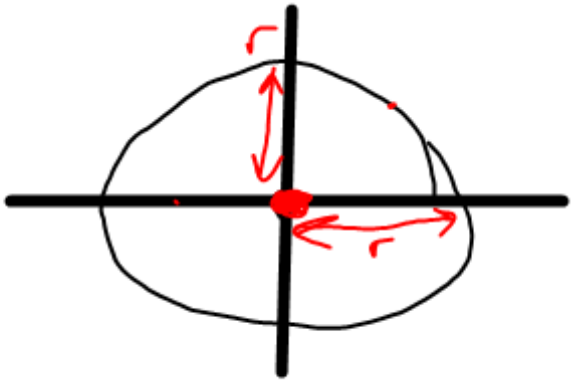
Circles / Ellipses

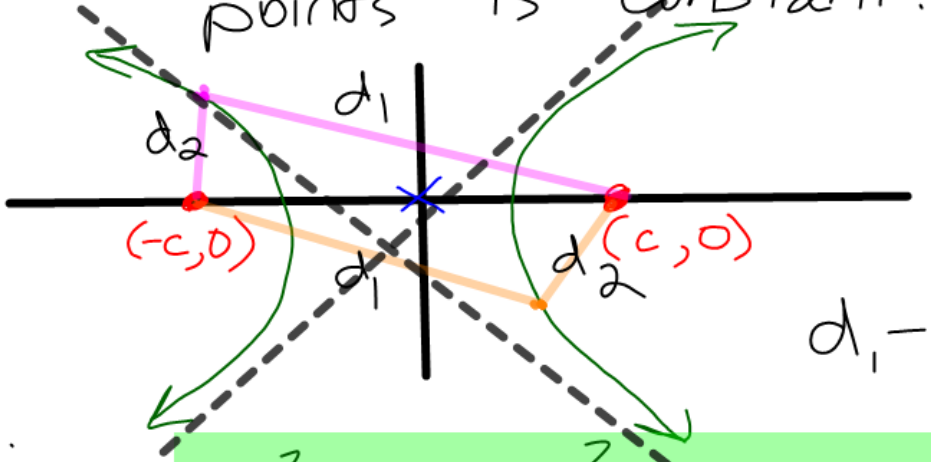


$$\frac{x^2}{r^2} + \frac{y^2}{r^2} = 1$$

$$x^2 + y^2 = r^2$$

Hyperbolas

: A set of points in a plane for which the difference of the distances to the 2 focal points is constant.



$d_1 - d_2 =$ constant

Equation:

