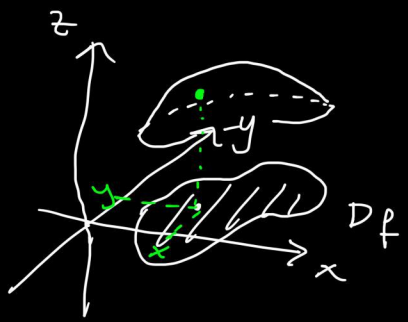
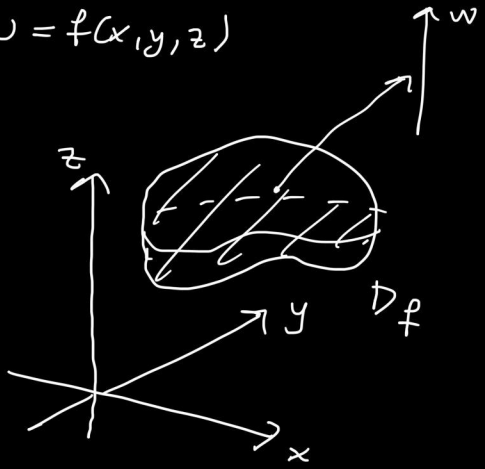
Intro

$z = f(x, y)$



$w = f(x, y, z)$



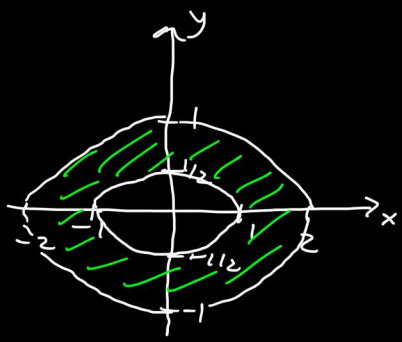
2.10. M_1 $\quad 1 \le x^2 + 4y^2 \le 4$

$1 \le x^2 + 4y^2$ och $x^2 + 4y^2 \le 4$

$x^2 + 4y^2 \ge 1$ $\quad x^2 + 4y^2 = 4$

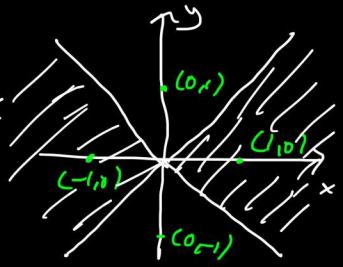
$\frac{x^2}{1^2} + \frac{y^2}{\frac{1}{4}} = 1$ $\quad \frac{x^2}{2^2} + \frac{y^2}{1^2} = 1$

$\frac{x^2}{1^2} + \frac{y^2}{(1/2)^2} = 1$



2.10 M_2 $\quad x^2 - y^2 \geq 0$

$x^2 - y^2 = 0 \iff y^2 = x^2 \iff y = \pm x$



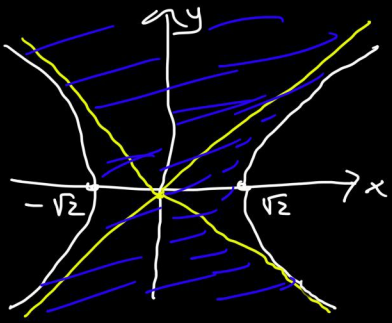
M_3 $\quad x^2 - y^2 \leq 2$

$x^2 - y^2 = 2$ hyperbel

$y=0$: $\quad x^2 - 0 = 2 \iff x = \pm\sqrt{2}$

$x=0$: $\quad 0 - y^2 = 2$ saknar

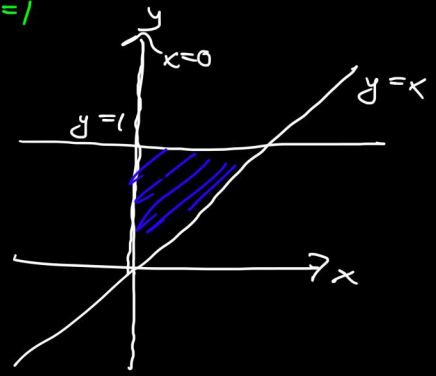
asymptoter $\quad x^2 - y^2 = 0 \iff y = \pm x$



2.10. M_4 $0 \le x \le y \le 1$

$0 \le x$ och $x \le y$ och $y \le 1$

$x = 0$ $y = x$ $y = 1$



M_5 $2^x \cdot 3^y \le 1$

$2^x \cdot 3^y = 1$ $=0$

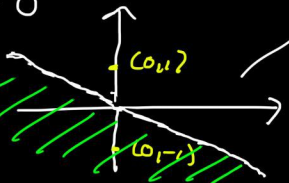
$\Leftrightarrow \ln(2^x \cdot 3^y) = \ln 1$

$\Leftrightarrow \ln 2^x + \ln 3^y = 0$

$\Leftrightarrow x \ln 2 + y \ln 3 = 0$

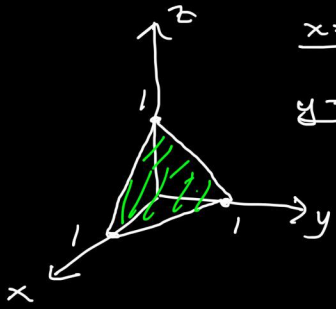
$\Leftrightarrow y = -\frac{\ln 2}{\ln 3} x$

