Last day's work: pp. 70-71 #4def, 5cd, 6a, 7a 6a 5c

Siri divides

$y = af(k(x-d))+c$

p. 70 #6

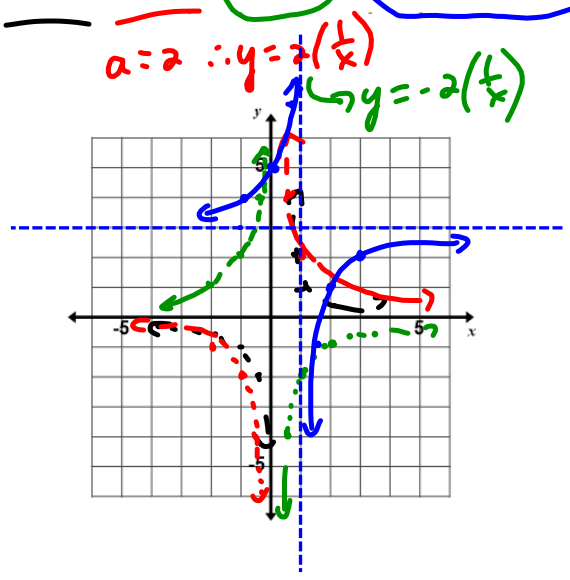
6. Explain what transformations you would need to apply to the graph of $y = f(x)$ to graph each function.

a) $y = f\left(\frac{1}{3}(x+4)\right)$ c) $y = -3f(2(x-1)) - 3$

hs by a factor of 3
h.t. 4 units to the left

p. 70 #5c

c) $y = \frac{1}{x}, y = \frac{2}{x}, y = -\frac{2}{x}, y = -\frac{2}{x-1} + 3$



Today's Learning Goal(s):

By the end of the class, I will be able to:

a) determine if and where any holes or asymptotes occur for a rational function.
b) graph a rational function.

2.5 Exploring Graphs of Rational Functions (Holes)

Date: Mar. 1/18
(Every lesson)

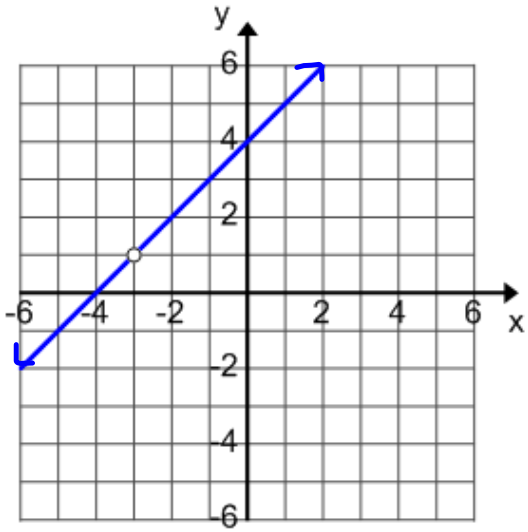
HOLES!!!

Graph $g(x) = \frac{x^2+7x+12}{x+3}$ Just like our first unit! Factor first.

$$g(x) = \frac{(x+3)(x+4)}{(x+3)}$$

We have the restriction that $x \neq -3$, but since we cancel $(x+3)$ we create a hole in the graph.

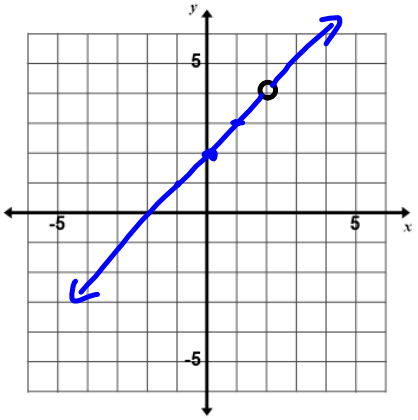
So, $g(x) = (x + 4)$ is a linear function with a hole at $x = -3$



