

Ellipses

Tuesday, October 3, 2017 2:58 PM

graphing form

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

\longleftrightarrow
 $\sqrt{a^2} = a$

\updownarrow $\sqrt{b^2} = b$

$$\frac{x^2}{16} + \frac{(y-3)^2}{49} = 1$$

$C: (0, 3)$

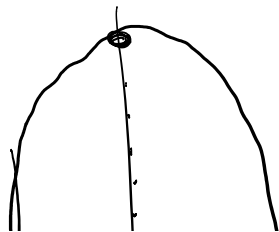
\longleftrightarrow
 $\sqrt{16} = 4$

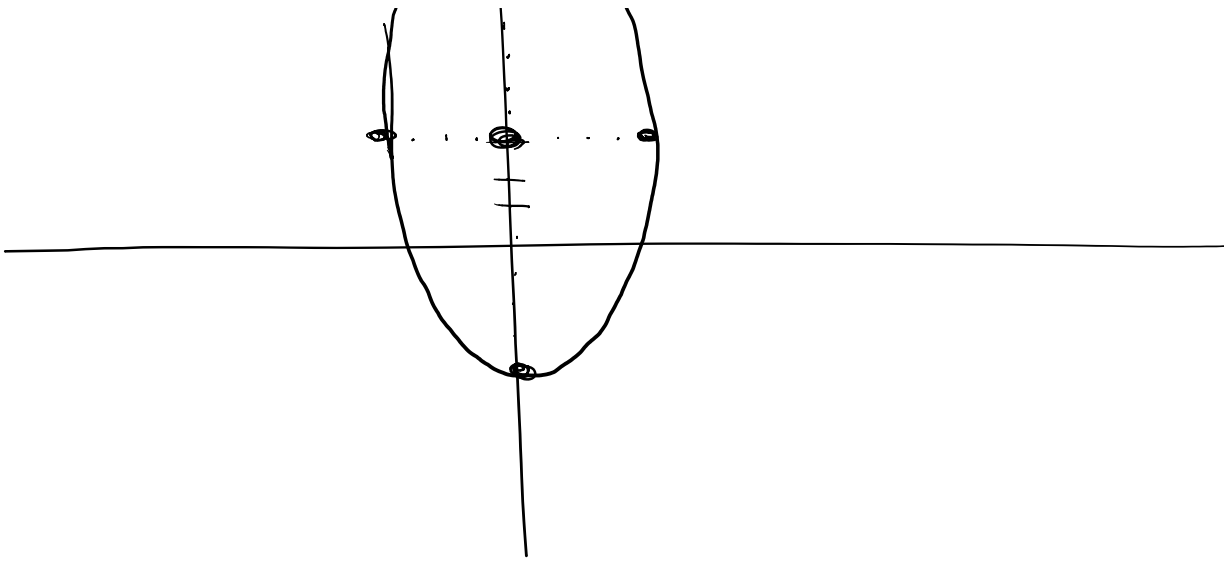
\updownarrow

$\sqrt{49} = 7$

$D: -4 \leq x \leq 4$

$R: -4 \leq y \leq 10$





5. $9x^2 + 36y^2 + 54x - 144y - 99 = 0$

$$\underline{9x^2 + 54x + \underline{\quad}} + \underline{36y^2 - 144y + \underline{\quad}} = 99$$