$ax + by + c = 0$



2.11 M_1 $x+y+z \le 1$, $x \ge 0, y \ge 0, z \ge 0$ 1 oktanten

$x+y+z=1$ $x=0, y=0, z=0$

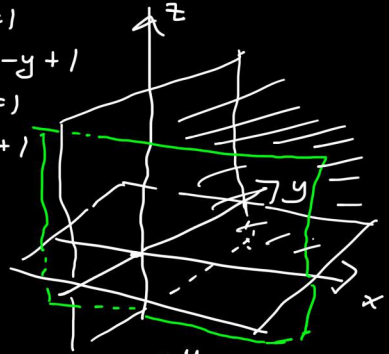


$x=0$ $y+z=1$

$\Leftrightarrow z = -y+1$

$y=0$: $x+z=1$

$\Leftrightarrow z = -x+1$



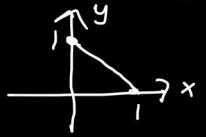
xz-planet $y=0$

yz-planet $x=0$

xy-planet $z=0$

$z=0$: $x+y=1$

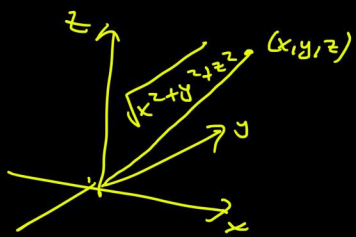
$\Leftrightarrow y = -x+1$

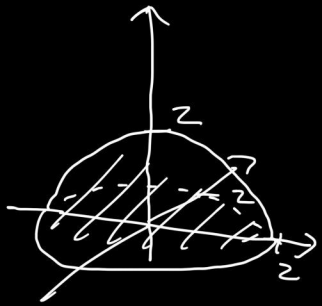


2.11, M_2 $\quad x^2+y^2+z^2 \le 4,\ z \ge 0$

$x^2+y^2+z^2 = 4$

$\Leftrightarrow \quad x^2+y^2+z^2 = 2^2$



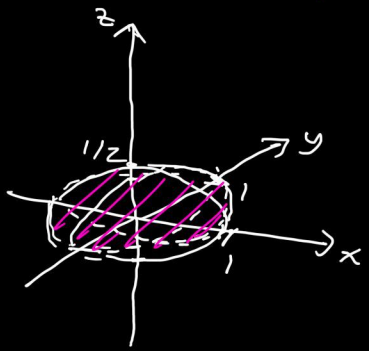


2.11. M_3 $\quad x^2+y^2+4z^2 \le 1$

$x^2+y^2+4z^2=1$

$\Leftrightarrow \quad \frac{x^2}{1^2}+\frac{y^2}{1^2}+\frac{z^2}{(\frac{1}{2})^2}=1$

