Warmup

Find center, foci, lengths of major and minor axes

$$\frac{(x+2)^2}{5}+\frac{(y-3)^2}{2}=1 \qquad \frac{(x-4)^2}{121}+\frac{(y+5)^2}{64}=1$$

$C(-2,\ 3)$
$a=\sqrt{5}$
$b=\sqrt{2}$
$c=\sqrt{5-2}=\sqrt{3}$
major axis = $2\sqrt{5}$
minor axis = $2\sqrt{2}$
$f(-2\pm\sqrt{3},\ 3)$

$C(4,-5)$
$a=11$
$b=8$
$c=\sqrt{121-64}=\sqrt{57}$
major axis = 22
minor axis = 16
$f(4\pm\sqrt{57},-5)$

5.6 - Inverse of a Function

Inverse Functions

$g(x) = 2x - 2$

Find $g^{-1}(x)$

Swap x and y

$$x = 2y - 2$$

$$x + 2 = 2y$$

$$\frac{x+2}{2} = y$$

$$g^{-1}(x) = \frac{x+2}{2}$$

"g inverse of x"

5.6 - Inverse of a Function

Inverse Functions

$f(x) = \sqrt{2x - 3}$

Find $f^{-1}(3)$

$$x = \sqrt{2y - 3}$$

$$x^2 = 2y - 3$$

$$x^2 + 3 = 2y$$

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

$$f^{-1}(3) = \frac{3^2 + 3}{2}$$

$$f^{-1}(3) = \frac{12}{2}$$

$$f^{-1}(3) = 6$$

Faster Way $3 = \sqrt{2y - 3}$

5.6 - Inverse of a Function

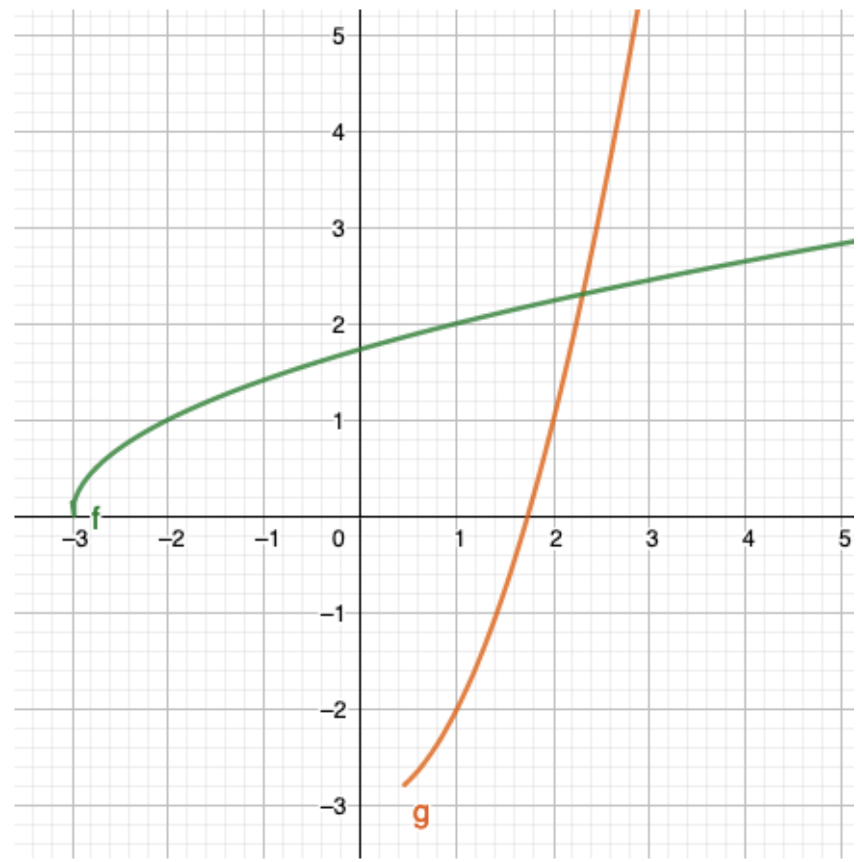
Inverse Functions

Find f^{-1}, then the domain and range of f^{-1}

$f(x) = \sqrt{x+3}$

$f^{-1}(x) = x^2 - 3$

	$f(x)$	$f^{-1}(x)$
D:	$x \geq -3$	$x \geq 0$
R:	$y \geq 0$	$y \geq -3$



5.6 - Inverse of a Function

Inverse Functions

Find the domain and range of f^{-1}