Ex.1 Graph $f(x)=\dfrac{x^2-4}{x-2}$ R: $x \neq 2$

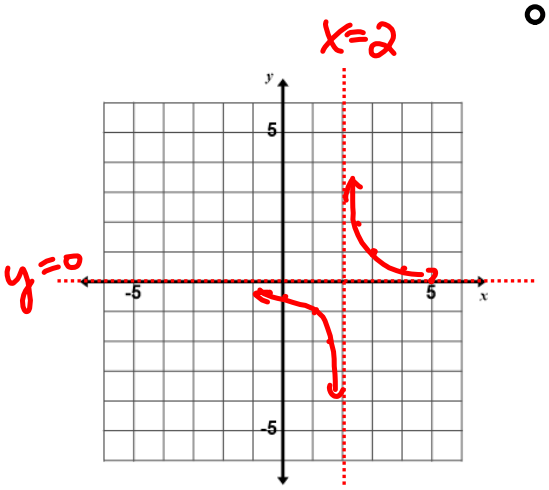
$=\dfrac{(x-2)(x+2)}{x-2}$

$= x+2$



The restriction is that $x \neq 2$.
there is hole at $x = 2$.

Ex.2 Graph $g(x)=\dfrac{1}{x-2}$ R: $x \neq 2$



The restriction is still $x \neq 2$.
there is vertical asymptote at $x = 2$.

Summary:

If the restriction divides out, then there is a **hole** at that point.

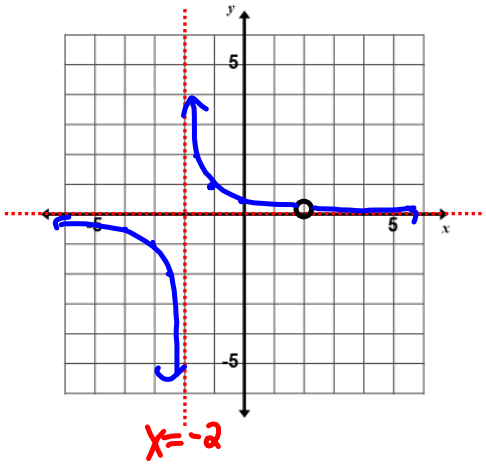
If the restriction remains, then there is a vertical asymptote at that point.

