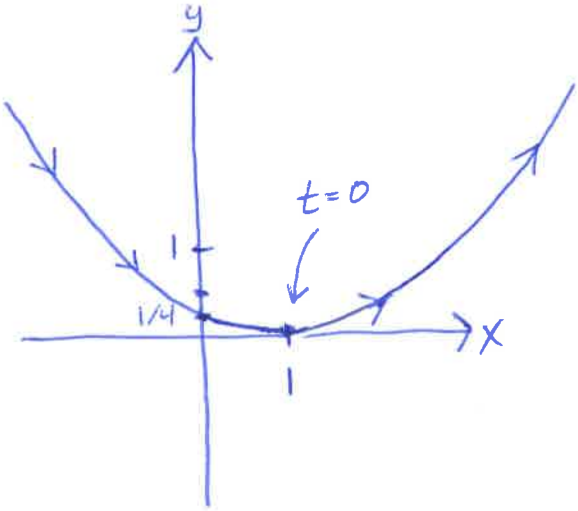
8.2.1

$$x = 1 + 2t \qquad (-\infty < t < \infty)$$
$$y = t^2$$

$$t = \frac{x-1}{2}$$

$$y = \left(\frac{x-1}{2}\right)^2$$

$$y = \frac{1}{4}(x-1)^2 + 0$$

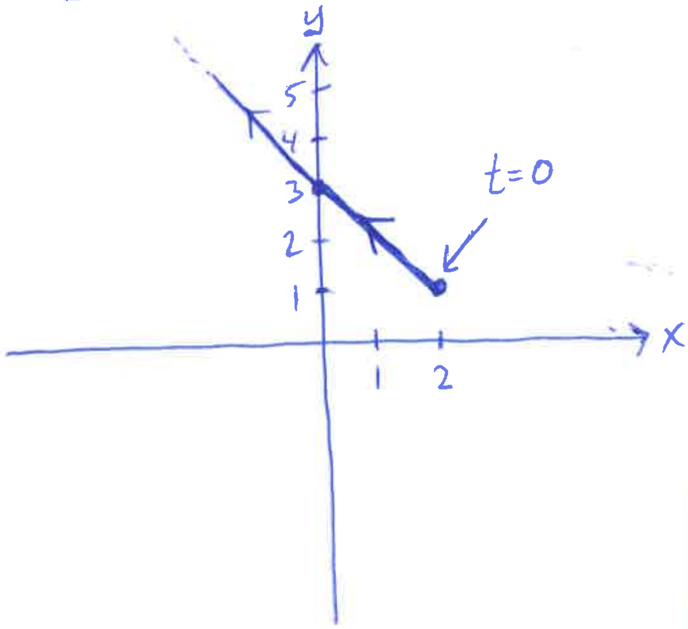


8.2.2

$$x = 2 - t, \quad y = t + 1, \quad (0 \le t < \infty)$$

$$t = 2 - x, \quad y = 2 - x + 1, \quad y = -x + 3$$

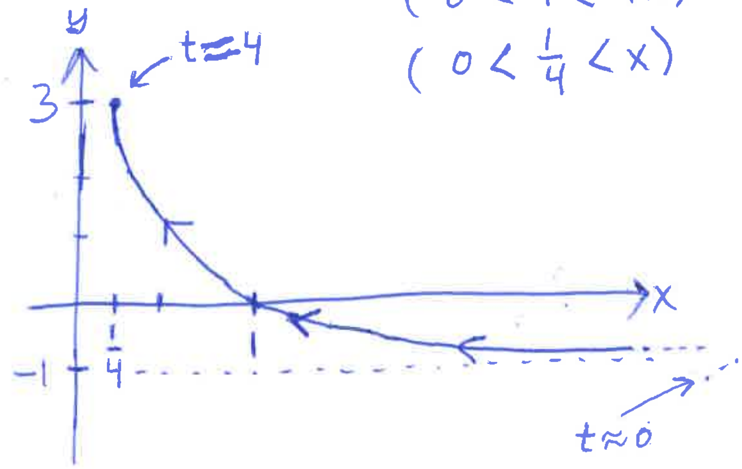
$$0 \le 2 - x < \infty$$
$$-2 \le -x < \infty$$
$$-\infty < x \le 2$$