1. $f(x) = \dfrac{1}{\sqrt{3x+2}}$

$f^{-1}(x)$

D: $x > 0$

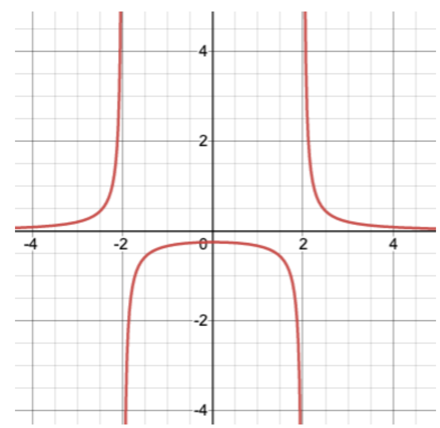
R: $y > -\dfrac{2}{3}$

2. $f(x) = \dfrac{1}{x^2 - 4}$

$f^{-1}(x)$

D: $x \neq 0$

R: $y \neq \pm 2$



5.6 - Inverse of a Function

Inverse Functions

Find the domain and range of f^{-1} where $f(x) = g(k(x))$

$$k(x) = \sqrt{x-3}$$

$$g(x) = \frac{1}{x^2+2}$$

$$g(k(x)) = \frac{1}{x-1}$$

$$D: \ x \geq 3$$

$$R: \ 0 < y \leq \frac{1}{2}$$

$$f^{-1}(x) = \frac{1+x}{x} = \frac{1}{x} + 1$$

$$D: \ 0 < x \leq \frac{1}{2}$$

$$R: \ y \geq 3$$

7.1 - Inverse Variation

Direct and Inverse Variation

$$y = kx$$

"y varies directly as x"

y = 12 when x = 15

$$12 = k(15)$$

$$k = \frac{12}{15} = \frac{4}{5}$$

$$y = \frac{k}{x}$$

"y varies inversely as x"

y = 3 when x = 4

$$3 = \frac{k}{4}$$

$$k = 12$$

7.1 - Inverse Variation

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$$3 = \frac{k}{4}$$

$$k = 12$$

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1) y varies directly as x
   and y = 17 when x = 12
   Find x, when y = 5

$$k = \frac{17}{12} \qquad x = \frac{60}{17}$$

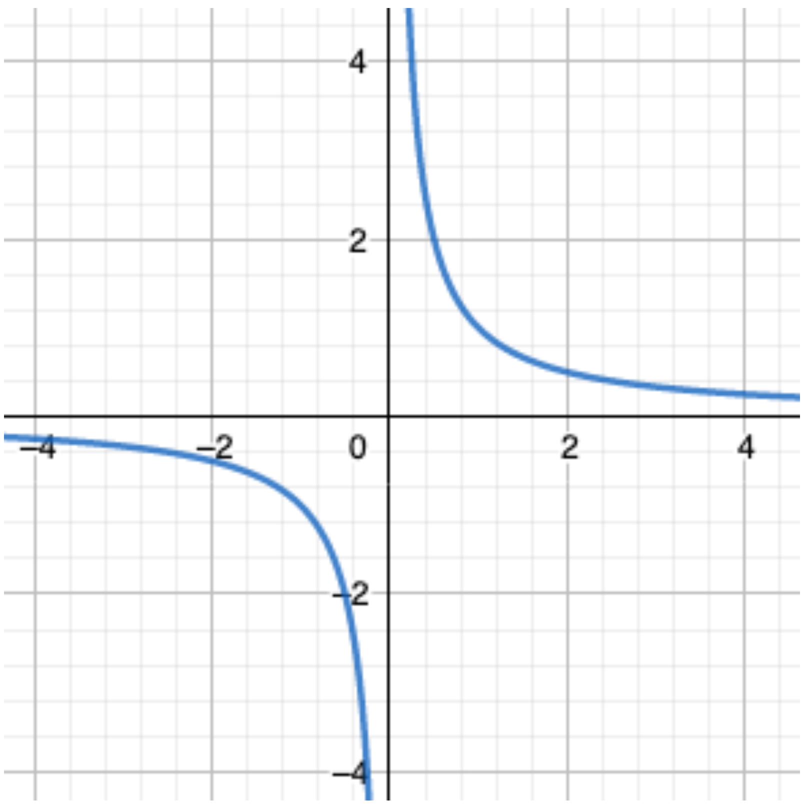
2) y varies inversely as x.
   At x_1, y = 10. At x_2, y = 24.
   What is the ratio of x_1/x_2?