$$9(x^2 + 6x + \underline{9}) + 36(y^2 - 4y + \underline{4}) = 99$$

as $\downarrow \uparrow$

$$\cancel{9}(x+3)^2$$

$$\cancel{36}(y-2)^2$$

81

144

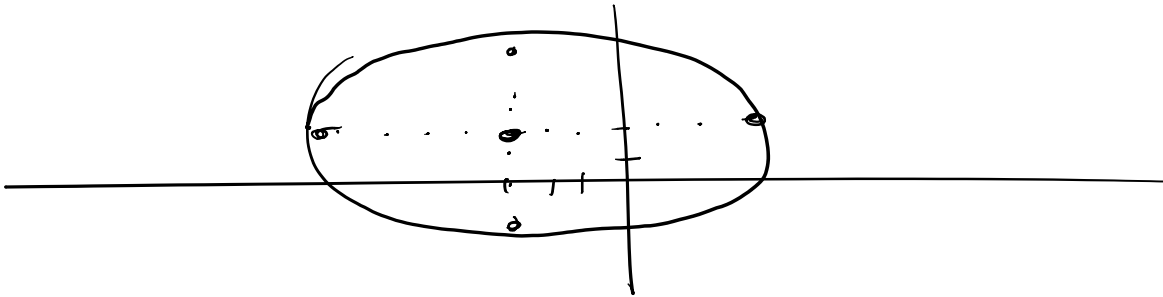
$$\cancel{324} \cancel{36}$$

$$\cancel{324} \cancel{9}$$

$$= \frac{324}{324}$$

$$\frac{(x+3)^2}{36} + \frac{(y-2)^2}{9} = 1$$

$$C: (-3, 2) \quad \leftarrow \rightarrow \sqrt{36} = 6 \quad \updownarrow \sqrt{9} = 3 \quad D: -9 \leq x \leq 3 \quad R: -1 \leq y \leq 5$$



$$5x^2 + 20y^2 + 30x + 40y - 15 = 0$$

$$\begin{array}{r}
 5x^2 + 30x + \underline{\quad} \quad \quad 20y^2 + 40y \underline{\quad} = 15 \\
 \hline
 5(x^2 + 6x + \frac{9}{1}) + 20(y^2 + 2y + \frac{1}{1}) \quad \quad \quad \begin{array}{r} 45 \\ + 20 \\ \hline 80 \\ \hline 80 \end{array} \\
 \downarrow \quad \quad \quad \downarrow \\
 5(x+3)^2 + 20(y+1)^2 = \frac{80}{80} \\
 \hline
 \boxed{\frac{(x+3)^2}{16} + \frac{(y+1)^2}{4} = 1}
 \end{array}$$