ellipsoid
medelp. origo
halvaxlar 1, 1, 1/2



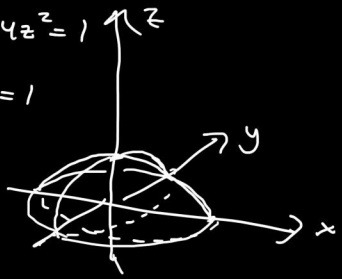
$z=0 \quad x^2+y^2=1$

$x=0 \quad y^2+4z^2=1$

$y^2+\frac{z^2}{(1/2)^2}=1$

$y=0$

- - -



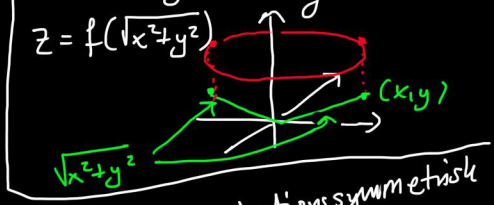
2.11. M_4 $\quad x^2+y^2 \le z \le 1$

$x^2+y^2 \le z$ och $z \le 1$

$x^2+y^2=z$ $\qquad z=1$

Rotationssymmetri kring z-axeln

$z=f(\sqrt{x^2+y^2})$

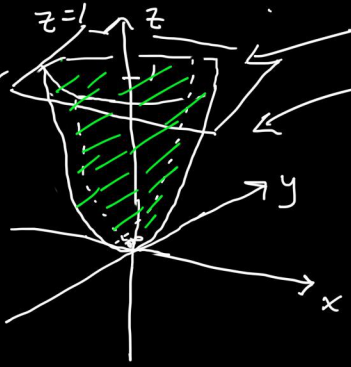


$z=x^2+y^2$

Skärning $y=0$: $z=x^2$ parabler

$x=0$: $z=y^2$

$z=0$: $x^2+y^2=0$ endast origo

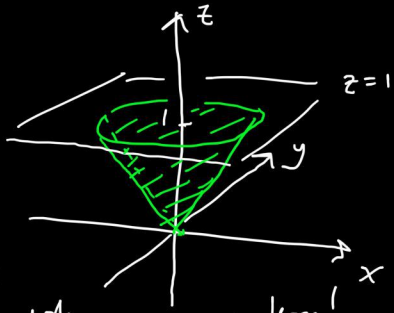


rotationssymmetrisk kring z-axeln paraboloid

2.11. M_5 $\quad \sqrt{x^2+y^2} \le z \le 1$

$\sqrt{x^2+y^2} \le z$ och $z \le 1$

$z = \sqrt{x^2+y^2}$ $\quad$ $z = 1$

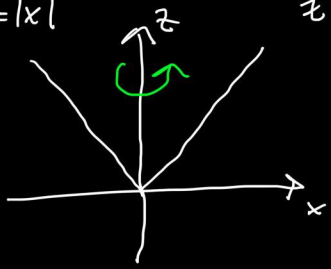


en kon!

$z = \sqrt{x^2+y^2}$

samt på formen $z = f(\sqrt{x^2+y^2})$ s.a. rot.symmetrisk kring z-axeln

$y=0$: $z = \sqrt{x^2} = |x|$



2.11. M_6 $\quad x^2+y^2 \le 1$ kropp i rummet!

dvs. $x^2+y^2+0\cdot z \le 1$

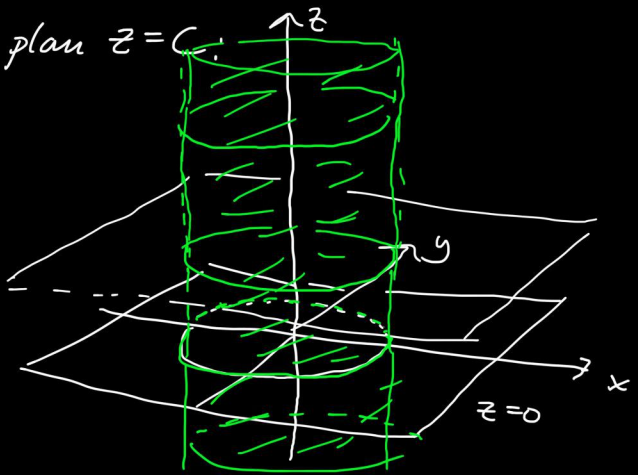
$x^2+y^2=1$

ser likadan ut i varje plan $z=C$:

$z=C$: $\quad x^2+y^2=1$

enhetscirkeln

cylindrisk kropp



3.1 c) Tips!

$f(x,y) = \ln\left(\frac{x+y}{x-y}\right)$

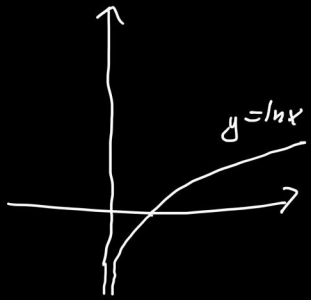
största möjliga def. mängd

$$\frac{x+y}{x-y} > 0$$

$\Leftrightarrow$ $x+y>0$ och $x-y>0$

eller

$x+y<0$ och $x-y<0$

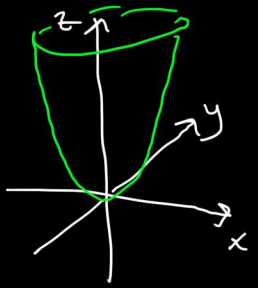


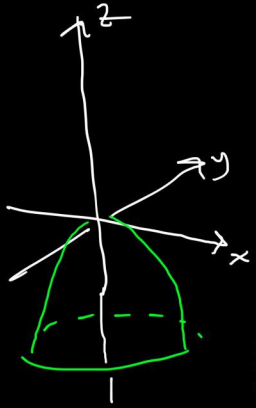
. . . . . - G,S,V,

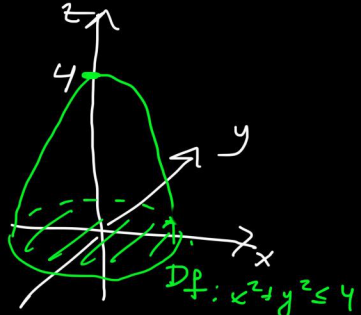
3.4 a) $f(x,y) = 4 - x^2 - y^2$, $x^2 + y^2 \leq 4$

$= 4 - (x^2 + y^2)$

$z = x^2 + y^2$ paraboloid → $z = -(x^2 + y^2)$ → $z = 4 - (x^2 + y^2)$







forflytningsregler!

3.4 b) $f(x,y) = \sqrt{4-(x^2+y^2)}$, $x^2+y^2 \le 4$

$z = \sqrt{4-(x^2+y^2)} \Rightarrow z^2 = 4-(x^2+y^2) \Leftrightarrow x^2+y^2+z^2 = 2^2$

OBS!

Står med enkelp, origo radie 2. Ej grat!

Korrekt: $x^2+y^2+z^2 = 2^2 \Leftrightarrow z^2 = 4-(x^2+y^2)$

står med enkelp, origo radie 2

övre halvstår

$\Leftrightarrow z = \pm\sqrt{4-(x^2+y^2)}$

undre halvstår

Vi får alltså den övre halvstaven: