# 5.6 - Inverse of a Function

Warmup - Find the inverse and the inverse's domain and range

1. $f(x) = \dfrac{2}{3 + x}$     $f^{-1}(x) = \dfrac{2 - 3x}{x}$; $x \neq 0$; $y \neq -3$

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

3. $f(x) = \dfrac{2x}{3x - 1}$     $f^{-1}(x) = \dfrac{x}{3x - 2}$; $x \neq \dfrac{2}{3}$; $y \neq \dfrac{1}{3}$

4. $f(x) = \dfrac{3x + 4}{2x - 3}$     $f^{-1}(x) = \dfrac{3x + 4}{2x - 3}$; $x \neq \dfrac{3}{2}$; $y \neq \dfrac{3}{2}$

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

# 7.1 - Inverse Variation

## Direct and Inverse Variation

$y = mx + b$

$y = 2x - 5$

$y = kx$

"y varies directly as x"

y = 12 when x = 15

$12 = k(15)$

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

Find x when y = 20

$20 = \frac{4}{5}x$

$\frac{5}{4} \cdot 20 = \frac{4}{5}x \cdot \frac{5}{4}$

$25 = x$

# 7.1 - Inverse Variation

## Direct and Inverse Variation

$y = mx + b$

$y = 2x - 5$

$y = kx$

"y varies directly as x"

$y = 12$ when $x = 15$

$12 = k(15)$

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

Find x when y = 20

$20 = \frac{4}{5}x$

$\frac{5}{4} \cdot 20 = \frac{4}{5}x \cdot \frac{5}{4}$

$25 = x$

---

1) y varies directly as x
   and y = 12 when x = 8
   Find x, when y = 16

   $k = \frac{3}{2}$     $x = \frac{32}{3}$

2) y varies directly as x
   and y = 10 when x = 14
   Find y, when x = 21

   $k = \frac{5}{7}$     $y = 15$

# 7.1 - Inverse Variation

## Direct and Inverse Variation

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

"y varies inversely as x"

y = 3 when x = 4

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

$$k = 12$$

Find x when y = 36

$$36 = \frac{12}{x}$$

$$x = \frac{12}{36} = \frac{1}{3}$$

# 7.1 - Inverse Variation

## Direct and Inverse Variation

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

"y varies inversely as x"

y = 3 when x = 4

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

$$k = 12$$

Find x when y = 36

$$36 = \frac{12}{x}$$

$$x = \frac{12}{36} = \frac{1}{3}$$

_____

1) y varies inversely as x
   and y = 2 when x = 8
   Find x, when y = 8

$$k = 16 \qquad x = 2$$

2) y varies inversely as x
   and y = $\frac{2}{3}$ when x = 2
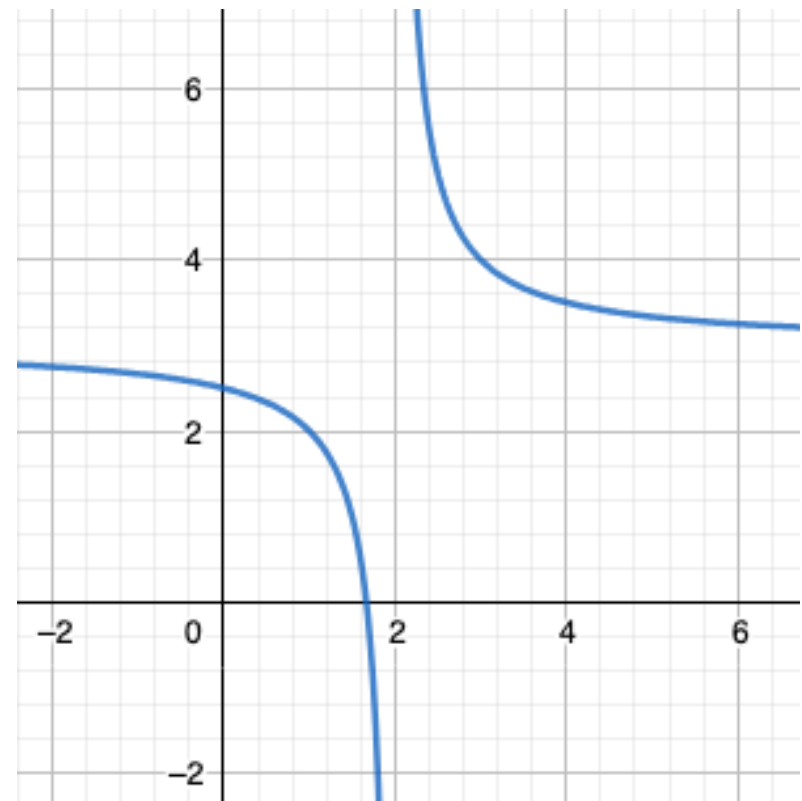   Find y, when x = 6

