# Bell Work

(12, 5) (5, 12)

Solve the system.

1. $x^2 + y^2 = 169$

   $x + y = 17$

   $y = -x + 17$

   $x^2 + (-x+17)^2 = 169$

   $x^2 + (-x+17)(-x+17)$

   $+x^2 - 34x + 289 = 169$

   $-169$

   $2x^2 - 34x + 120 = 0$

   $2(x^2 - 17x + 60) = 0$

   $2(x-12)(x-5) = 0$

   $x = 12 \quad x = 5$

2. $y = x^2 + 4x - 2$

   $y = 6x - 3$

   $6x - 3 = x^2 + 4x - 2$

   $-6x + 3 \qquad -6x + 3$

   $0 = x^2 - 2x + 1$

   $0 = (x-1)(x-1)$

   $x = 1$

   $(1, 3)$

Solve:

3. $\dfrac{x+2}{x} = \dfrac{2x+4}{3}$

   $3(x+2) = x(2x+4)$

   $3x + 6 = 2x^2 + 4x$

   $-3x - 6 \qquad -3x - 6$

   $0 = 2x^2 - x - 6$

   $(2x-3)(x+2) = 0$

   $x = 3/2 \quad x = -2$

4. $\dfrac{x}{x-1} + \dfrac{-1}{x-2} = \dfrac{2x-5}{x^2 - 3x + 2}$

   $(x-2)(x-1)$

   $x(x-2) - 1(x-1) = 2x - 5$

   $x^2 - 2x - x + 1 = 2x - 5$

   $x^2 - 5x + 6 = 0$

   $(x-2)(x-3) = 0$

   $\cancel{x = 2} \quad x = 3$

17) $\dfrac{x^2+12x+36}{x^2-8x+12} \div x^2-36$

$(x+6)\cancel{(x+6)}$

$\dfrac{x^2+12x+36}{x^2-8x+12} \cdot \dfrac{1}{x^2-36} = \dfrac{x+6}{(x-6)^2(x-2)}$

$(x-6)(x-2)$ $\quad \cancel{(x+6)}(x-6)$

15) $\frac{x-4}{\cancel{x-2}}(\cancel{x-2}) + \frac{-2x+1}{\cancel{x-2}}(\cancel{x-2}) = 2(x-2)$ CD $\Rightarrow (x-2)$