Ellipse

hyperbola

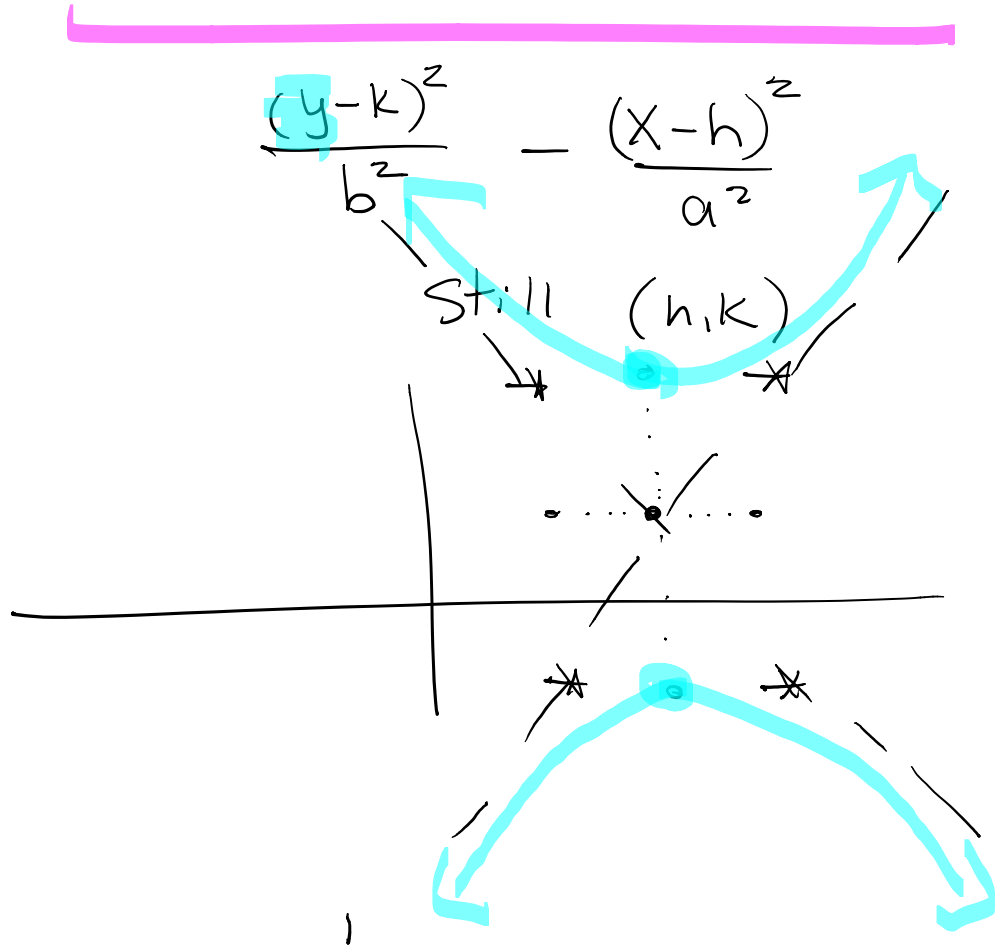
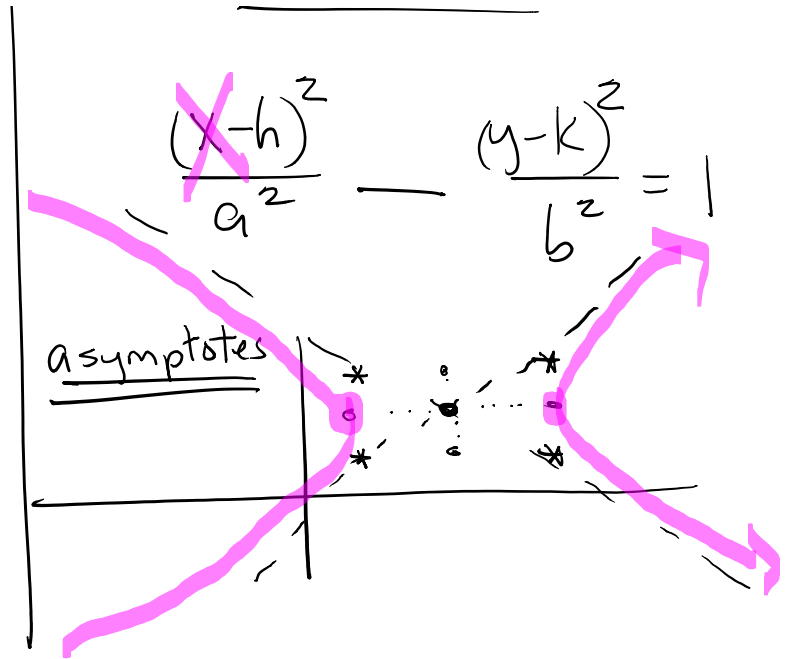
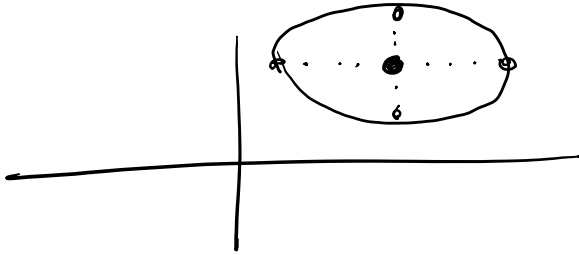
... 1) 2

