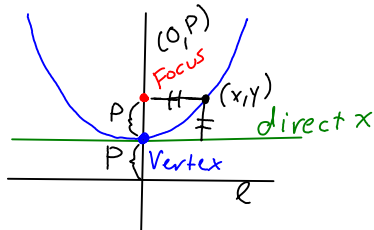


10.5 Notes: Conic Sections

Tuesday, March 06, 2007
7:27 PM

A. Parabolas $y = Ax^2 + Bx + C$



Definition: $|FP| = |Pl|$

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

$$x^2 + (y+p)^2 = (y+p)^2$$

$$x^2 + y^2 - 2py + p^2 = y^2 + 2py + p^2$$

$$x^2 = 4py$$

$$y = \frac{x^2}{4p}$$

Translate $(0,0) \rightarrow (h,k)$

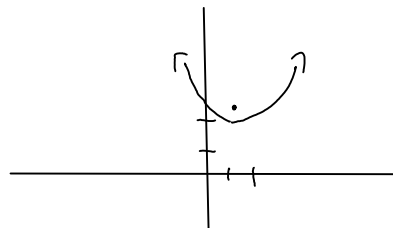
$$y-k = \frac{(x-h)^2}{4p}$$

opens up if $p > 0$
down if $p < 0$

$$x-h = \frac{(y-k)^2}{4p}$$

opens right if $p > 0$
left if $p < 0$

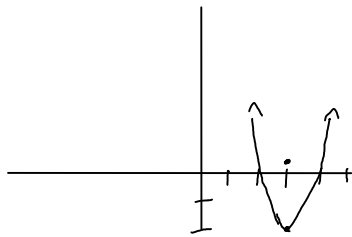
ex] Focus at $\frac{1}{2}m$ Vertex will be at $(x,y) = (1m, 2m)$, open up



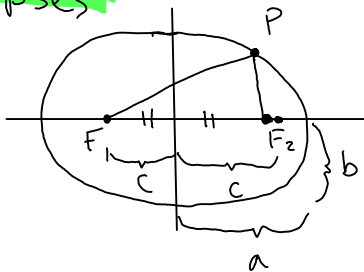
$$(y-2) = \frac{(x-1)^2}{4(\frac{1}{2})}$$

ex] 10.5 #8 $y + 12x - 2x^2 = 16$
order(y) = 1
order(x) = 2

$$\begin{aligned}
 \text{order}(x) &= 2 \\
 y &= 2x^2 - 12x + 16 \\
 y &= 2(x^2 - 6x + 8) \\
 y &= 2(x^2 - 6x + 9 - 9 + 8) \\
 y &= 2(x-3)^2 - 2 \\
 y+2 &= 2(x-3)^2 \\
 y+2 &= \frac{(x-3)^2}{\frac{1}{2}} \\
 y+2 &= \frac{(x-3)^2}{4(\frac{1}{8})} \quad P = \frac{1}{8} \\
 &\quad \text{Vertex } (3, -2)
 \end{aligned}$$



B Ellipses



$$\overline{F_1P} + \overline{PF_2} =$$

$$(a^2 - c^2)x^2 + a^2y^2 = a^2/(a^2 - c^2)$$

$$\text{let } b^2 = a^2 - c^2$$

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

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

Translation

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

EX] 10.5 #16

$$x^2 + 2y^2 - 6x + 4y + 7 = 0$$

$$\text{order}(x) = 2 \quad \text{if } + \text{ on } x^2$$

$$\text{order}(y) = 2 \quad \text{if } + \text{ on } y^2$$

$$x^2 - 6x + 2y^2 + 4y = -7$$

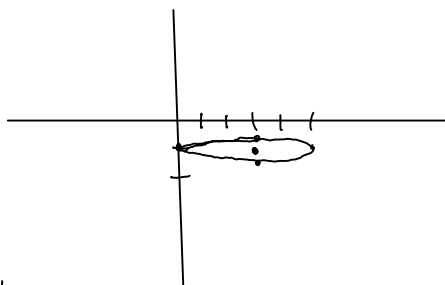
$$x^2 - 6x + (3)^2 - (3)^2 + 2[y^2 + 2y + (1)^2 - (1)^2] = -7$$

$$(x-3)^2 + 2(y+1)^2 = -7 + 9 + 2 = 4$$

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

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

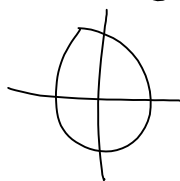
center (3, -1)



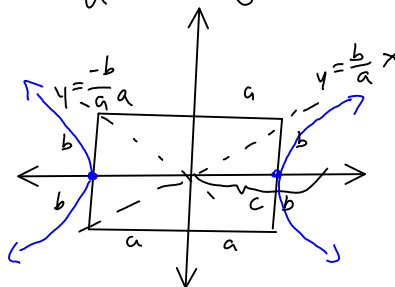
$$\text{Foci } c^2 = |a^2 - b^2|$$

C Hyperbolas

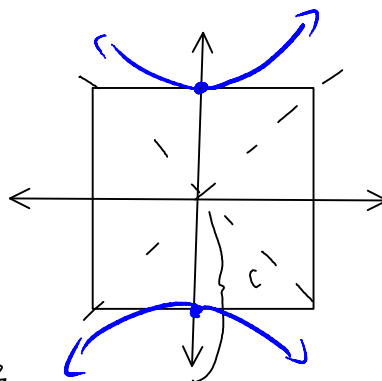
$$\text{ellipse } \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$



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



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



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

Ex #19

$$\frac{x^2}{144} - \frac{y^2}{25} = 1$$

←

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$$\frac{x^2}{12^2} - \frac{y^2}{5^2} = 1$$

