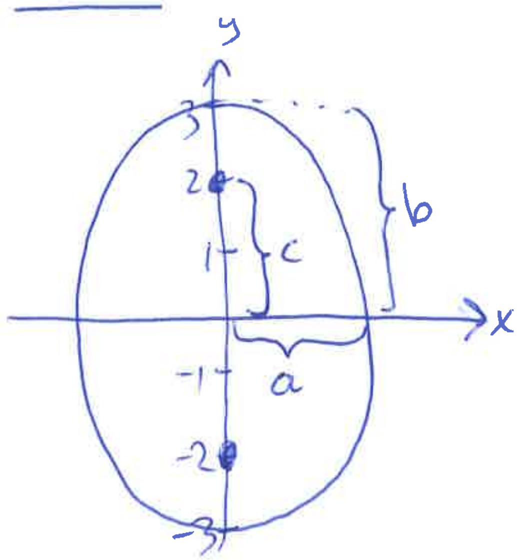
## 8.1.1




$$3 = S = b > a = L$$

$$c = 2$$

$$c = \sqrt{S^2 - L^2}$$

$$c = \sqrt{b^2 - a^2}$$

$$2 = \sqrt{3^2 - a^2}$$

$$4 = 9 - a^2$$

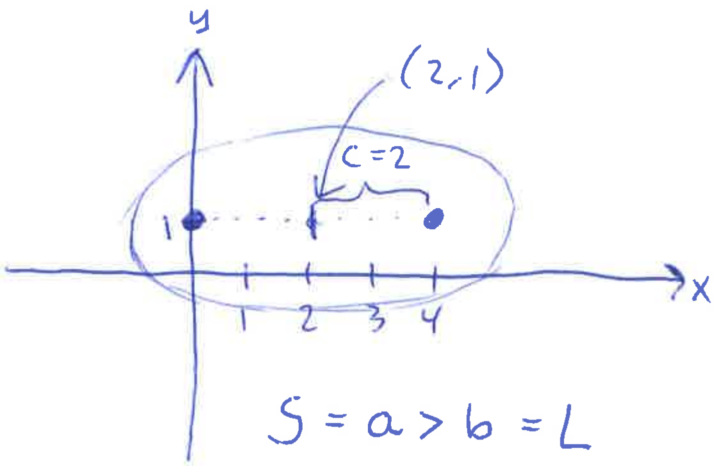
$$a = \sqrt{5}$$

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

$$\frac{x^2}{(\sqrt{5})^2} + \frac{y^2}{3^2} = 1$$

$$\frac{x^2}{5} + \frac{y^2}{9} = 1$$

## 8.1.2




$$S = a > b = L$$

$$\varepsilon = \frac{1}{2} = \frac{c}{S}$$

$$\frac{1}{2} = \frac{2}{S}$$

$$S = 4 = a$$

$$c = \sqrt{S^2 - L^2}$$

$$2 = \sqrt{a^2 - b^2}$$

$$2 = \sqrt{4^2 - b^2}$$

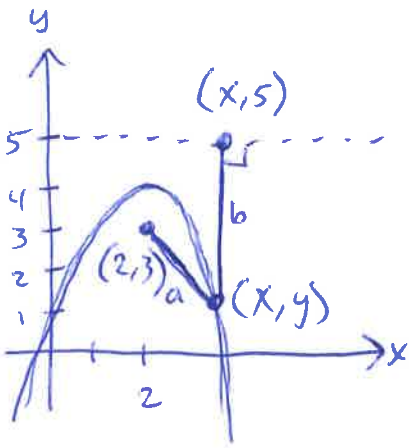
$$4 = 16 - b^2$$

$$b = \sqrt{12}$$

$$\frac{(x-x_0)^2}{a^2} + \frac{(y-y_0)^2}{b^2} = 1$$

$$\frac{(x-2)^2}{16} + \frac{(y-1)^2}{12} = 1$$

## 8.1.3




$a = b$

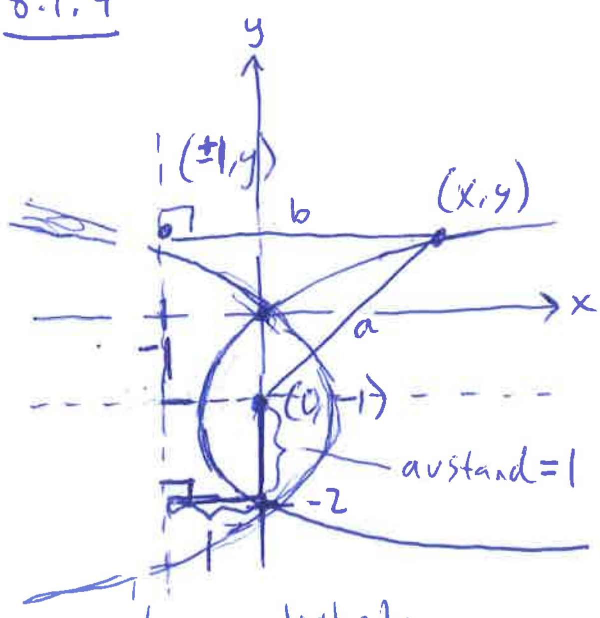
$$\sqrt{(x-2)^2+(y-3)^2} = \sqrt{(y-5)^2}$$

$$(x-2)^2 + \cancel{y^2} - 6y + 9 = \cancel{y^2} - 10y + 25$$

