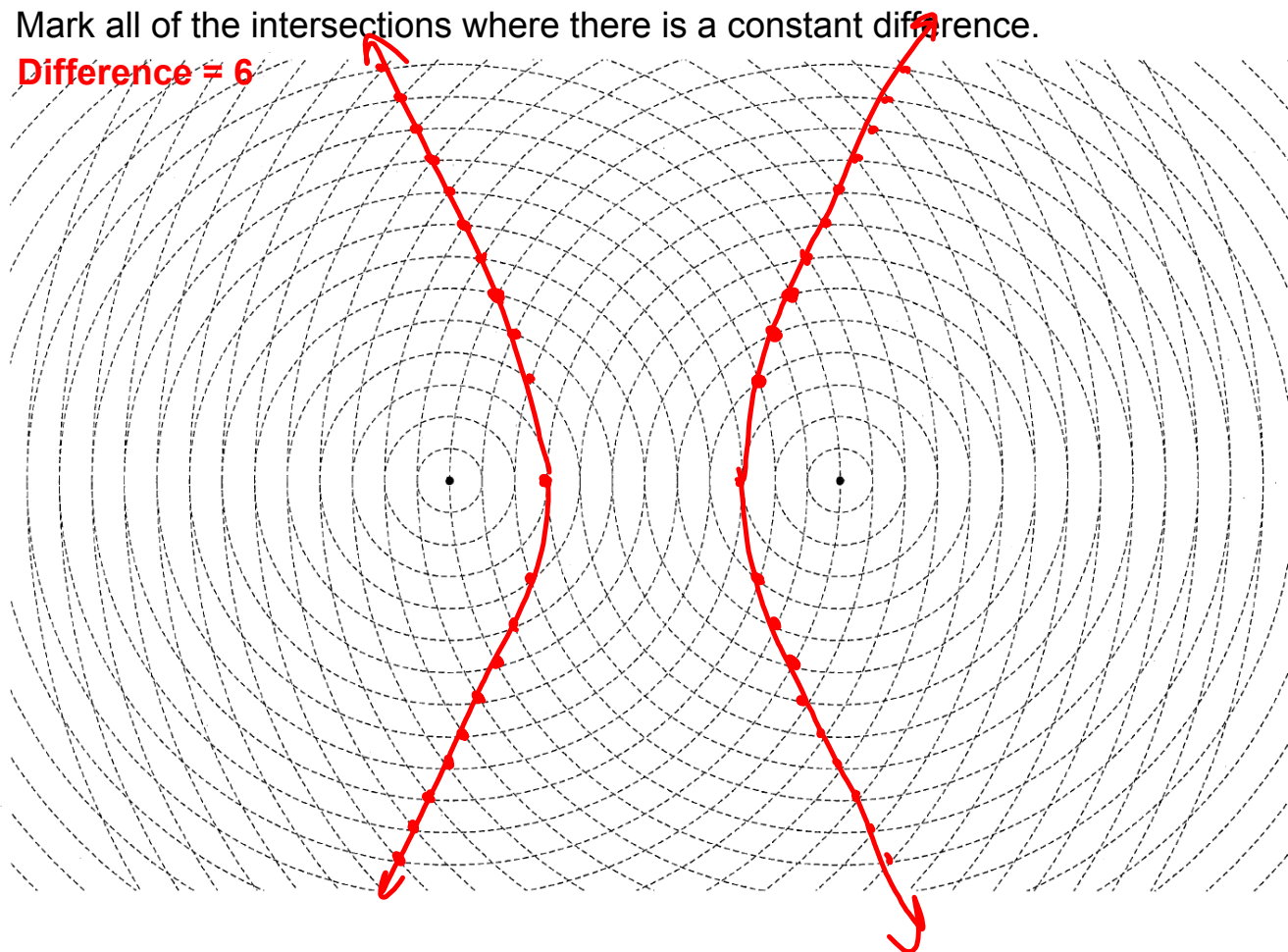


Section 9.5 Exploration

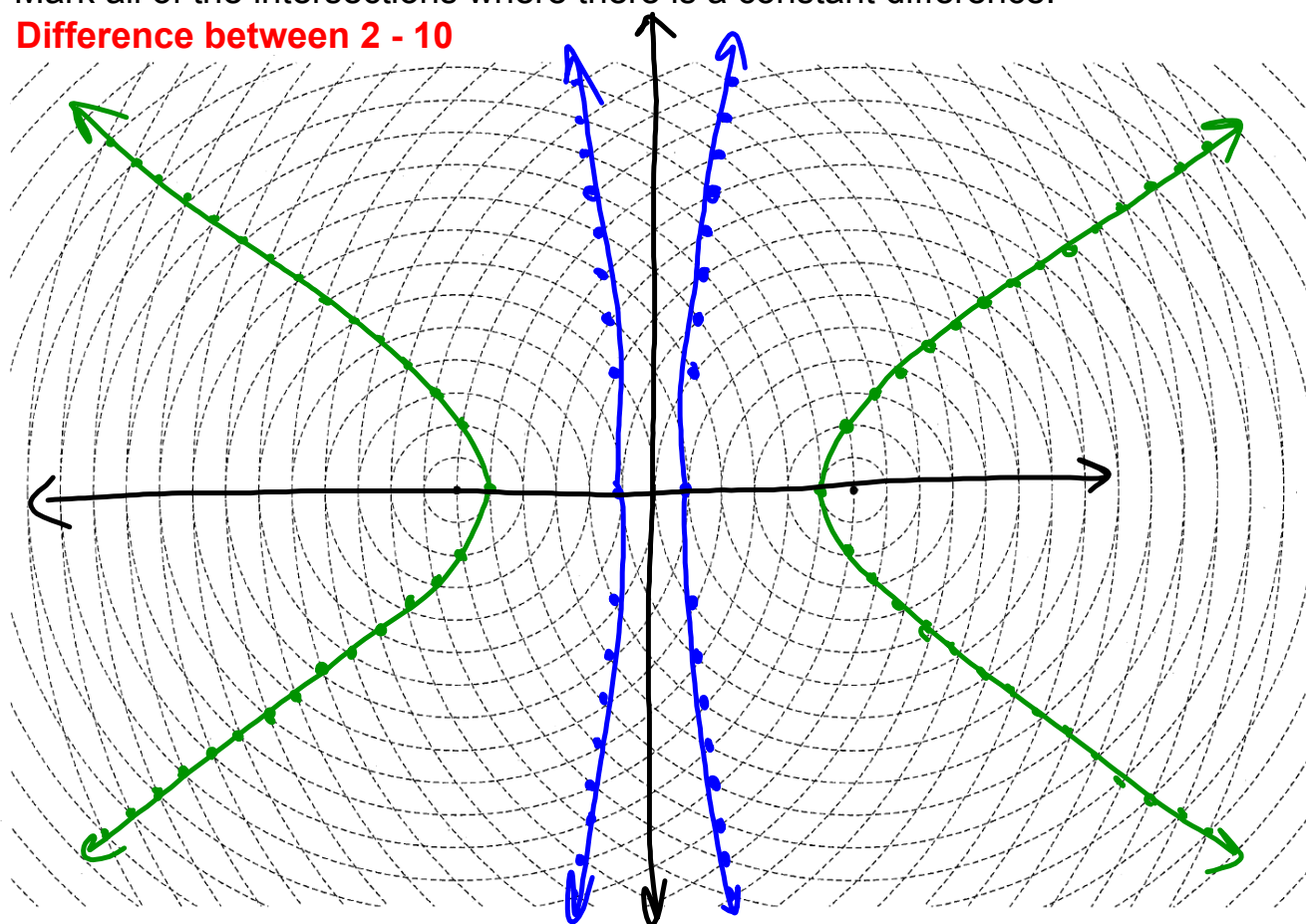
Mark all of the intersections where there is a constant difference.

Difference = 6