8.2.3

$$x = \frac{1}{t}, \quad y = t - 1, \quad (0 < t < 4)$$

$$t = \frac{1}{x}, \quad y = \frac{1}{x} - 1, \quad \left(0 < \frac{1}{x} < 4\right)$$
$$(0 < 1 < 4x)$$
$$\left(0 < \frac{1}{4} < x\right)$$



8.2.4

$$x = \frac{1}{1+t^2}, \quad y = \frac{t}{1+t^2}, \quad (-\infty < t < \infty)$$

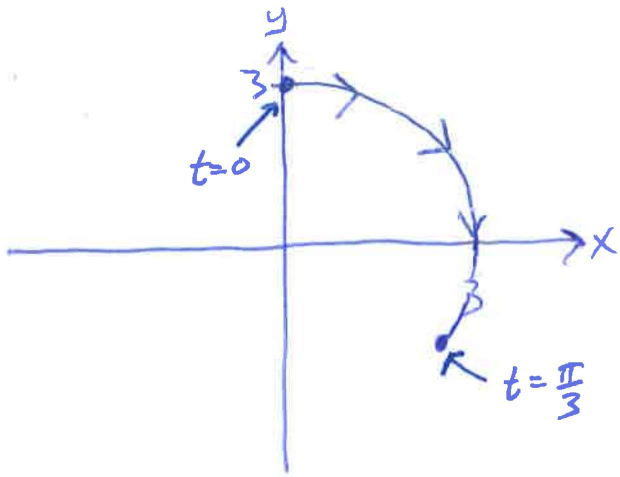
se video 015, 016

8.2.5

$$x = 3\sin(2t), \quad y = 3\cos(2t), \quad \left(0 \le t \le \frac{\pi}{3}\right)$$

Sirkel med senter i origo, radius 3

$$\left(0 \le t \le \frac{\pi}{3}\right) \Rightarrow \left(0 \le 2t \le \frac{2\pi}{3}\right)$$



$$x^2 + y^2 = 3^2$$

Sin og cos har "byttet plass" så figuren blir speilvendt ift $x = a\cos(t)$; $y = b \cdot \sin(t)$

8.2.6

$$x = a\cdot \sec(t),\quad y = b\cdot \tan(t)$$
$$\left(-\tfrac{\pi}{2} < t < \tfrac{\pi}{2}\right)$$