$$k = \frac{4}{3} \qquad y = \frac{2}{9}$$
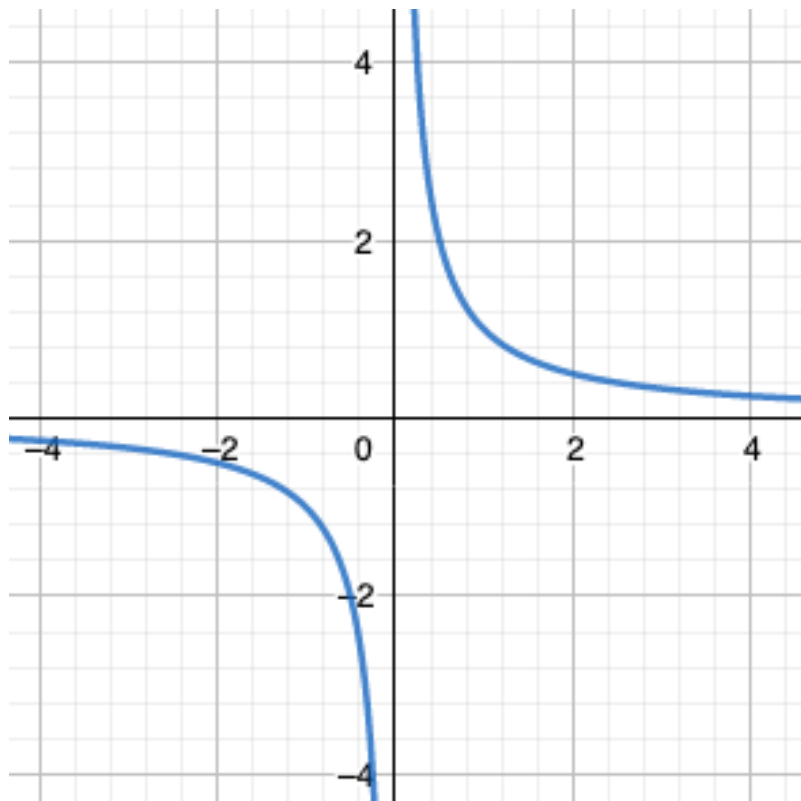
$$f(x) = \frac{1}{x}$$