Mark all of the intersections where there is a constant difference.

Difference between 2 - 10



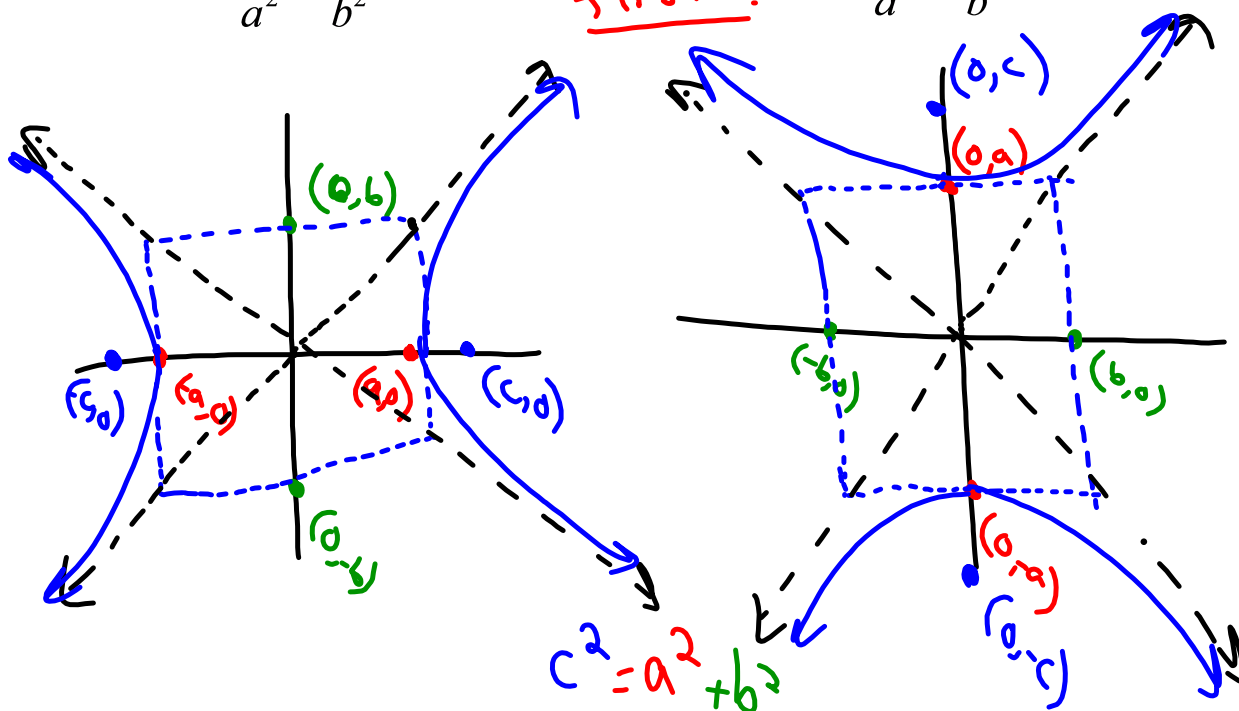
9.5 Graph and Write Equations of Hyperbolas

