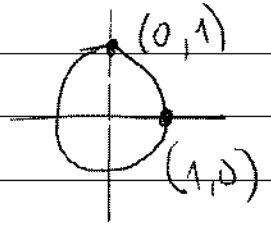
10-17

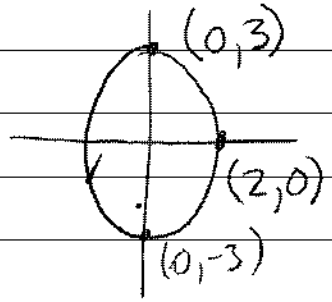
Note Title 10/17/2007

Ex Sketch $\frac{(x-1)^2}{4} + \frac{(y-2)^2}{9} = 1$ ellipse $\left(\frac{1}{4}, \frac{1}{9} > 0\right)$

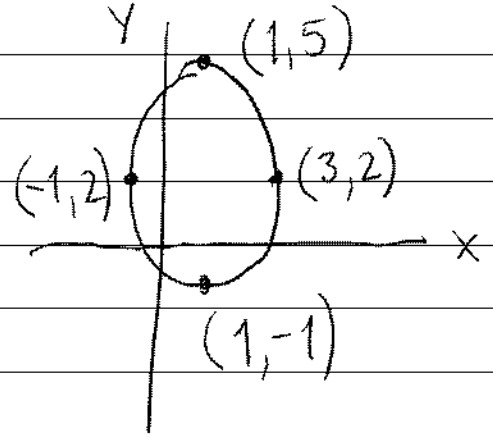
1.



2. scaling $a=2$, $b=3$

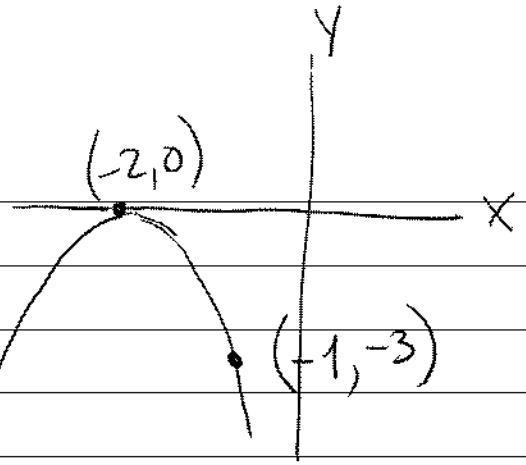


3. shift $x_0 = 1$, $y_0 = 2$



vertices
(1,5)
(1,-1)

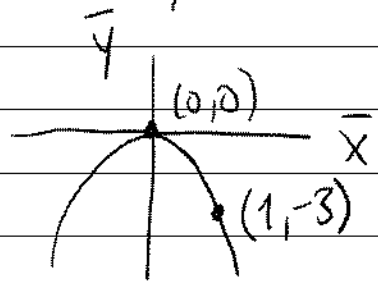
Ex Write an equation for this curve:



1. Shift to put vertex at origin

$\bar{x} = x+2$

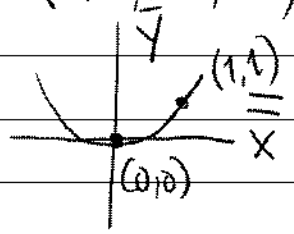
$\bar{y} = y$



2. Flip + scale to put $(1,1)$, $(1,-1)$, or $(-1,1)$ on curve.

$\bar{\bar{x}} = \bar{x}$

$\bar{\bar{y}} = -\frac{1}{3}\bar{y}$



3. Prototype: $\bar{\bar{y}} = \bar{\bar{x}}^2$

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

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

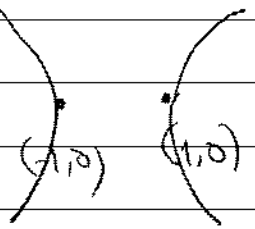
Ex Sketch $\frac{(x+1)^2}{4} - (y+1)^2 = 1$ $\quad \frac{1}{4} \cdot (-1) < 0$

hyperbola

1. Prototype

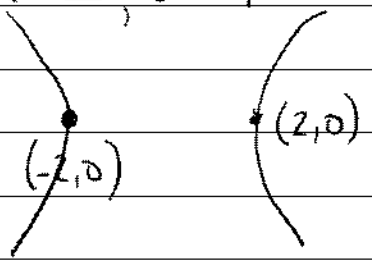
$x^2 - y^2 = 1$

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

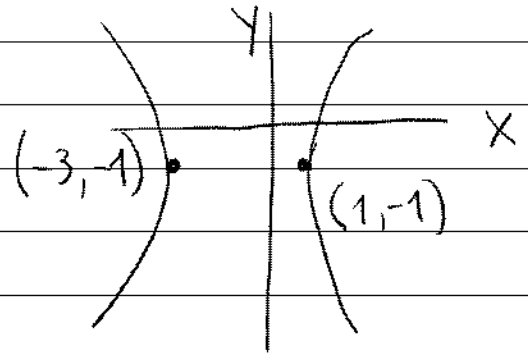


2. Scale

$a = 2, \; b = 1$



3. Shift $x_0 = -1, \; y_0 = -1$



vertices

$(-3,-1)$

$(1,-1)$

Ex Identify & sketch $3x^2 + 12x = 8y - 4y^2 - 4$

$3x^2 + 12x + 4y^2 - 8y + 4 = 0$ ellipse

$3(x^2+4x+4) + 4(y^2-2y+1) + 4 = 0 + 3\cdot 4 + 4\cdot 1$

$(\frac{4}{2})^2 = 4$ ← $3(x^2+4x+4)$; $4(y^2-2y+1)$ → $(\frac{-2}{2})^2 = 1$

$$\frac{3(x+2)^2 + 4(y-1)^2}{12} = \frac{12+4-4}{12} = \frac{12}{12}$$

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

scaling : $a = 2,\ b = \sqrt{3}$

shift : $x_0 = -2,\ y_0 = 1$