$$x = a\cdot \frac{1}{\cos(t)}$$

$$\cos(t) = \frac{a}{x}$$
$$t = \cos^{-1}\left(\frac{a}{x}\right)$$

$$y = b\cdot \tan\left(\cos^{-1}\left(\frac{a}{x}\right)\right)$$

$$y = b\cdot \frac{\sqrt{1-\left(\frac{a}{x}\right)^2}}{\frac{a}{x}}$$

se $\tan(\cos^{-1}x)$ i tabellen i Økt 7

$$y = \frac{bx}{a}\sqrt{1-\left(\frac{a}{x}\right)^2}$$

$$y^2 = \frac{b^2x^2}{a^2}\left(1-\frac{a^2}{x^2}\right)$$

$$y^2 = \frac{b^2x^2}{a^2} - \frac{b^2\cancel{x^2}a^2}{a^2\cancel{x^2}}$$

$$a^2y^2 = b^2x^2 - a^2b^2$$

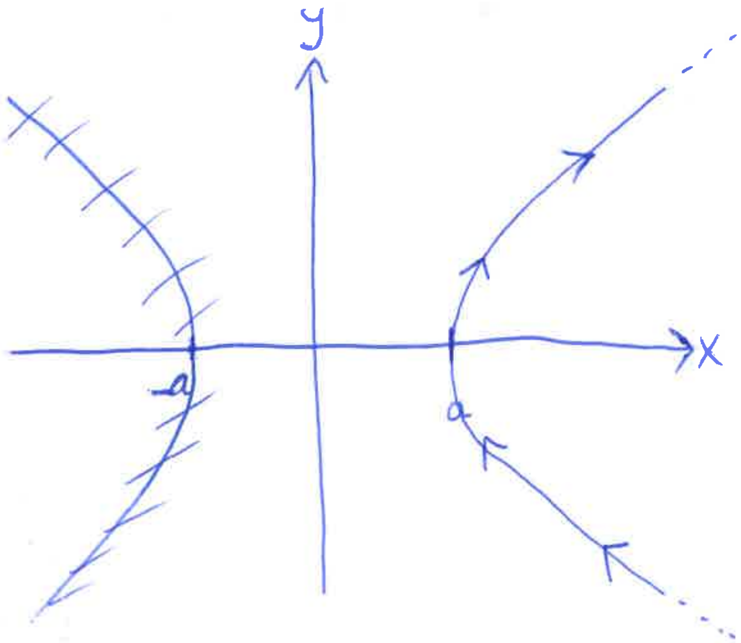
$$a^2y^2 - b^2x^2 = -a^2b^2$$

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

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

Aha!

Det er en hyperbel med brennpunkter || med x-aksen, og senter i origo.



Men siden $-\frac{\pi}{2} < t < \frac{\pi}{2}$ vil $x = a\cdot\frac{1}{\cos(t)} > 0$, så det er kun delen til høyre som gjelder.

Når $t \to -\frac{\pi}{2}$ vil $y \to -\infty$
og $t \to +\frac{\pi}{2}$ vil $y \to +\infty$

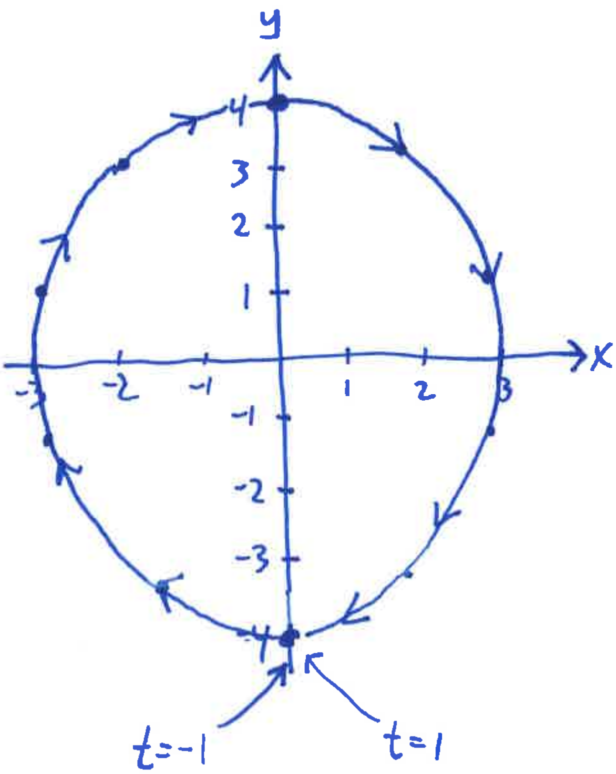
8.2.7

$x = 3\sin(\pi t)$, $y = 4\cos(\pi t)$

$(-1 < t < 1)$

t	x	y
-1	0	-4
-0.8	-1.8	-3.2
-0.6	-2.9	-1.2
-0.4	-2.9	1.2
-0.2	-1.8	3.2
0	0	4
0.2	1.8	3.2
0.4	2.9	1.2
0.6	2.9	-1.2
0.8	1.8	-3.2
1	0	-4

Husk å sette kalkulatoren til radianer.



$$\frac{x}{3} = \sin(\pi t)$$

$$\sin^{-1}\left(\frac{x}{3}\right) = \pi t$$

$$t = \frac{1}{\pi} \cdot \sin^{-1}\left(\frac{x}{3}\right)$$

$$y = 4 \cdot \cos\left(\cancel{\pi} \cdot \frac{1}{\cancel{\pi}} \cdot \sin^{-1}\left(\frac{x}{3}\right)\right)$$