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

Horizontal

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

Vertical

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

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

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

$$\pm\sqrt{\frac{b^2}{a^2}(x^2 - a^2)} = \sqrt{y^2}$$

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

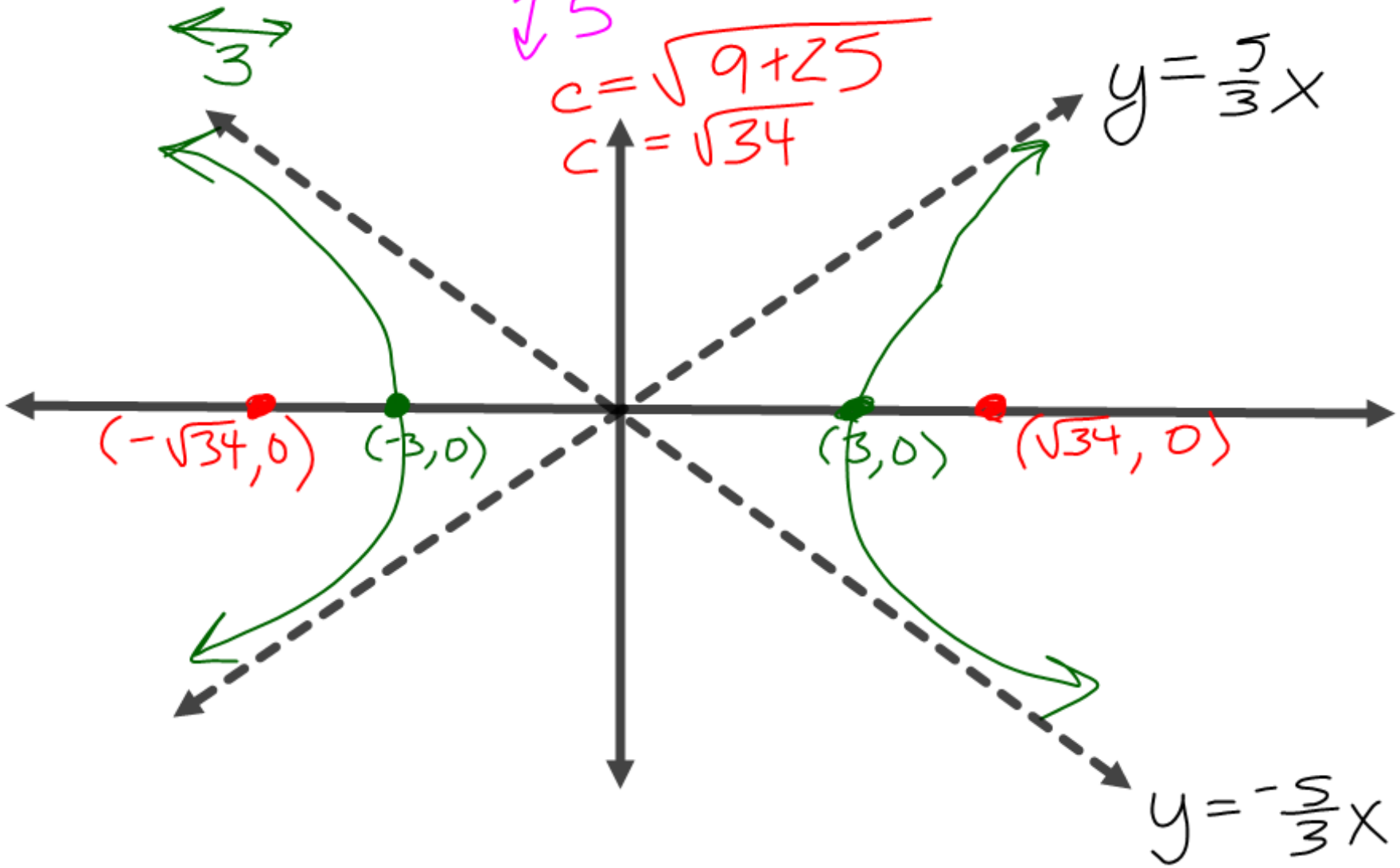
$$y \approx \pm \frac{b}{a}\sqrt{x^2}$$

$$y \approx \pm \frac{b}{a}x$$

[EX 1] $\frac{x^2}{9} - \frac{y^2}{25} = 1$

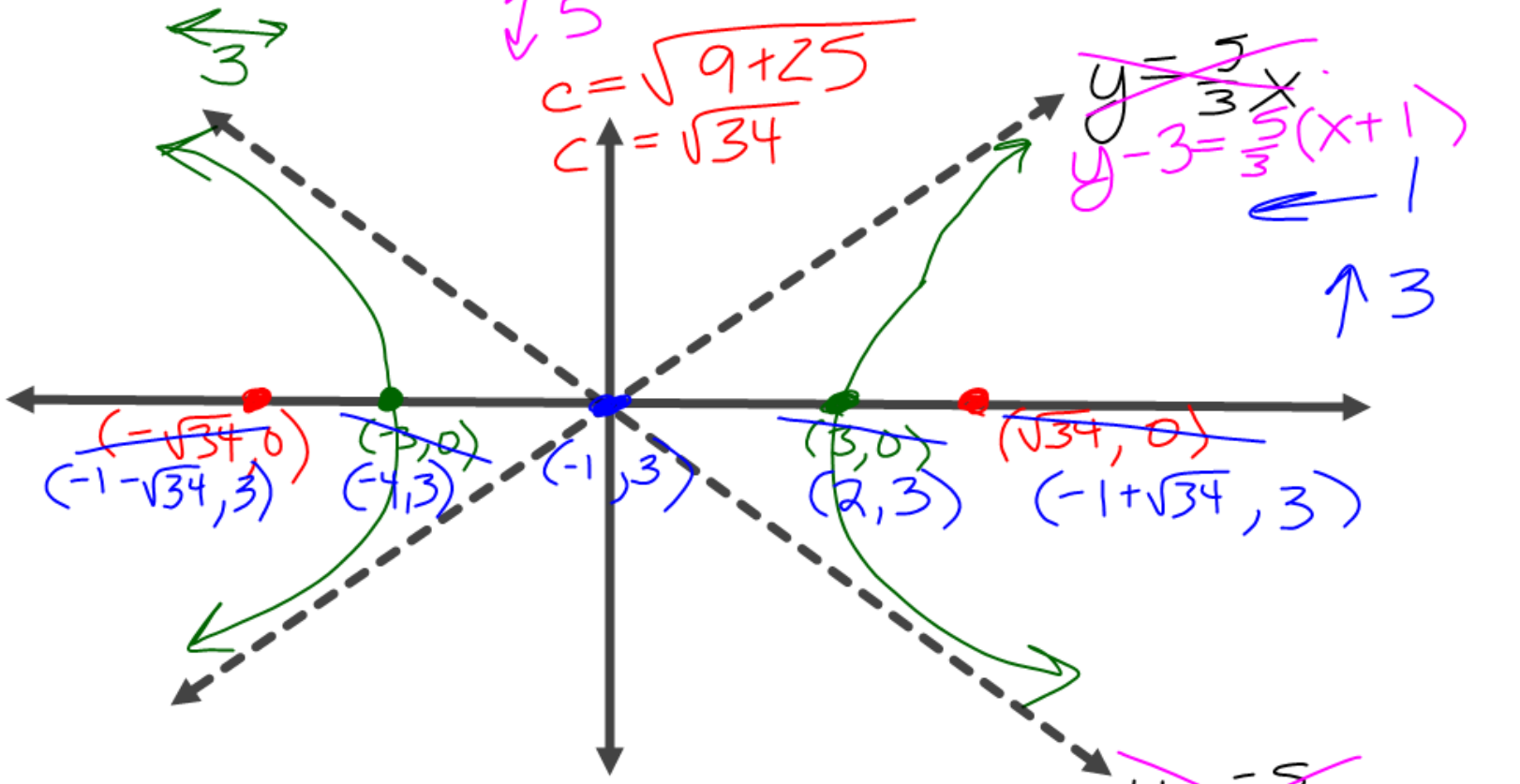
C (0,0)