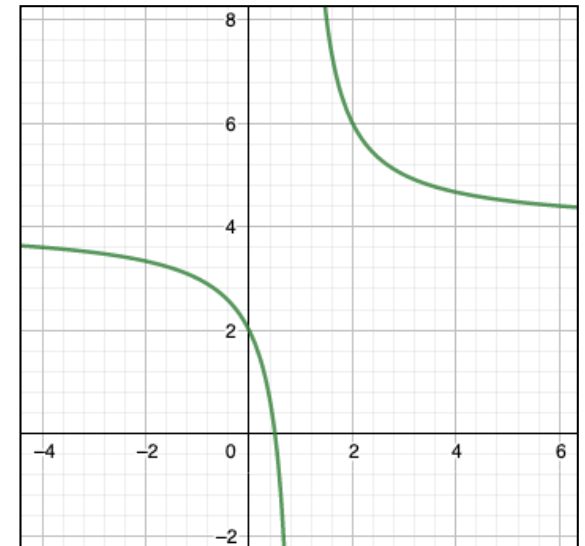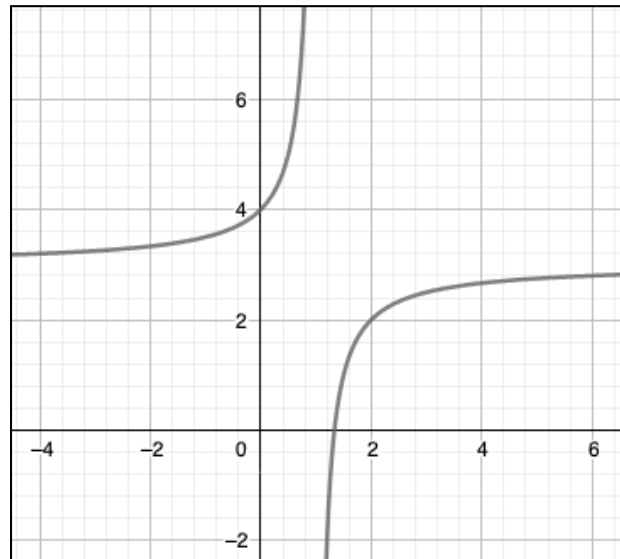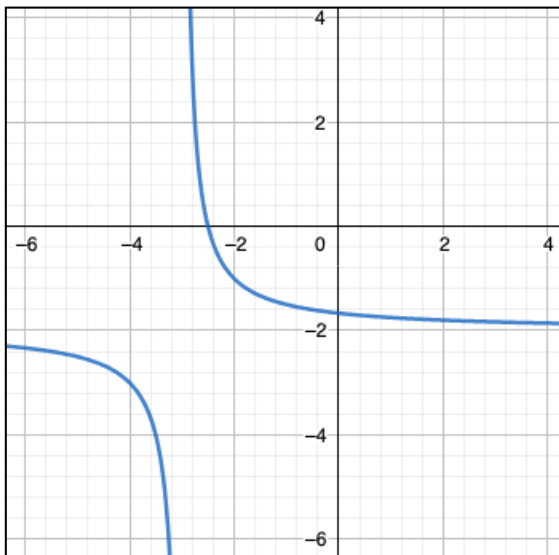$$f(x) = \frac{1}{x - 2} + 3$$