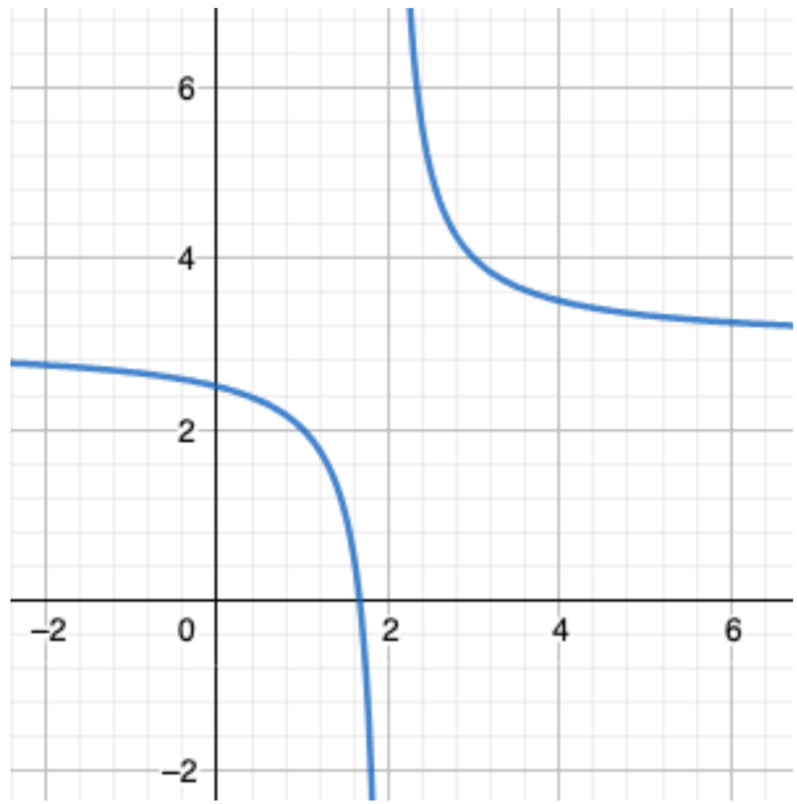
$$\frac{x_1}{x_2} = \frac{12}{5}$$

7.2 - Graphing Rational Functions

$$f(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x-2} + 3$$

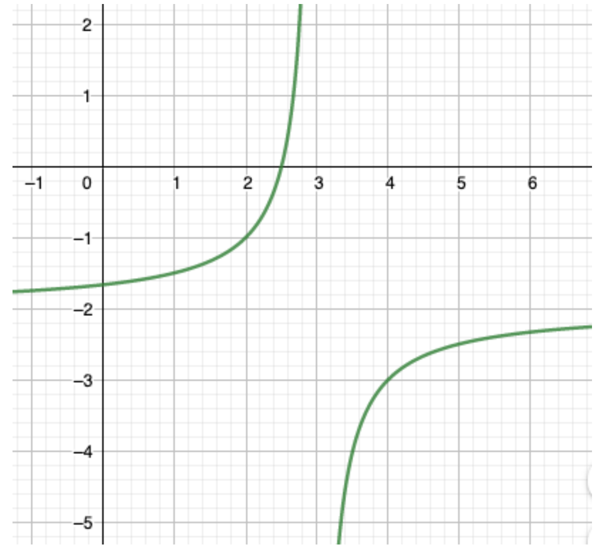




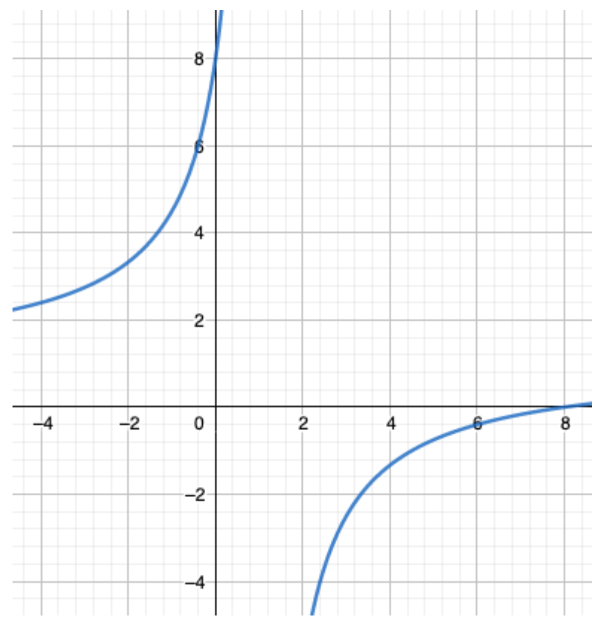
7.2 - Graphing Rational Functions

Graph the functions

1. $f(x) = \dfrac{1}{-x+3} - 2$

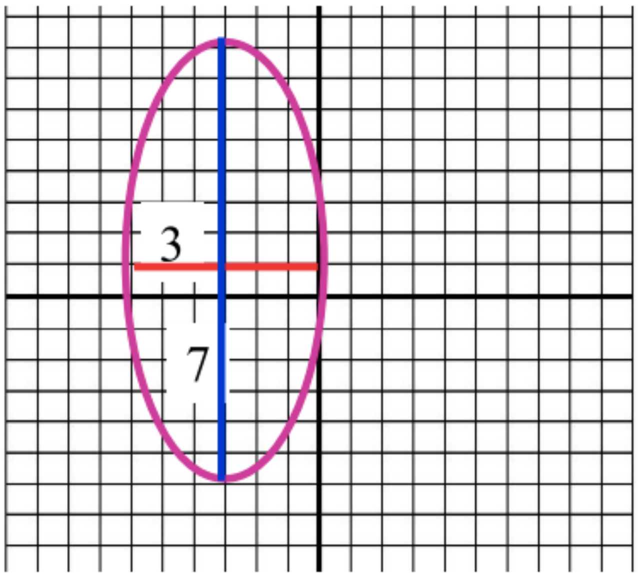


2. $f(x) = \dfrac{2x+5}{-x+1} + 3$



Conics - Ellipses

What if the center was not at the origin?



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

$$a = 7,\ b = 3$$

$$\frac{(x-h)^2}{3^2} + \frac{(y-k)^2}{7^2} = 1$$

Where is the center? C(-3,1)

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

Conics - Ellipses

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

$$4x^2+y^2+24x-10y+45=0$$

$$(4x^2+24x)+(y^2-10y)=-45$$

$$4(x^2+6x+?)+(y^2-10y+?)=-45+?$$

$$4(x^2+6x+9)+(y^2-10y+25)=-45+36+25$$

$$4(x+3)^2+(y-5)^2=16$$

$$\frac{(x+3)^2}{4}+\frac{(y-5)^2}{16}=1$$

Conics - Ellipses

1. Find the equation of an ellipse with the following characteristics

   Center (3, -2), major axis = 12 (horizontal), c = 4

$$\frac{(x-3)^2}{36} + \frac{(y+2)^2}{20} = 1$$

2. Find the equation of an ellipse with the following characteristics

   Focus (-4, 6), (-4, 12)

$b^2 = 16$

$$\frac{(x+4)^2}{16} + \frac{(y-9)^2}{25} = 1$$