Horizontal



[EX 2] $\frac{(x+1)^2}{9} - \frac{(y-3)^2}{25} = 1$

C (0,0)
Horizontal



[Ex 3] $\frac{(y+3)^2}{64} - \frac{(x-5)^2}{100} = 1$

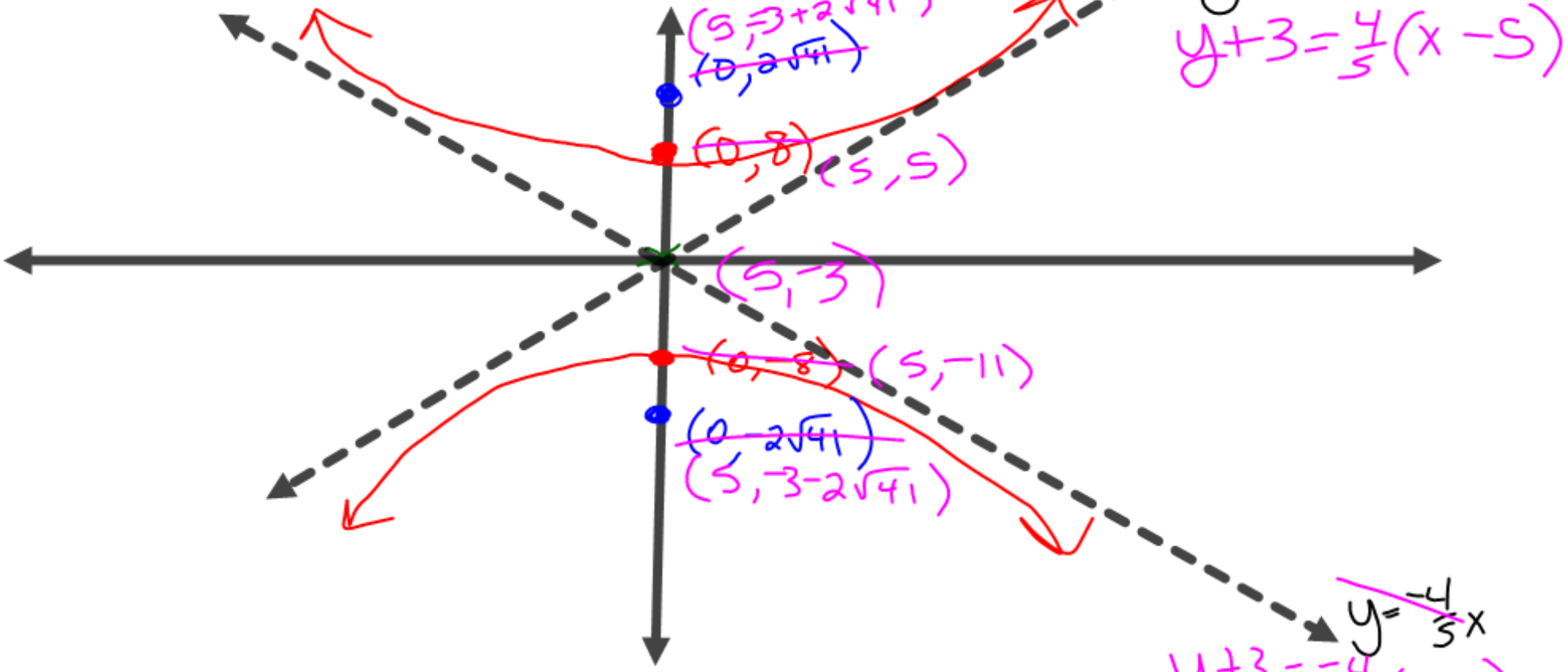
$\updownarrow 8$ $\quad \leftrightarrow 10$