$$(x-2)^2 = -10y + 6y + 25 - 9$$

$$(x-2)^2 = 16 - 4y$$

## 8.1.4




to muligheter

Siden parabelen går gjennom origo, må den gå gjennom (0,-2) og i de punktene er avstanden lik 1 til fokuset. Da må også avstanden ~~...~~ til styrelinja der være lik 1.

Dvs at styrelinja må være $x = \pm 1$;

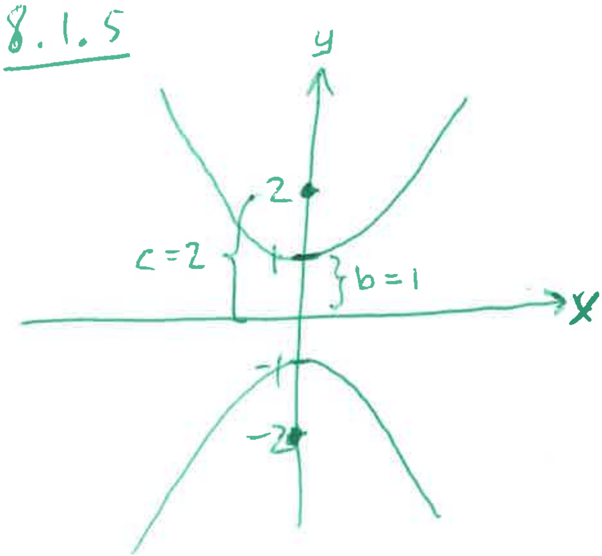
$a = b$

$$\sqrt{(x-0)^2 + (y-(-1))^2} = \sqrt{(x-(\pm 1))^2 + (y-y)^2}$$

$$\cancel{x^2} + y^2 + 2y + \cancel{1} = \cancel{x^2} \pm 2x \pm \cancel{1}$$

$$y^2 + 2y = \pm 2x$$

## 8.1.5




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

$$c = \sqrt{a^2+b^2}$$

$$c^2 = a^2 + b^2$$

$$a^2 = c^2 - b^2 = 2^2 - 1^2 = 3$$

$$a = \sqrt{3}$$

$$\Rightarrow \quad \frac{y^2}{1^2} - \frac{x^2}{3} = 1 \quad \Rightarrow \quad 3y^2 - x^2 = 3$$

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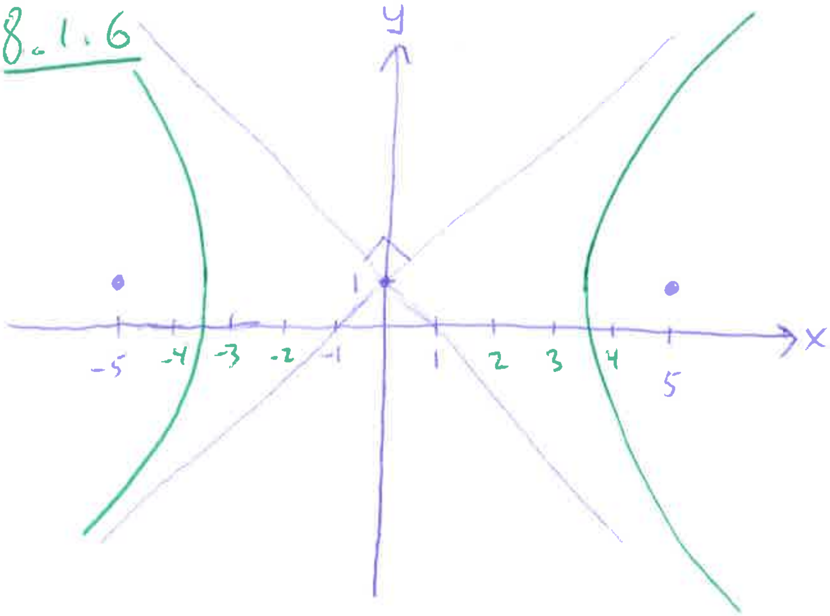
## 8.1.6




