_1)^2 \leq r^2$

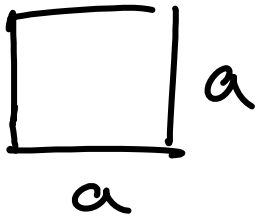
$$\Leftrightarrow \quad |v_1 - u_1| \leq r$$

$$\Leftrightarrow \quad u_1 - r \leq v_1 \leq u_1 + r$$

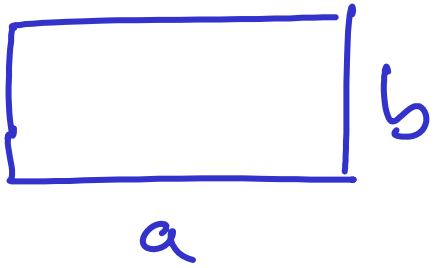

Graph von f_+
r
u
Graph von f_-
$u_1 - r$
u_1
$u_1 + r$


Graph von f_+
u
D
Graph von f_-

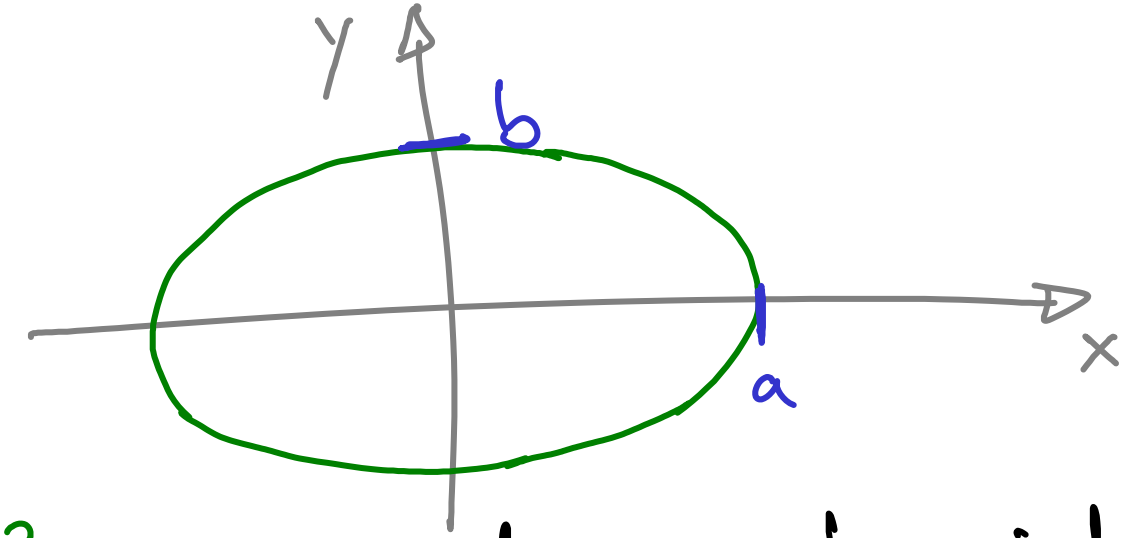
Quadrat



Rechteck



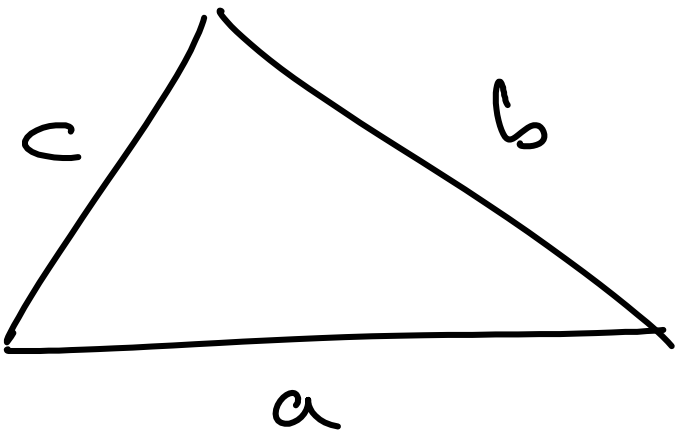
Ellipse

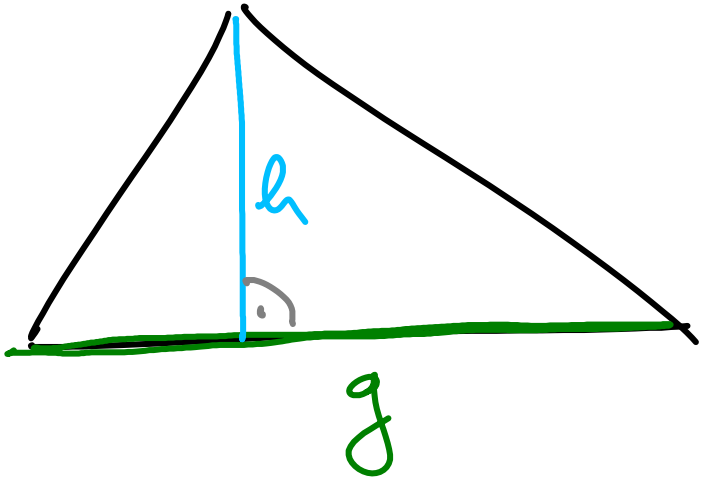


$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

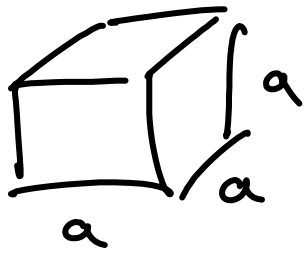
für $a = b$ wird es ein Kreis mit Radius a, denn