Standard Form:

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

a is always first!

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



EXAMPLE 1 Graph an equation of a hyperbola

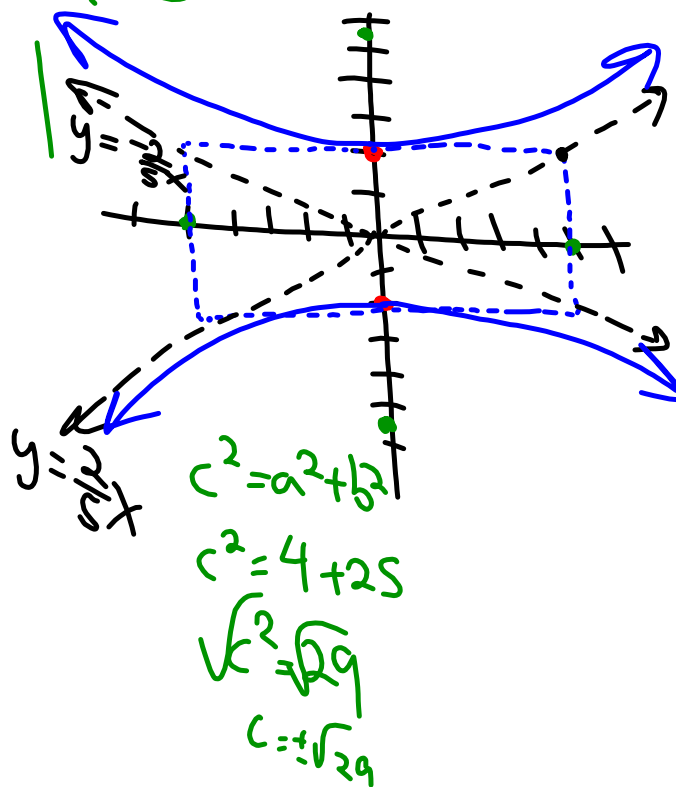
Graph $25y^2 - 4x^2 = 100$. Identify the vertices, foci, and asymptotes of the hyperbola.

$$\frac{25y^2}{100} - \frac{4x^2}{100} = \frac{100}{100}$$

$$\frac{y^2}{4} - \frac{x^2}{25} = 1$$

$a=2$ $b=5$

Vertices: $(0, \pm 2)$
 foci: $(0, \pm \sqrt{29})$
 asym: $y = \pm \frac{2}{5}x$



EXAMPLE 2 Write an equation of a hyperbola

Write an equation of the hyperbola with foci at $(-4, 0)$ and $(4, 0)$ and vertices at $(-3, 0)$ and $(3, 0)$.

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

$$a = 3$$

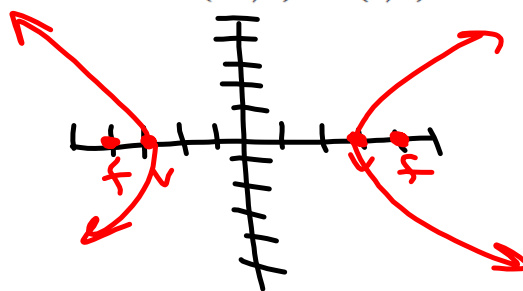
$$c = 4$$

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

$$4^2 = 3^2 + b^2$$

$$16 = 9 + b^2$$

$$\begin{array}{r} -9 \quad -9 \\ \hline 7 = b^2 \end{array}$$



$$\frac{x^2}{3^2} - \frac{y^2}{7} = 1$$

$$\boxed{\frac{x^2}{9} - \frac{y^2}{7} = 1}$$

GRAPHING In Exercises 27–32, the equations of parabolas, circles, ellipses, and hyperbolas are given. Graph the equation. *We'll identify now, you graph later!*

27. $\frac{x^2}{25} - \frac{y^2}{49} = 1$

hyper.

28. $y^2 = 18x$

para.

29. $48x^2 + 12y^2 = 48$

el.

30. $\frac{x^2}{144} + \frac{y^2}{256} = 1$

el.

31. $\frac{y^2}{25} - \frac{x^2}{121} = 1$

hyper.

32. $18x^2 + 18y^2 = 288$

cir.