$x-4-2x+1=2(x-2)$

$-x-3=2x-4$

$+x \quad +4 \quad +x \quad +4$

$1=3x$

$x=1/3$

$$\frac{x}{3x(x-1)} \qquad \frac{2x}{x^2-2x+1} \qquad \frac{3x}{12x+12}$$

$$(x-1)(x-1) \qquad 12(x+1)$$

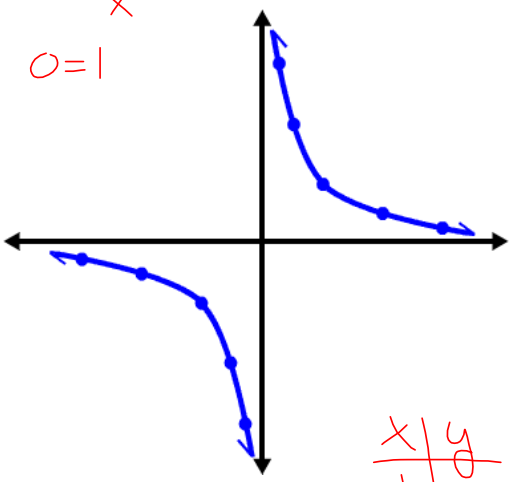
$$(x-1)^2$$

$$CD \Rightarrow 12x(x-1)^2(x+1)$$

# Rational Equations

$0 = \frac{1}{x}$

$0 = 1$



$y = \frac{1}{x}$

| x | y |
|---|---|
| 1 | 1 |
| 2 | 1/2 |
| 0 | undefined |

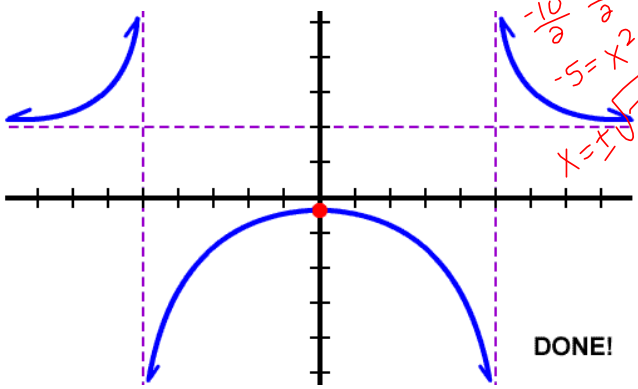
$0 = \frac{2x^2+10}{x^2-25}$

$0 = 2x^2+10$

$\frac{-10}{2} = \frac{2x^2}{2}$

$-5 = x^2$

$x = \pm\sqrt{-5}$

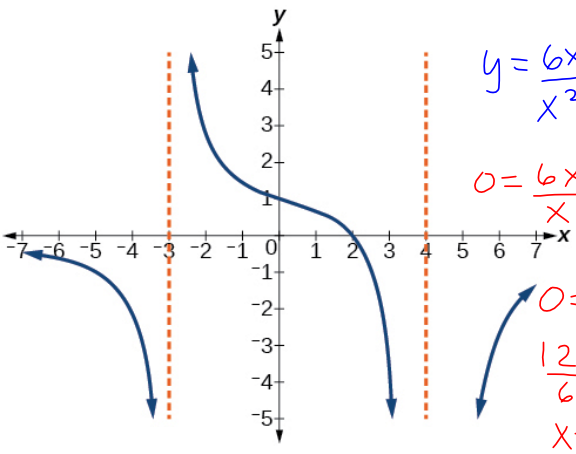



$y = \frac{2x^2 + 10}{x^2 - 25}$

$y = \frac{2(x^2+5)}{(x+5)(x-5)}$

$x+5=0$ $x=5$

$x=-5$




$y = \frac{6x-12}{x^2-x-12}$

$0 = \frac{6x-12}{x^2-x-12}$

$0 = 6x-12$

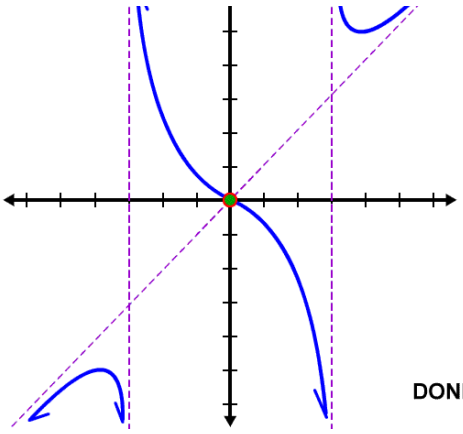
$\frac{12}{6} = \frac{6x}{6}$

$x = 2$

$$y = \frac{6x - 12}{x^2 - x - 12}$$

$6(x-2)$

$(x-4)(x+3)$



DONE!