$$y = 4 \cdot \sqrt{1 - \left(\frac{x}{3}\right)^2}$$

$$y^2 = 16\left(1 - \left(\frac{x}{3}\right)^2\right)$$

$$\frac{y^2}{16} = 1 - \frac{x^2}{9}$$

$$\frac{x^2}{3^2} + \frac{y^2}{4^2} = 1$$

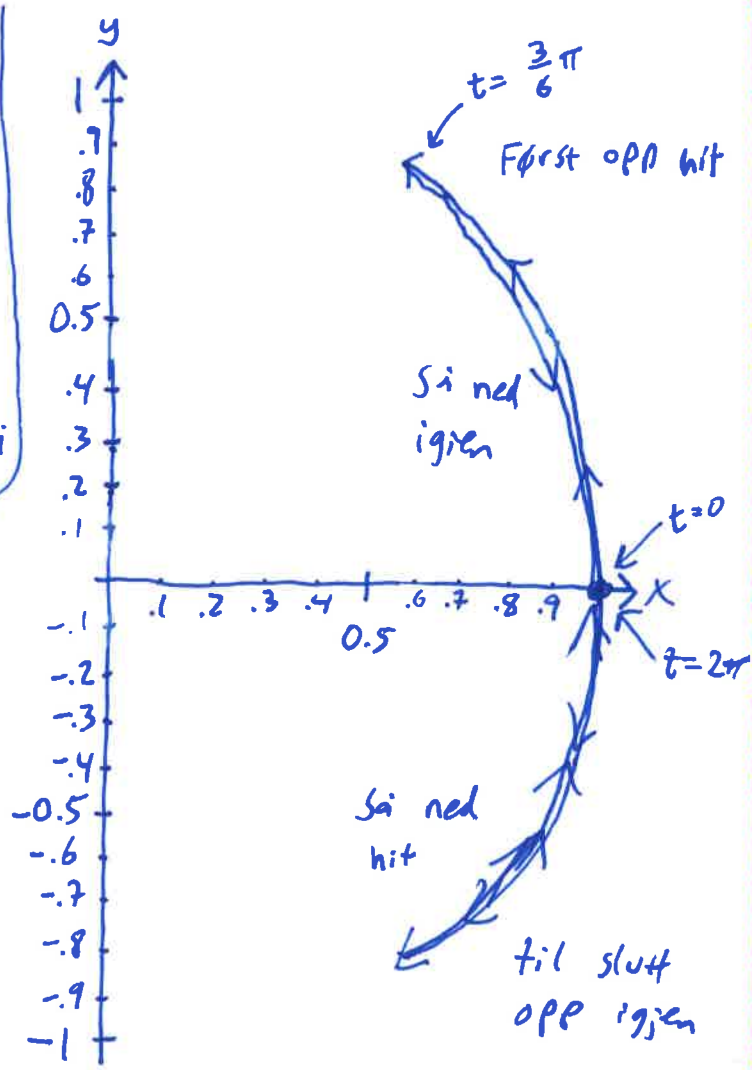
8.2.8

$x = \cos(\sin(s))$, $y = \sin(\sin(s))$

$(-\infty < s < \infty)$

$\sin(s)$ har periode 2π, så det er kun nødvendig å se på $0 \leq s \leq 2\pi$:

s	x	y
0	1	0
$\frac{1}{6}\pi$	0.88	0.48
$\frac{2}{6}\pi$	0.65	0.76
$\frac{3}{6}\pi$	0.54	0.84
$\frac{4}{6}\pi$	0.65	0.76
$\frac{5}{6}\pi$	0.88	0.48
$\frac{6}{6}\pi$	1	0
$\frac{7}{6}\pi$	0.88	-0.48
$\frac{8}{6}\pi$	0.65	-0.76
$\frac{9}{6}\pi$	0.54	-0.84
$\frac{10}{6}\pi$	0.65	-0.76
$\frac{11}{6}\pi$	0.88	-0.48
$\frac{12}{6}\pi$	1	0



