

**Simplify:**

$$\frac{x^2 - 9x + 14}{x^2 - 6x + 5} \div \frac{x^2 - 8x + 7}{x^2 - 7x + 10}$$

$$\frac{x^2 - 9x + 14}{x^2 - 6x + 5} \cdot \frac{x^2 - 7x + 10}{x^2 - 8x + 7} =$$

$$\frac{\cancel{(x-7)}(x-2)}{(x-1)\cancel{(x-5)}} \cdot \frac{\cancel{(x-5)}(x-2)}{(x-1)\cancel{(x-7)}}$$

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

**Simplify:**C.D.:  $(x-3)(x+4)$ 

$$\frac{x}{x-3} - \frac{3}{x+4} + \frac{7}{x^2 + x - 12}$$

$$\frac{x(x+4)}{(x-3)(x+4)} - \frac{3(x-3)}{(x-3)(x+4)} + \frac{7}{(x-3)(x+4)}$$

$$\frac{x^2 + 4x}{(x-3)(x+4)} - \frac{3x - 9}{(x-3)(x+4)} + \frac{7}{(x-3)(x+4)}$$

$$\frac{x^2 + x + 16}{(x-3)(x+4)}$$

# Vertical Asymptotes, Holes, Horizontal Asymptotes & Graphing



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## Vertical Asymptotes

Step 1: Factor the numerator and denominator

Step 2: Simplify (cross out)

Step 3: Set simplified denominator equal to 0

Step 4: Solve for variable

## Holes

Step 1: Factor the numerator and denominator

Step 2: Simplify (cross out)

Step 3: Set what you crossed out, equal to 0

Step 4: Solve for variable

Step 5: Plug in what you find from Step 4 into simplified equation

Step 6: Solve

\*What you find in Step 4 is your x-coordinate.

\*What you find in Step 6 is your y-coordinate.

## Horizontal Asymptotes



- Degree of numerator = Degree of denominator

Horizontal Asymptote:  $y = \frac{\text{coefficient of numerator}}{\text{coefficient of denominator}}$

- Degree of numerator < Degree of denominator

Horizontal Asymptote:  $y=0$

- Degree of numerator > Degree of denominator

Horizontal Asymptote: None

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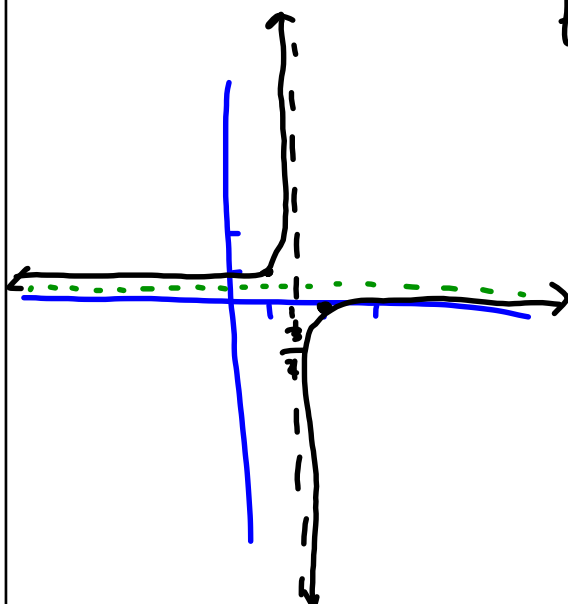
Find all asymptotes & holes & then graph:

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

VA:  $2x - 3 = 0$   
 $x = \frac{3}{2}$

Hole: none

HA:  $y = \frac{1}{2}$



X	Y
1	1
2	0

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Find all asymptotes & holes & then graph:

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

VA:  $x=3$   
 Hole:  $(1, 1/4)$   
 HA:  $y=0$

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

$x-1=0$   
 $x=1$

$$= \frac{1}{1+3} = \frac{1}{4}$$

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

x	y
-4	-1
-2	1

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Find all asymptotes & holes & then graph:

$$f(x) = \frac{x^2 - 3x - 4}{x - 4}$$

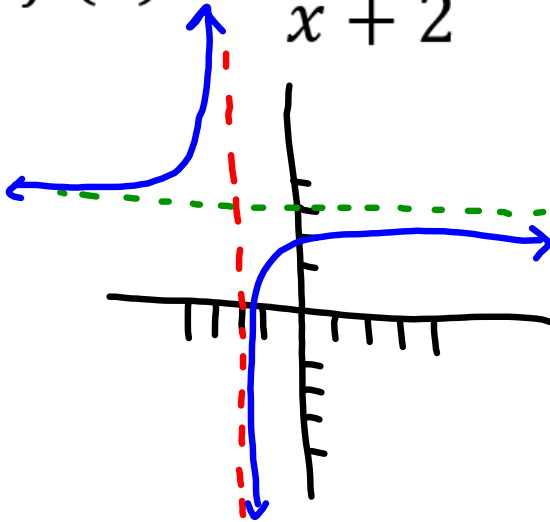
VA: none  
 Hole:  $(4, 5)$   
 HA: none

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Find all asymptotes & holes & then graph:



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



$$VA: x = -2$$

Hole: none

$$HA: y = 3$$

X	Y
-3	10
0	-1/2

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Find all asymptotes & holes & then graph:



$$f(x) = \frac{3x^2 + 7x - 6}{x^2 - 9}$$

$$(3x^2 + 9x - 2x - 6) = (3x - 2)(x + 3)$$

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

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

$$\frac{(3x-2)}{(x-3)}$$

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Find all asymptotes & holes & then graph:

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



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Find all asymptotes & holes & then graph:

$$f(x) = \frac{3x^2}{2x^2 - 5}$$



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Find all asymptotes & holes & then graph:

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



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Homework



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