Ex.3 Graph $h(x)=\dfrac{x-2}{x^2-4}$

$=\dfrac{x-2}{(x-2)(x+2)}$

$=\dfrac{1}{x+2}$

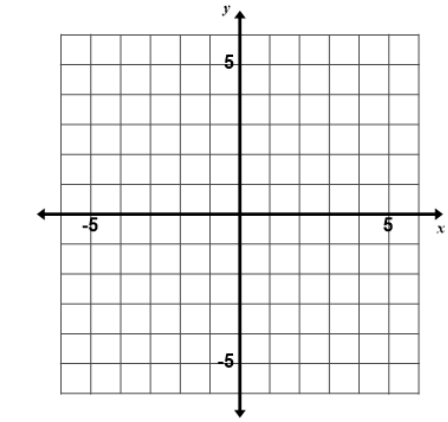
R: $x\neq 2, -2$



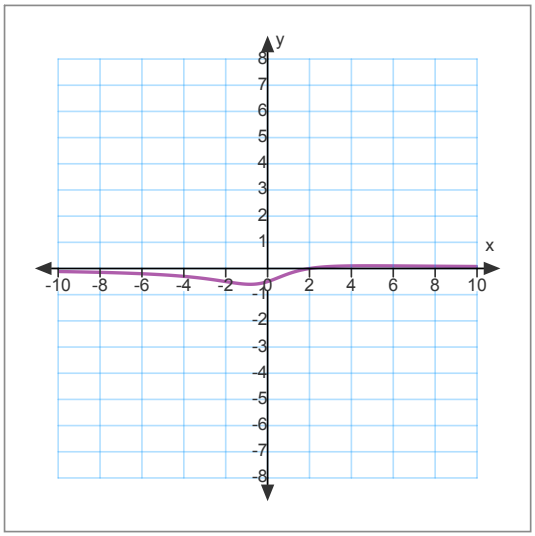
Ex.4 Graph $m(x)=\dfrac{x-2}{x^2+4}$

R: None no restrictions,
no asymptotes

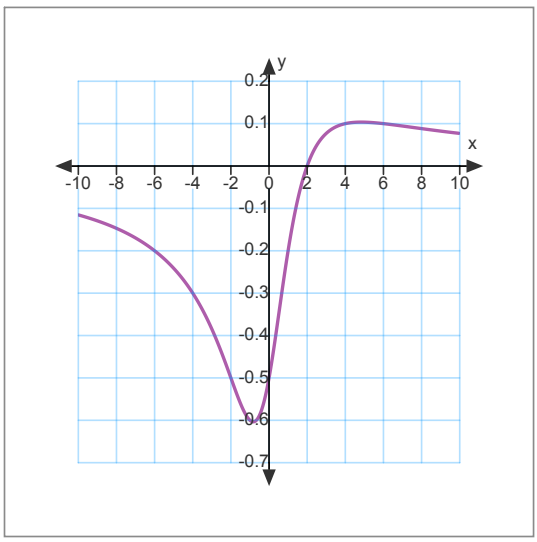
did not reduce/cancel,
no holes



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



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



If time, (otherwise, continue to additional homework on next slide)

Ex.5 Determine any vertical asymptotes or holes for:

$$f(x)=\frac{x^3-4x}{x^3-x^2-6x}$$

$$=\frac{x(x^2-4)}{x(x^2-x-6)}$$

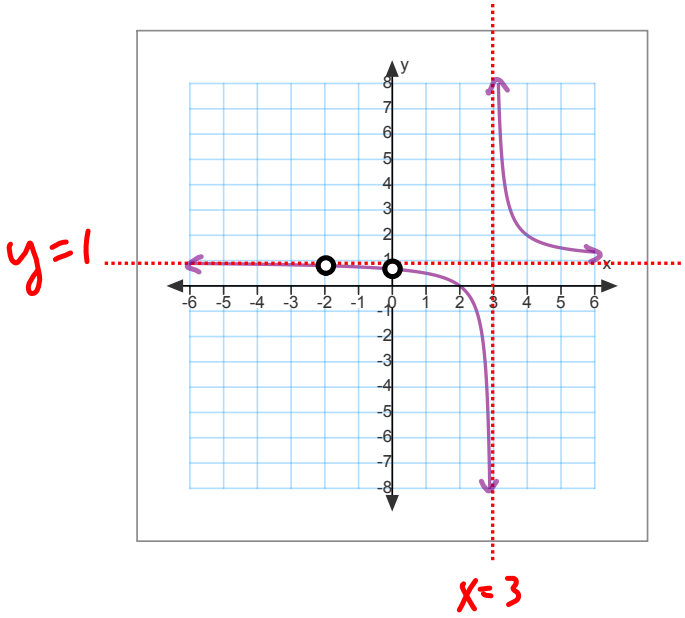
$$=\frac{x(x+2)(x-2)}{x(x+2)(x-3)}$$

$$=\frac{x-2}{x-3}$$

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

$$x\neq 0,3,-2$$

Holes at $x = 0$ and $x = -2$
(because the x and $x+2$ divided out)
vertical asymptote at $x = 3$
(because the $x-3$ remained)



$$y=\frac{x^3-4x}{x^3-x^2-6x}$$

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

Today's Homework Practice includes:
pp. 70-73 #6bc, 7c, (8,9)ac, 10, 12, 16, 18 [20, 22]
+3 Quesons

Additional Homework Questions Assigned

MCR 3UI

Graphs of Rational Functions

Determine any Vertical Asymptotes or Holes for the following functions. Graph each function.

$a(x) = \dfrac{x^2 - 2x - 3}{x - 3}$ $b(x) = \dfrac{x^2 + 2x}{x^3 - 4x}$ $c(x) = \dfrac{x^3 - x^2 + 2x - 2}{x - 1}$