$$\frac{x^2}{a^2} + \frac{y^2}{a^2} = 1 \iff x^2 + y^2 = a^2$$

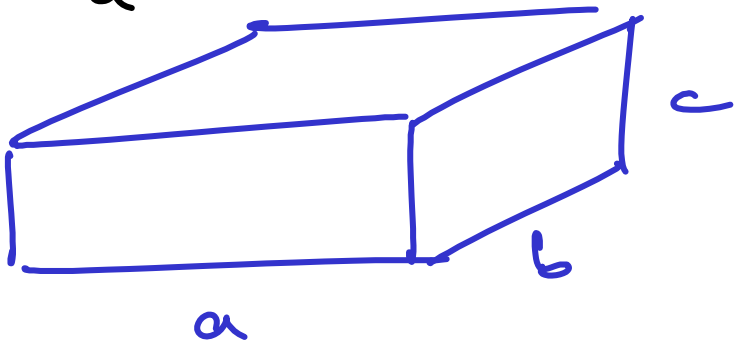

c
b
a

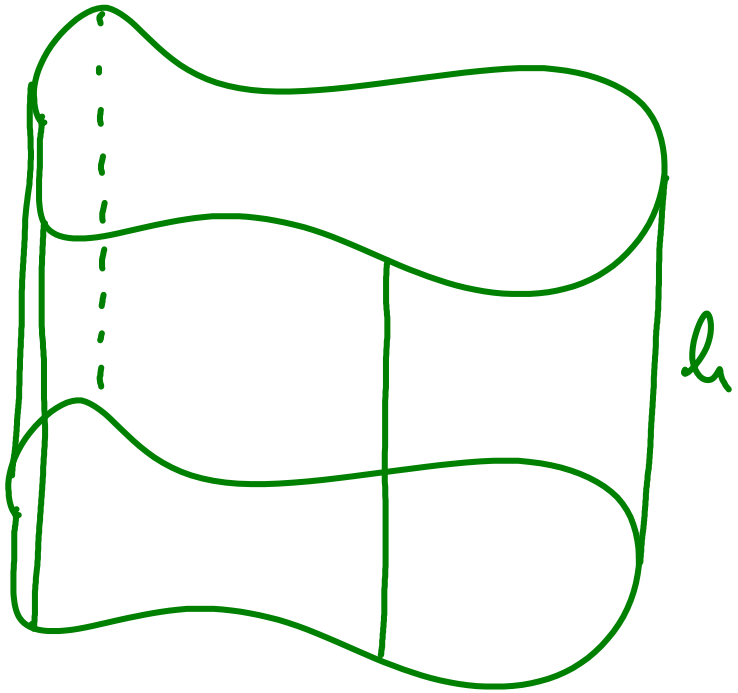

h
g

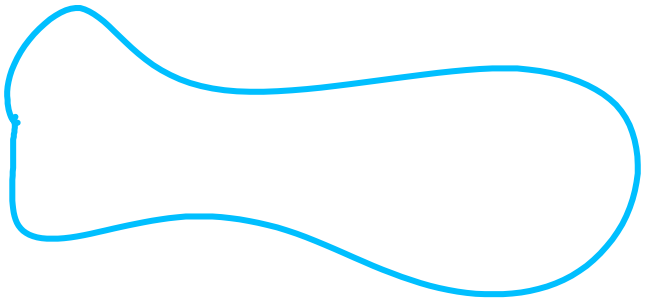
Würfel



Quader



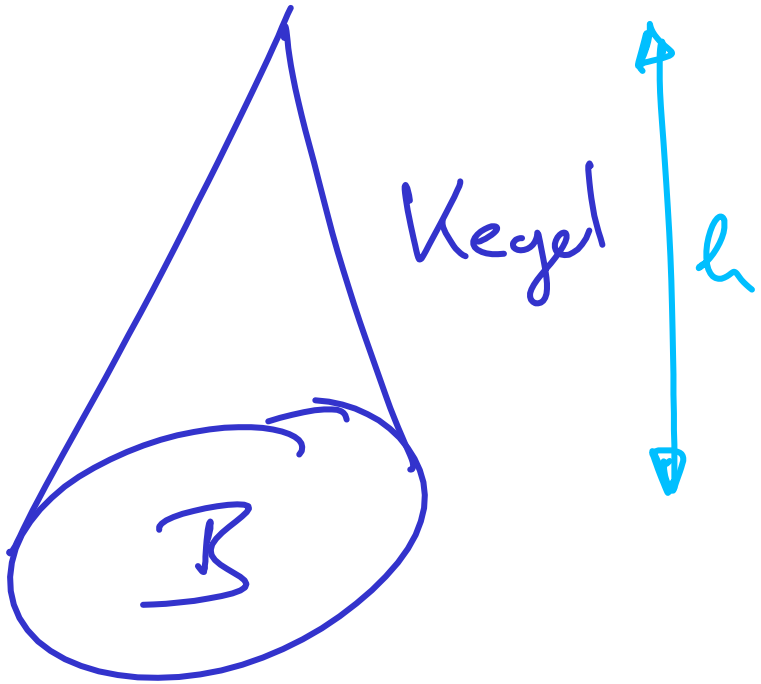


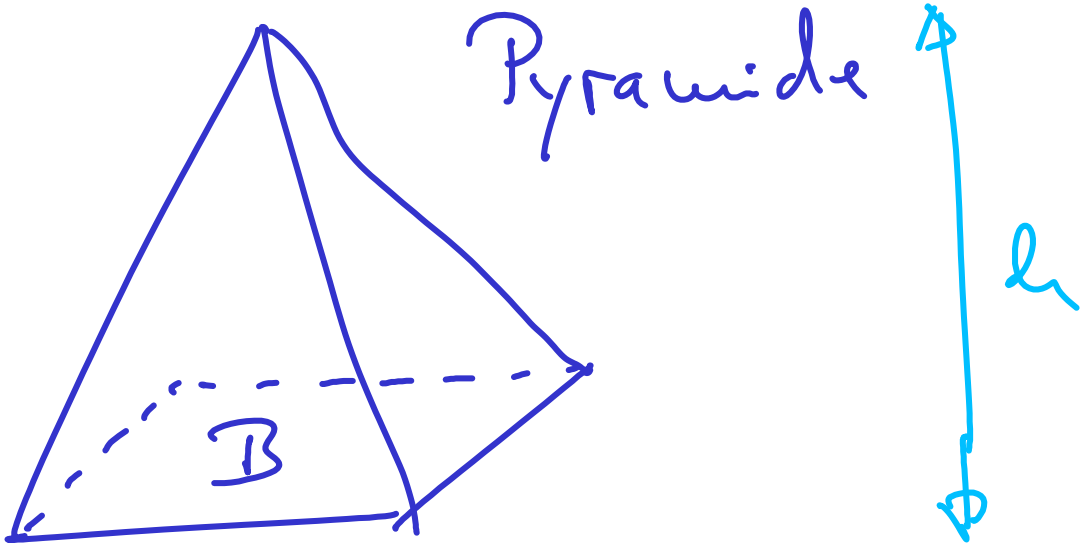


Grundfläche

Flächeninhalt B

Umfang U


Kegel
h
B


Pyramide
h
B

Zur Bergmannschen Regel

Wärmeverlust proportional zur Oberfläche O
(im Wesentlichen)

Wärmeproduktion prop. zum Volumen V
(im Wesentlichen)

Quotient $\frac{O}{V}$

zentr. Streckung

$(x, y, z) \mapsto (\alpha x, \alpha y, \alpha z)$

$\alpha > 0$

$\frac{1}{\alpha} \frac{O}{V}$

< 1