Asymptoter:

$$x = \pm(y-1)$$

$$y - 1 = \pm x$$

$$y = \pm x + 1$$

Asymptotene står vinkelrett på hverandre

$$\Rightarrow \quad a = b$$

$$x_0 = 0, \quad y_0 = 1$$

$$C = 5$$

$$C = \sqrt{a^2+b^2} = \sqrt{2a^2} = \sqrt{2} \cdot a = 5$$

$$a = \frac{5}{\sqrt{2}} = b \approx 3.5$$

$$\frac{(x-0)^2}{\frac{25}{2}} - \frac{(y-1)^2}{\frac{25}{2}} = 1$$

$$\frac{2x^2}{25} - \frac{2(y-1)^2}{25} = 1$$

$$2x^2 - 2(y-1)^2 = 25$$

## 8.1.7

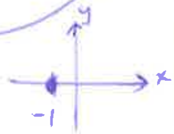
$$x^2+2x+y^2+1=0$$

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

$$(x+1)^2-1+y^2+1=0$$

$$(x+1)^2+y^2=0$$

punktet $(-1,0)$



## 8.1.8

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

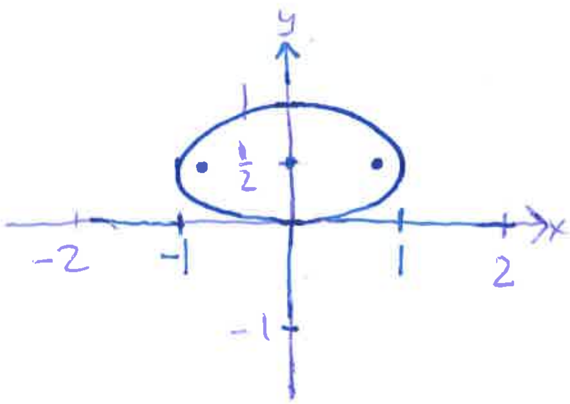
$$x^2+4\left(y-\frac{1}{2}\right)^2-1=0$$

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

Ellipse med senter i $(0,\frac{1}{2})$, storeradius $a=1$, lilleradius $b=\frac{1}{2}$

senter-brennpunkt

$c=\sqrt{1^2-\left(\frac{1}{2}\right)^2}=\frac{1}{2}\sqrt{3}\approx 0.87$



## 8.1.9

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

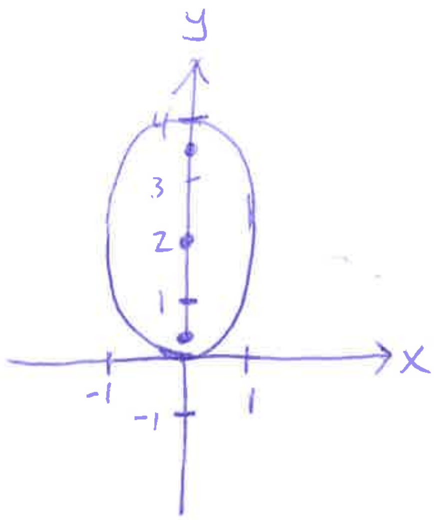
$$4x^2+(y-2)^2-4=0$$

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

Ellipse med senter i $(0,2)$, storeradius $b=2$, lilleradius $a=1$,

senter-brennpunkt $c=\sqrt{2^2-1}=\sqrt{3}$

$c\approx 1{,}73$



## 8.1.10

$$4x^2 - y^2 - 4y = 0$$

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

$$4x^2 - (y+2)^2 + 4 = 0$$

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

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

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

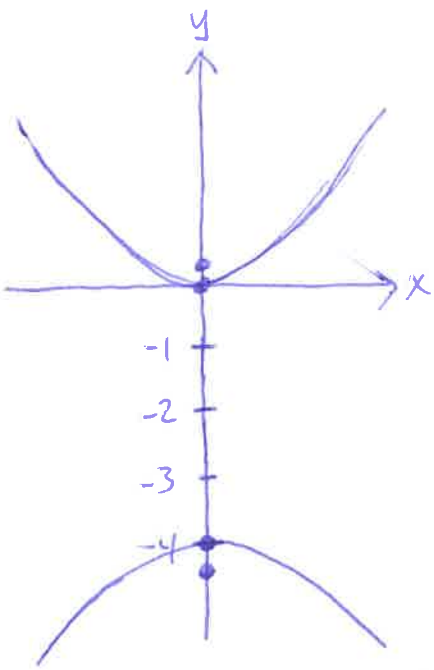
Hyperbel med brennpunkter parallellt med y-aksen.