$x = \cos(\sin(s))$

$\cos^{-1}(x) = \sin(s)$

$\sin^{-1}(\cos^{-1}(x)) = s$

$y = \sin(\sin(\sin^{-1}(\cos^{-1}(x))))$

$y = \sin(\cos^{-1}(x))$

$y = \sqrt{1 - x^2}$

$y^2 = 1 - x^2$

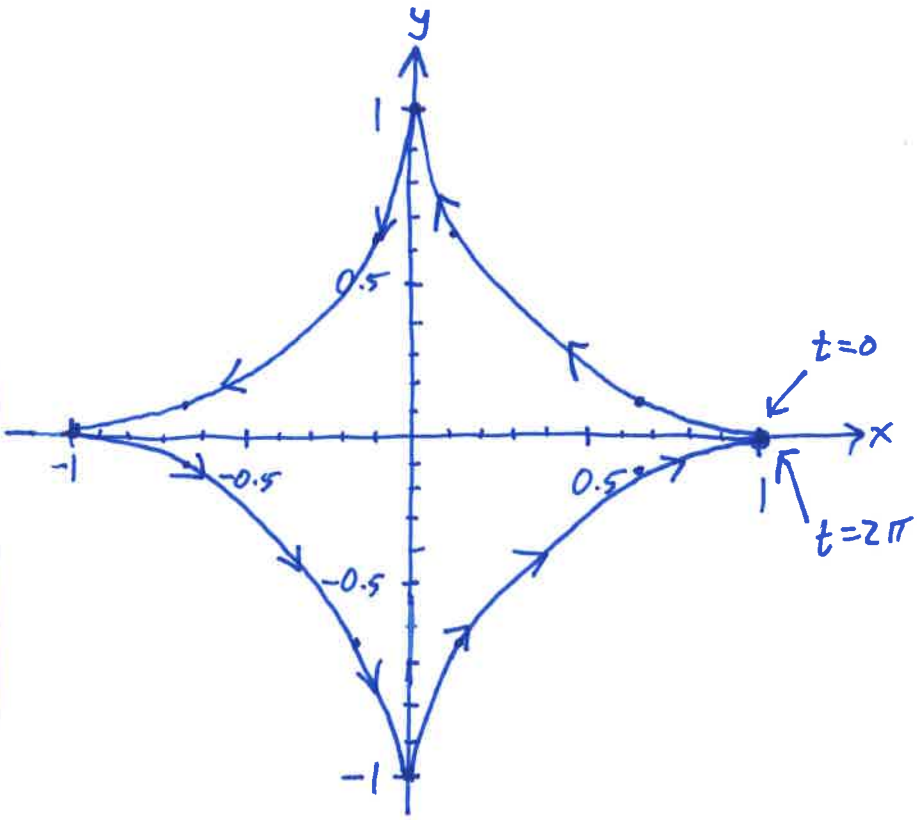
$x^2 + y^2 = 1$ Sirkel

8.2.9

$x = \cos^3(t) \quad y = \sin^3(t)$

$(0 \le t \le 2\pi)$

t	x	y
0	1	0
$\frac{1}{6}\pi$	0.65	0.125
$\frac{2}{6}\pi$	0.125	0.65
$\frac{3}{6}\pi$	0	1
$\frac{4}{6}\pi$	-0.125	0.65
$\frac{5}{6}\pi$	-0.65	0.125
$\frac{6}{6}\pi$	-1	0
$\frac{7}{6}\pi$	-0.65	-0.125
$\frac{8}{6}\pi$	-0.125	-0.65
$\frac{9}{6}\pi$	0	-1
$\frac{10}{6}\pi$	0.125	-0.65
$\frac{11}{6}\pi$	0.65	-0.125
$\frac{12}{6}\pi$	1	0