# 7.2 - Graphing Rational Functions

Graph the functions

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

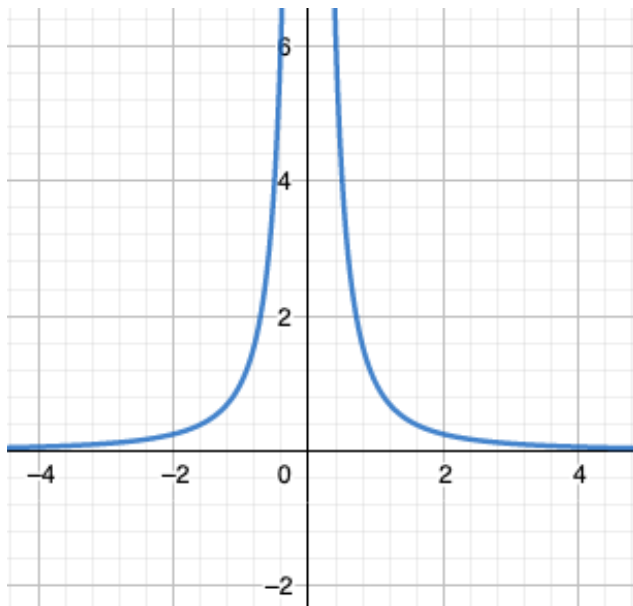2. $f(x) = \dfrac{1}{-x+1} + 3$

3. $f(x) = \dfrac{x+1}{x-1} + 3$
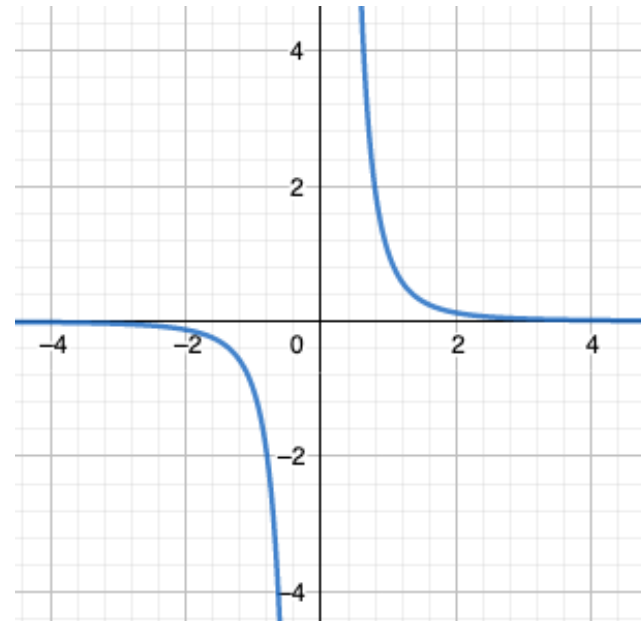
# 7.2 - Graphing Rational Functions

Graph the functions
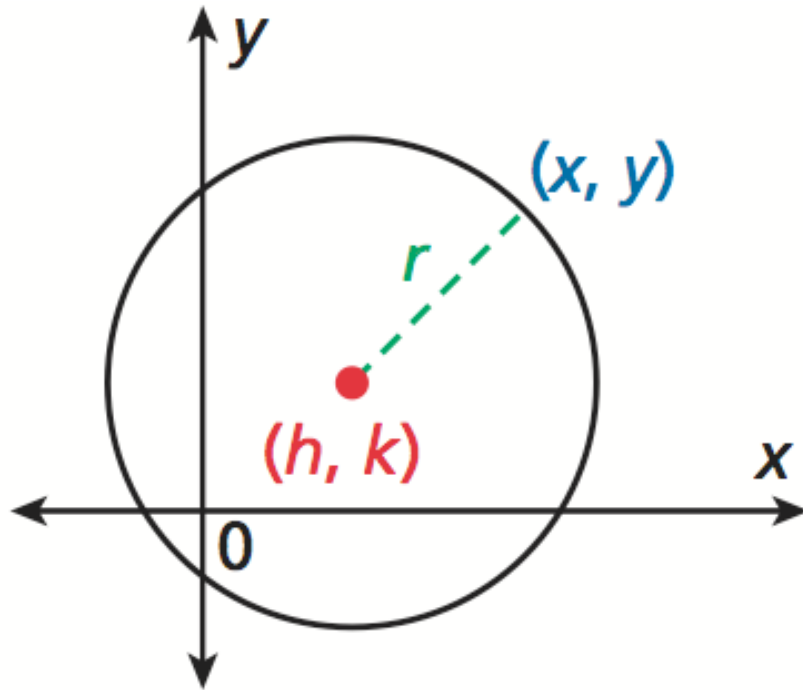
$$f(x) = \frac{1}{x^2}$$