Senter-toppunkt $b = 2$

Senter-brennpunkt $c = \sqrt{2^2+1^2} = \sqrt{5}$

$c \approx 2{,}2$

Senter: $(0,-2)$




## 8.1.11

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

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

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

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

$$y = (x+1)^2 - 4$$

parabel med akse $\parallel$ med y-aksen

Akse: $x = -1 = x_0$

$y_0 = -4$

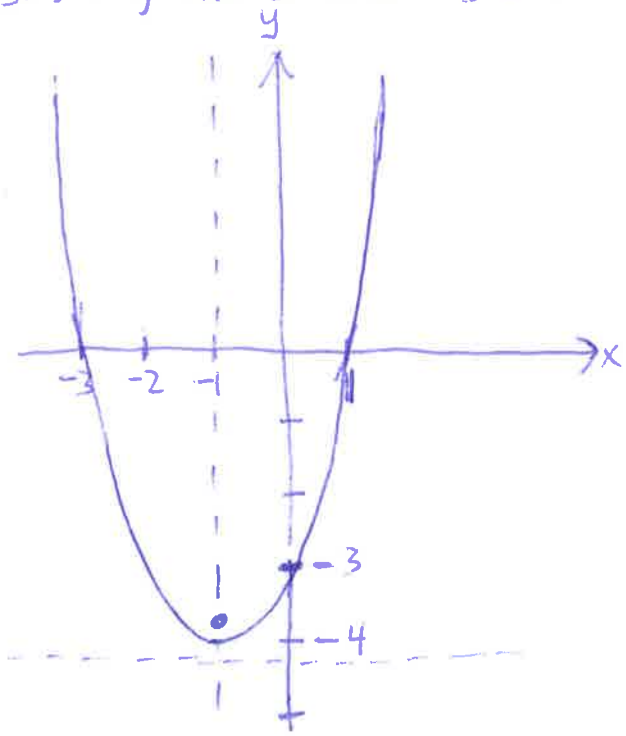
Toppunkt: $(-1,-4)$

Brennpunkt: $(-1, -3.75)$

Styrelinje: $y = -4.25$

Nullpunkter: $x = -1 \pm \sqrt{1 - \frac{-3}{1}} = -1 \pm 2$

Skjæring med y-aksen: $y = -3$



## 8.1.12

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

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

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

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

parabel $\parallel$ med x-aksen

Akse: $y = -\frac{1}{2} = y_0$

$x_0 = \frac{3}{2}$

Toppunkt: $\left(\frac{3}{2}, -\frac{1}{2}\right)$

Brennpunkt: $\left(\frac{3}{2} + \frac{1}{4(-2)}, -\frac{1}{2}\right)$

$= \left(\frac{11}{8}, -\frac{1}{2}\right) = \left(1.4, -\frac{1}{2}\right)$

Styrelinje: $x = \frac{3}{2} - \frac{1}{4(-2)}$

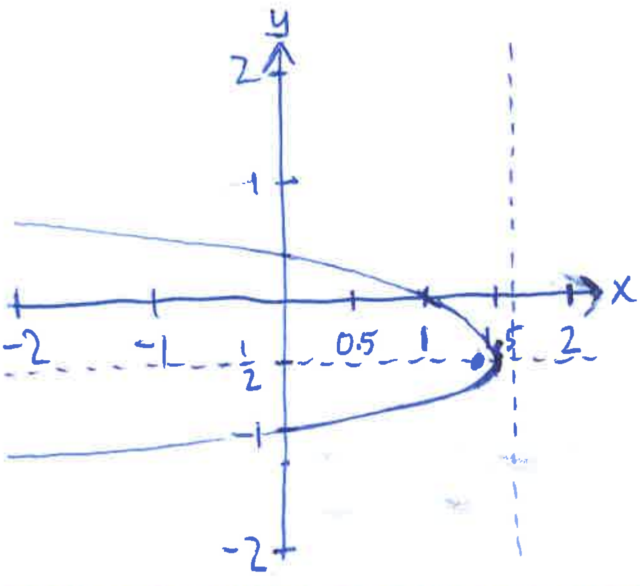
$x = \frac{13}{8} = 1.6$

Nullpunkter: $y = -\frac{1}{2} \pm \sqrt{\left(-\frac{1}{2}\right)^2 - \frac{1}{(-2)}}$