$0 = \frac{x^3}{x^2-9}$

$$y = \frac{x^3}{x^2 - 9}$$

$(x+3)(x-3)$

$0 = x^3$

$x = 0$

## How do you find the x-intercept(s)? y-intercept?

x-intercept ⇒ Let $y=0$ & solve for x
$(x, 0)$

y-intercept
Let $x=0$ & solve for y
$(0, y)$

## What is an asymptote?

Limit of the end behavior

Vertical asymptote
horizontal asymptote
end behavior asymptote

## How do you find the vertical asymptote(s)?

factor denominator
set $=0$
solve for x

$x=\#$

## How do you find the horizontal asymptote ?

$y=\#$

compare degrees of numerator and denominator

$$y=\frac{x^a}{x^b}$$

$a<b$ horizontal asymptote is always $y=0$

$a=b$ horizontal asymptote is the ratio of the leading coefficients

$a>b$ Not horizontal
end behavior asymptote

# Identify the intercepts and asymptotes.

$x+2=0$ $x-2=0$
$x=-2$ $x=2$

1. $y=\dfrac{4}{x^2-4}$

$(x+2)(x-2)$

x- intercept : None

$0=\dfrac{4}{x^2-4}$

$0=4$

y-int : $(0,-1)$

VA: $x=2$ $x=-2$

HA: $y=0$

$0=x-3$

2. $y=\dfrac{x-3}{x^2-2x-8}$

$(x-4)(x+2)$

y int: $(0,+3/8)$

x-int: $(3,0)$

VA: $x=4$ or $x=-2$

HA: $y=0$

$0=3x+2$

3. $y=\dfrac{3x+2}{x^2-3}$

x-int: $(-2/3,0)$

y-int: $(0,-2/3)$

HA: $y=0$

VA: $x=\pm\sqrt{3}$

4. $y=\dfrac{3}{x^2}$

5. $y=\dfrac{x^2-7x+12}{x^2-36}$

6. $y=\dfrac{x^2-5}{x+2}$

**Match the function with its graph.**

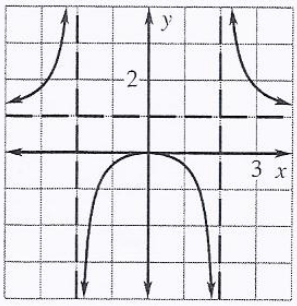
**7.** $y = \dfrac{x}{x^2 - 1}$ B

$(x+1)(x-1)$

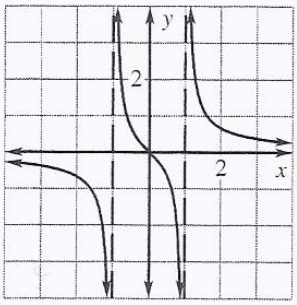
**8.** $y = \dfrac{x^2}{x^2 - 4}$ A

**9.** $y = \dfrac{x^2 - x - 6}{x + 1}$ C

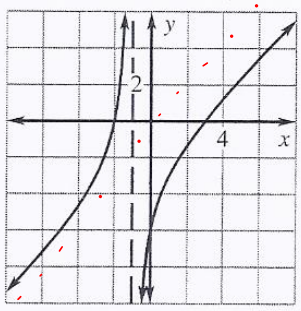
**A.**




**B.**




**C.**



Graph the function and show all intercepts and asymptotes.