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

# Circles in the Coordinate Plane

# Circles in the Coordinate Plane

**Standard Equation for a Circle**

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$\downarrow$

Substitution from diagram

$$r = \sqrt{(x - h)^2 + (y - k)^2}$$

$\downarrow$

Square each side

$$r^2 = (x - h)^2 + (y - k)^2$$

Standard Equation for a Circle

$$r^2 = (x - h)^2 + (y - k)^2$$

# Circles in the Coordinate Plane

Find the equation of the circle

1. $r = 3$, $C(3, -4)$ $\qquad$ $(x - 3)^2 + (y + 4)^2 = 9$

2. $r = 2\sqrt{3}$, $C(-2, 3)$ $\qquad$ $(x + 2)^2 + (y - 3)^2 = 12$

3. $r = 5\sqrt{2}$, $C(0, -5)$ $\qquad$ $x^2 + (y + 5)^2 = 50$

# Circles in the Coordinate Plane

Find the radius and center

$x^2 + y^2 - 12x - 16y + 84 = 0$

$x^2 - 12x + y^2 - 16y = -84$

$(x^2 - 12x + 36) + (y^2 - 16y + 64) = -84 + 100$

$(x - 6)^2 + (y - 8)^2 = 16 \qquad r = 4, \ C(6, \ 8)$

---

1. $x^2 + y^2 - 18x - 18y + 53 = 0 \qquad r = \sqrt{109}, \ C(9, \ 9)$

2. $x^2 + y^2 - 4x = 9 \qquad\qquad r = \sqrt{13}, \ C(2, \ 0)$

# Circles in the Coordinate Plane
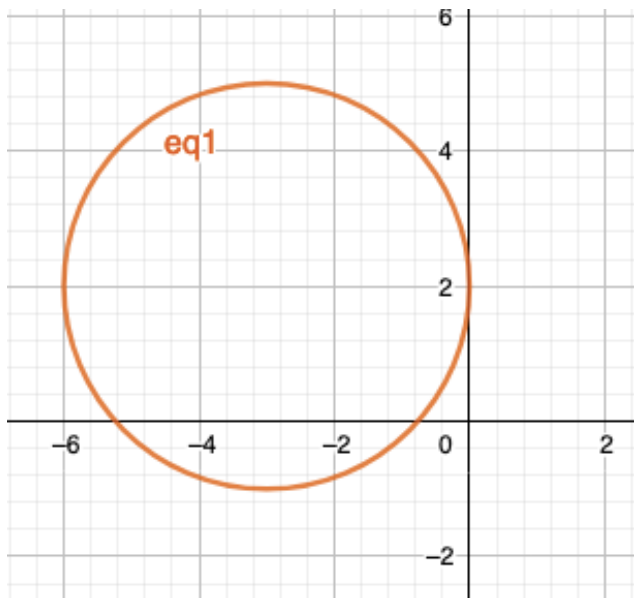
Find the equation of the circle with center C(2, 4) and the point (6, -3) on the circle.
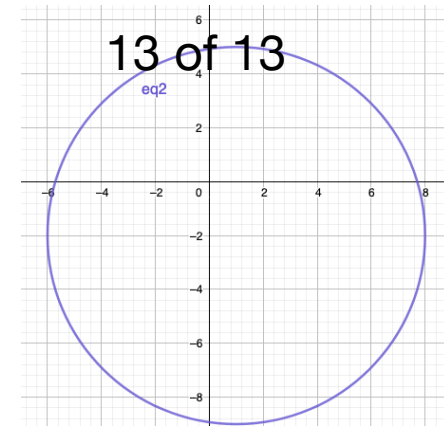
$$(x - 2)^2 + (y - 4)^2 = 65$$
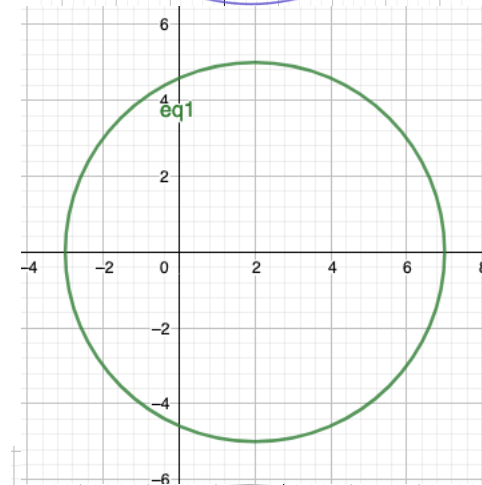
# Circles in the Coordinate Plane

Graph the circle.

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

1. $(x - 1)^2 + (y + 2)^2 = 49$

2. $25 = (x - 2)^2 + y^2$

3. $6 = (x + 1)^2 + (y - 1)^2 - 30$