$y = -\frac{1}{2} \pm \frac{1}{2}\sqrt{3}$

$y = \{0.37, -1.37\}$

Skjæring med x-aksen: $x = 1$




## 8.1.13

$x^2 + 3x - 2y^2 + 4y - 2 = 0$

$\left(x + \frac{3}{2}\right)^2 - \frac{3^2}{4} - 2\left(y + \frac{4}{2(-2)}\right)^2 - \frac{4^2}{4(-2)} - 2 = 0$

$\left(x + \frac{3}{2}\right)^2 - 2(y-1)^2 = \frac{9}{4}$

$\frac{\left(x + \frac{3}{2}\right)^2}{\frac{9}{4}} - \frac{2(y-1)^2}{\frac{9}{4}} = 1$

$\frac{\left(x + \frac{3}{2}\right)^2}{\left(\frac{3}{2}\right)^2} - \frac{(y-1)^2}{\left(\sqrt{\frac{9}{8}}\right)^2} = 1$

Hyperbel med brennpunkter $\parallel$ x-aksen

senter-toppunkt: $a = \frac{3}{2} = 1.5$

Senter-brennpunkt: $c = \sqrt{a^2 + b^2}$

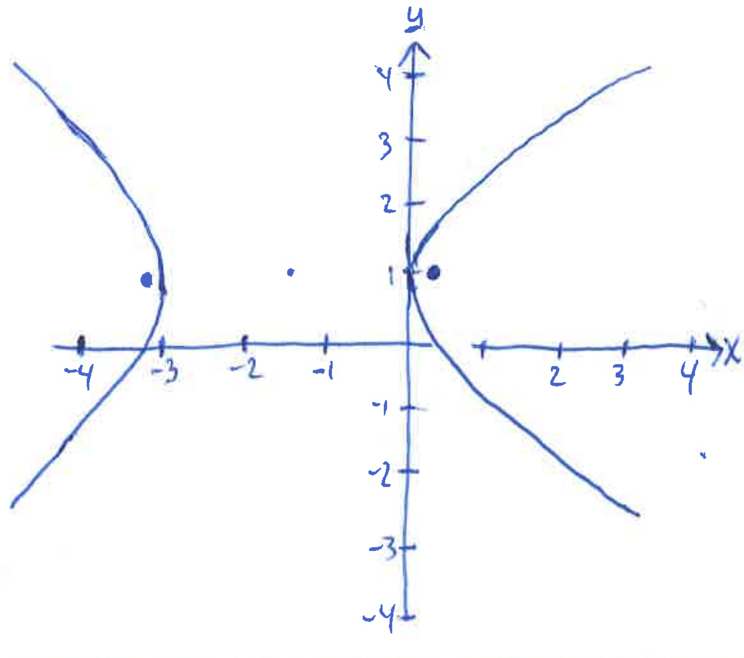
$c = \sqrt{\frac{9}{4} + \frac{9}{8}} = \frac{3}{4}\sqrt{6}$

$c \approx 1.8$

$b = \sqrt{\frac{9}{8}} \approx 1.06$

Senter: $\left(-\frac{3}{2}, 1\right)$

asymptoter: $\frac{x + \frac{3}{2}}{\frac{3}{2}} \pm \frac{y-1}{\sqrt{\frac{9}{8}}}$



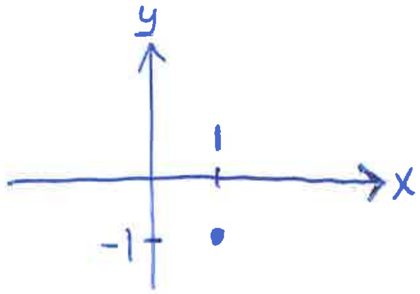
8.1.14

$9x^2 - 18x + 4y^2 + 8y = -13$

$9\left(x + \frac{-18}{2\cdot 9}\right)^2 - \frac{(-18)^2}{4\cdot 9} + 4\left(y + \frac{8}{2\cdot 4}\right)^2 - \frac{8^2}{4\cdot 4} = -13$

$9(x-1)^2 + 4(y+1)^2 = 0$

punktet $(1,-1)$




8.1.15

$9x^2 - 18x + 4y^2 + 8y = 23$

$9(x-1)^2 + 4(y+1)^2 = 36$

$\frac{(x-1)^2}{2^2} + \frac{(y+1)^2}{3^2} = 1$

Ellipse med senter i $(1,-1)$, storeradius $b=3$, lilleradius $a=2$,
senter-brennpunkt $c = \sqrt{9-4}$

$c = \sqrt{5} \approx 2.2$