$C(5,-3)$

$\rightarrow 5$

$\downarrow 3$

$c = \sqrt{100+64} = \sqrt{164} = 2\sqrt{41}$



$y = \frac{4}{5}x$

$y+3 = \frac{4}{5}(x-5)$

$y = \frac{-4}{5}x$

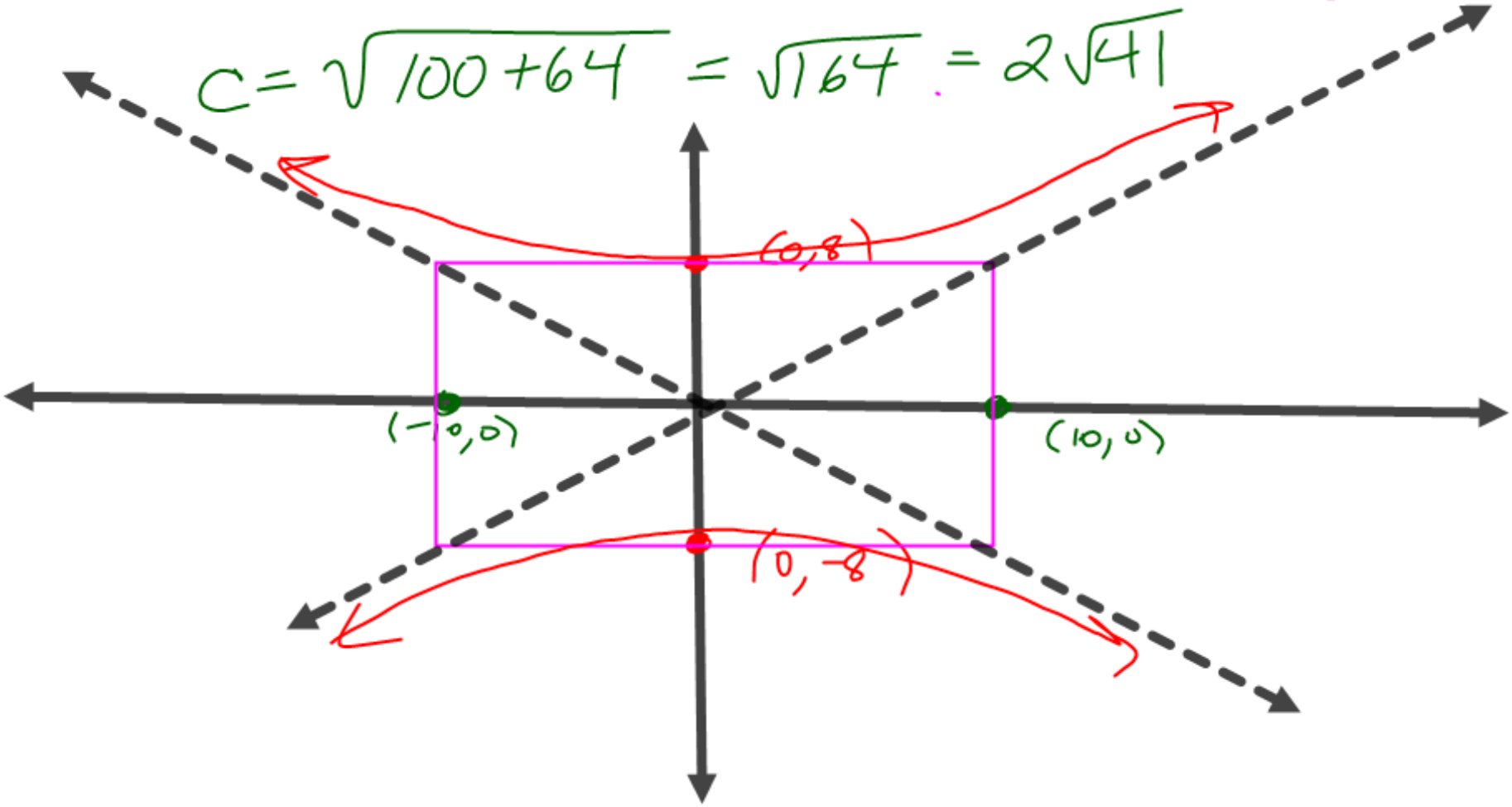
$y+3 = -\frac{4}{5}(x-5)$

[Ex 3] $\frac{(y+3)^2}{64} - \frac{(x-5)^2}{100} = 1$

$\updownarrow 8$ $\leftrightarrow 10$

$C(5,-3)$ $\rightarrow 5$ $\downarrow 3$

$c = \sqrt{100+64} = \sqrt{164} = 2\sqrt{41}$



$$49x^2 + 16y = 4y^2 + 98x + 163$$

HW: 1-5 ; 9-14