2

... 2

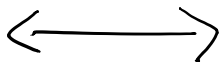
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$$\frac{(X-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$



$$\frac{(x-3)^2}{49} - \frac{(y+1)^2}{9} = 1$$

$$C: (3, -1)$$

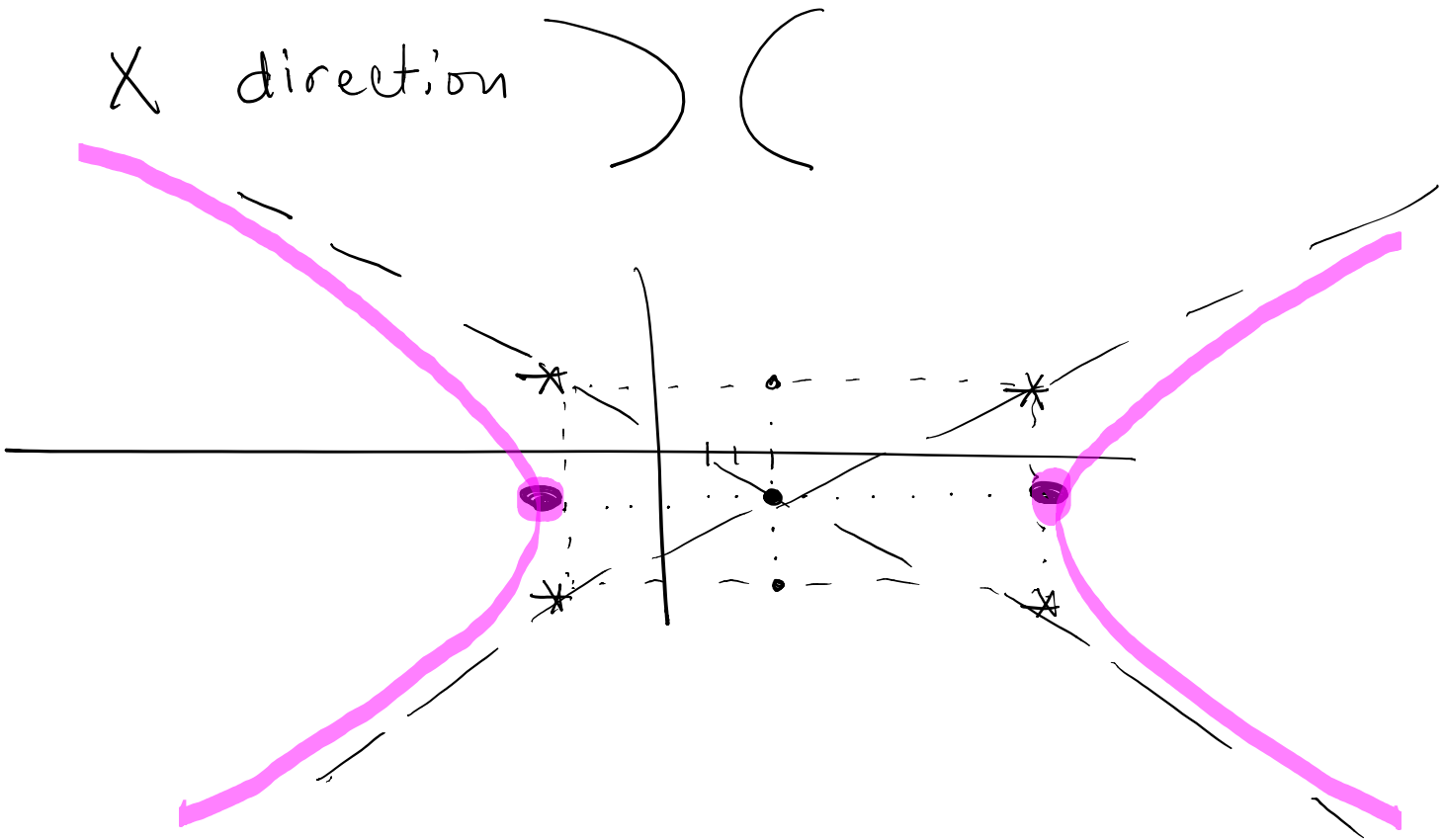


$$\sqrt{49} = 7$$



$$\sqrt{9} = 3$$

X direction

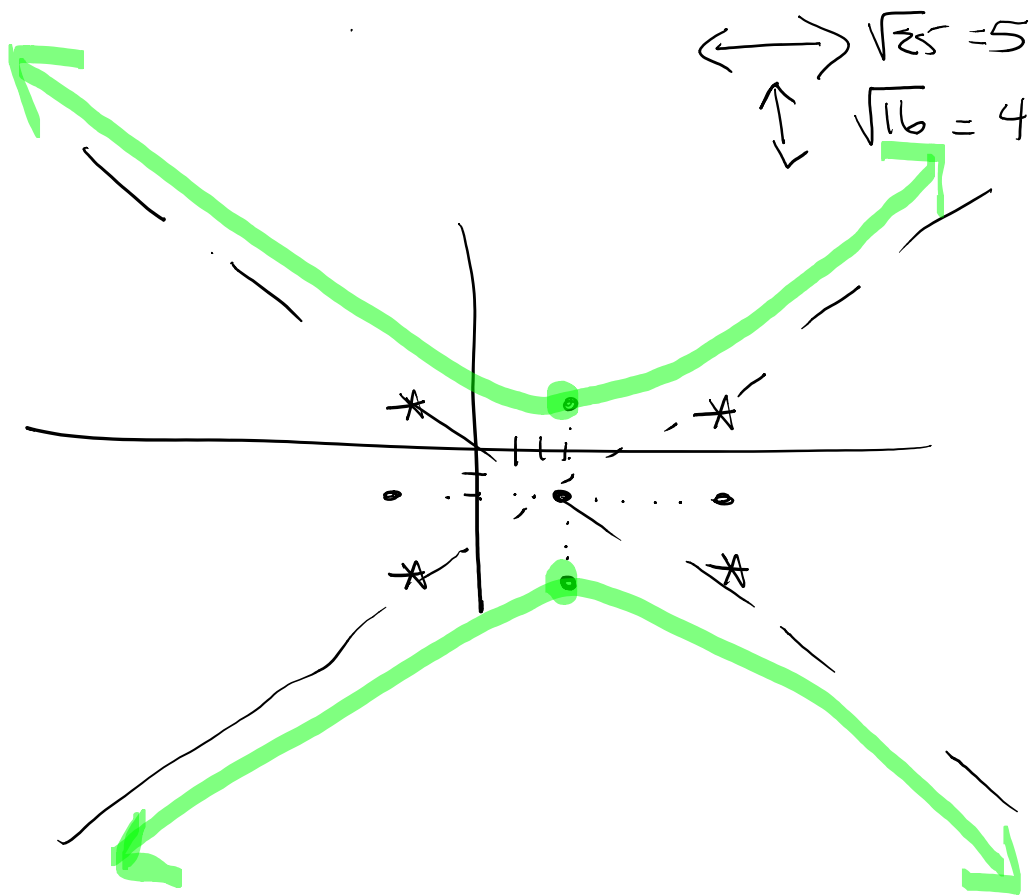


y direction

$$\frac{(y+2)^2}{16} - \frac{(x-3)^2}{25} = 1$$

$$y^2 - 36x^2 - 14y + 144x - 131 = 0$$

$\sqrt{16} = 4$ $\sqrt{25} = 5$
 Centre $(3, -2)$



#6.

$$y^2 - 36x^2 - 14y + 144x - 131 = 0$$

$$y^2 - 14y + \underline{49} - 36x^2 + 144x + \underline{\quad} = 131 + 49$$

$$(y-7)^2 - 36(x^2 - 4x + 4)$$

+49
-144

$$\frac{(y-7)^2}{36} - \frac{36(x-2)^2}{36} = \frac{36}{36}$$

$$\frac{(y-7)^2}{36} - \frac{(x-2)^2}{1} = 1$$

Center (2, 7) \longleftrightarrow 1 \updownarrow 6