10. $f(x) = \frac{(3)}{(x^2 - 1)}$ $\frac{0}{0}$

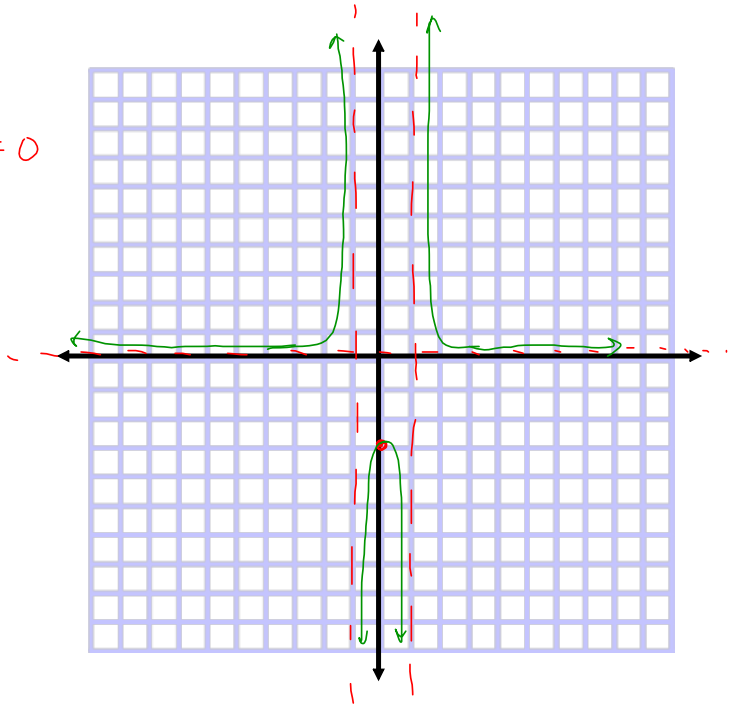
$(x+1)(x-1) = 0$

y-int: $(0,-3)$

x-int: None $0 = 3$

HA: $y = 0$

VA: $x = -1$ $x = 1$

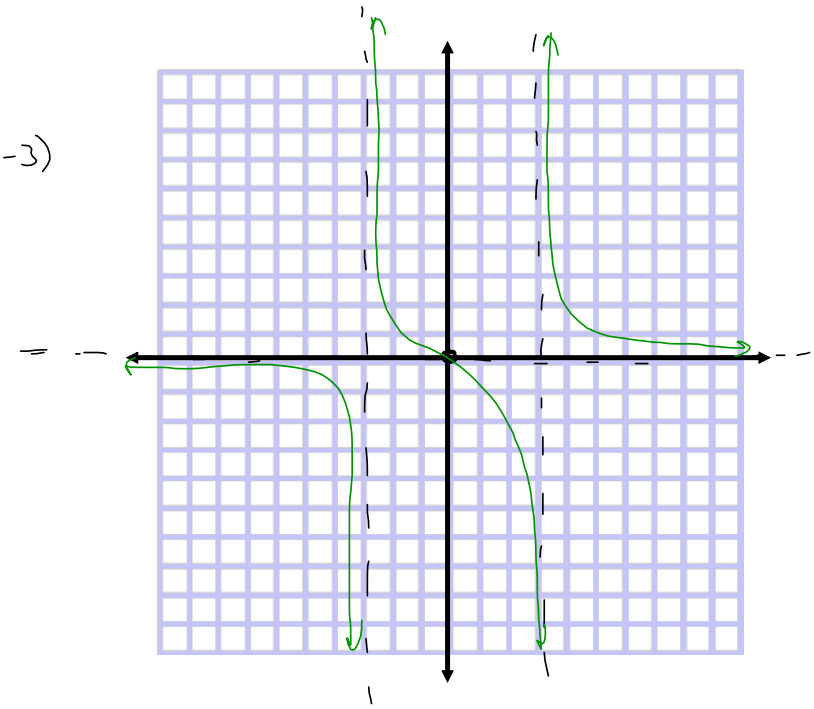


Graph the function and show all intercepts and asymptotes.

11. $g(x) = \dfrac{2x}{x^2 - 9}$

$(x+3)(x-3)$

y-int: (0,0)
x-int: (0,0)
VA: x=3 x=-3
HA: y=0



Graph the function and show all intercepts and asymptotes.