$x = \cos^3(t)$

$x^{1/3} = \cos(t)$

$\cos^{-1}(x^{1/3}) = t$

$y = \left(\sin\left(\cos^{-1}\left(x^{1/3}\right)\right)\right)^3$

$y = \left(\sqrt{1-(x^{1/3})^2}\right)^3$

$y^{1/3} = \sqrt{1-(x^{1/3})^2}$

$y^{2/3} = 1 - x^{2/3}$

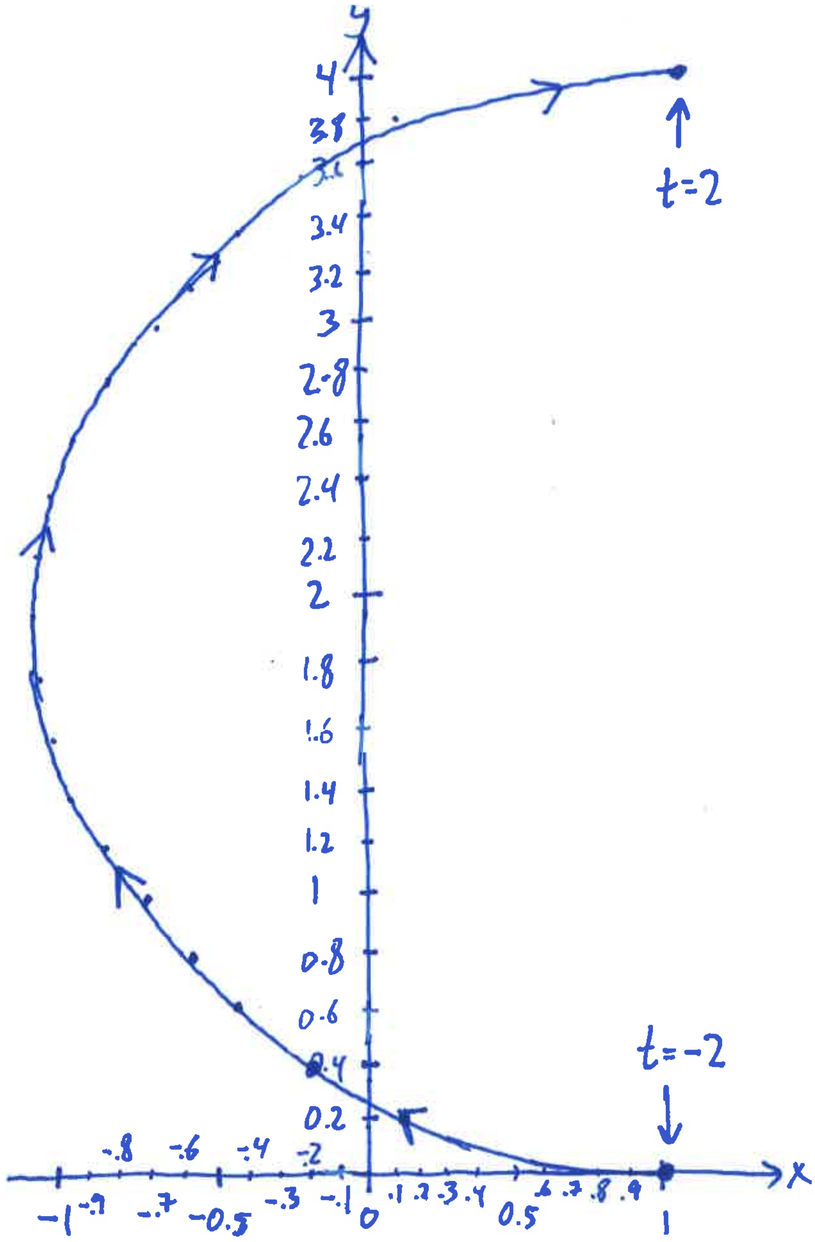
$x^{2/3} + y^{2/3} = 1$

Astroide

8.2.10

$$x = 1 - \sqrt{4-t^2}, \quad y = 2+t$$
$$(-2 \leq t \leq t)$$

t	x	y
-2	1	0
-1.8	0.13	0.2
-1.6	-0.2	0.4
-1.4	-0.43	0.6
-1.2	-0.6	0.8
-1	-0.73	1
-0.8	-0.83	1.2
-0.6	-0.91	1.4
-0.4	-0.96	1.6
-0.2	-0.99	1.8
0	-1	2
0.2	-0.99	2.2
0.4	-0.96	2.4
0.6	-0.91	2.6
0.8	-0.83	2.8
1	-0.73	3
1.2	-0.6	3.2
1.4	-0.43	3.4
1.6	-0.2	3.6
1.8	0.13	3.8
2	1	4



$$y = 2+t$$
$$t = y-2$$
$$x = 1 - \sqrt{4-(y-2)^2}$$
$$(x-1)^2 = 4-(y-2)^2$$
$$(x-1)^2 + (y-2)^2 = 2^2$$

Sirkel med senter i $(1,2)$ og radius 2.