12. $f(x) = \dfrac{2x+6}{x^2+8x+12}$

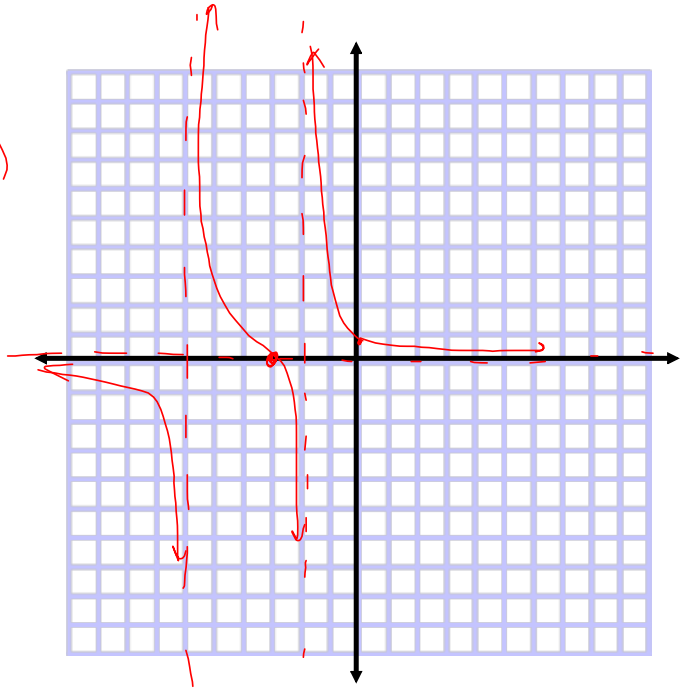
$(x+6)(x+2)$

x-int : $(-3, 0)$

y-int : $(0, 1/2)$

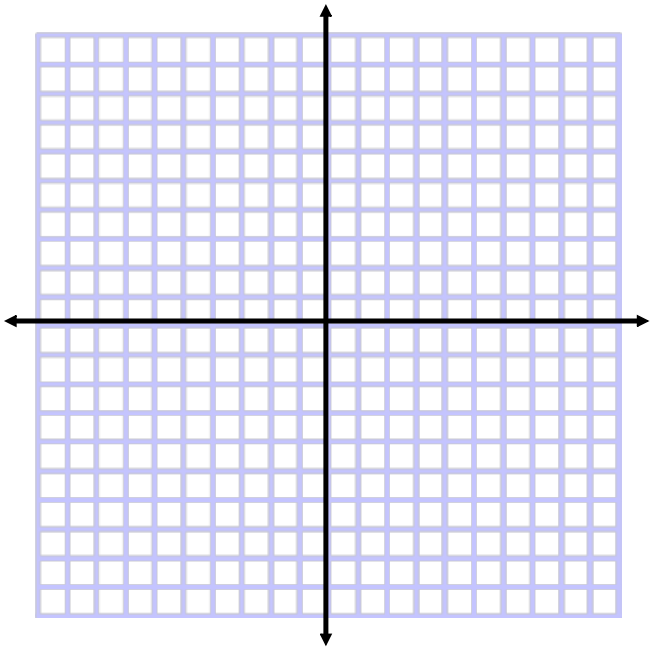
HA : $y = 0$

VA : $x = -6$ $x = -2$



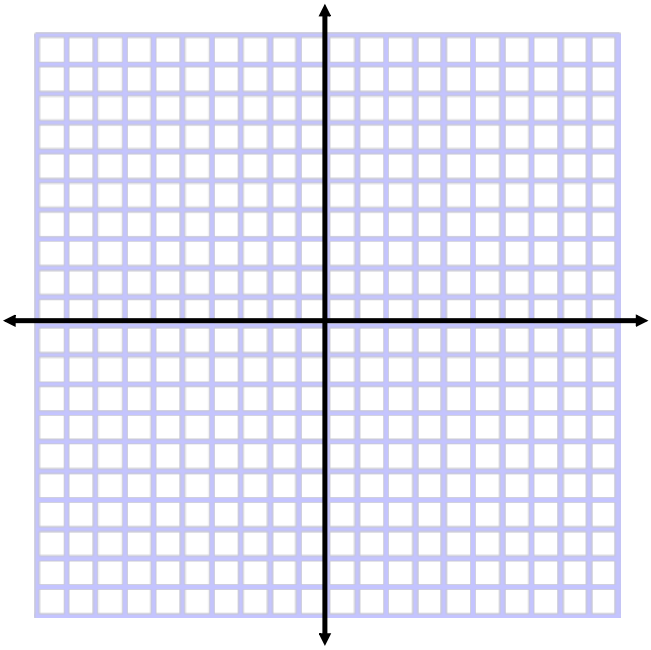
Graph the function and show all intercepts and asymptotes.

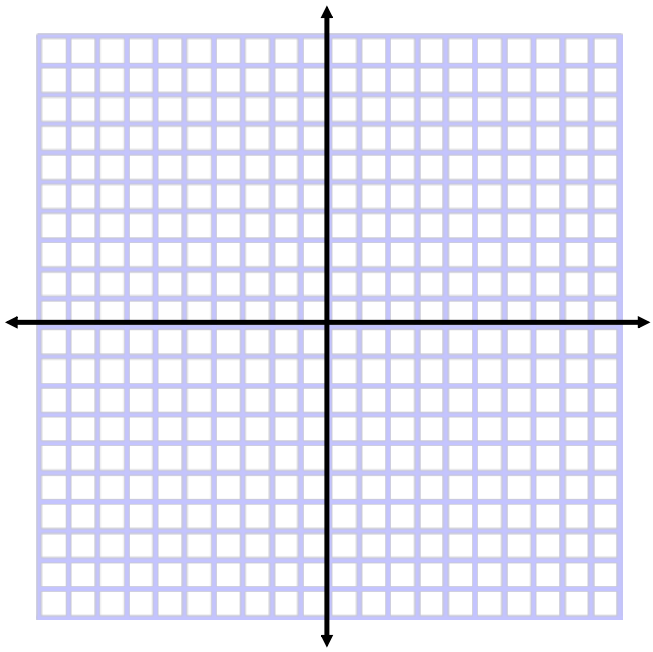
13. $f(x)=\dfrac{x^2-4}{x^2-4x+3}$



Graph the function and show all intercepts and asymptotes.

14. $h(x) = \dfrac{x}{(x-1)(x+5)}$



Graph the function and show all intercepts and asymptotes.

15. $f(x)=\dfrac{5x-10}{x+6}$