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: Sept. 30 /19
(Every lesson)

HOLES!!!

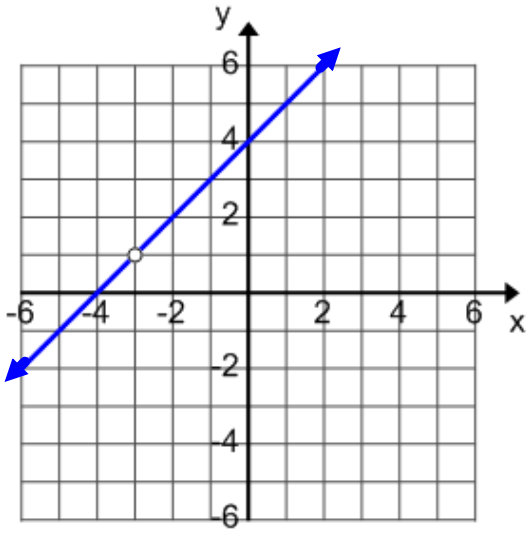
Graph $g(x) = \dfrac{x^2+7x+12}{x+3}$ Just like our first unit! Factor first.

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

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 $x = -3$

see desmos (FIRST)



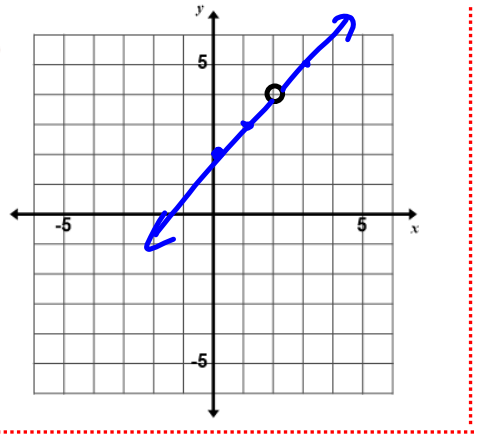
Ex.1 Graph $f(x)=\dfrac{x^2-4}{x-2}$

ex1.84state
show TI-84 (after)

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

$=x+2$

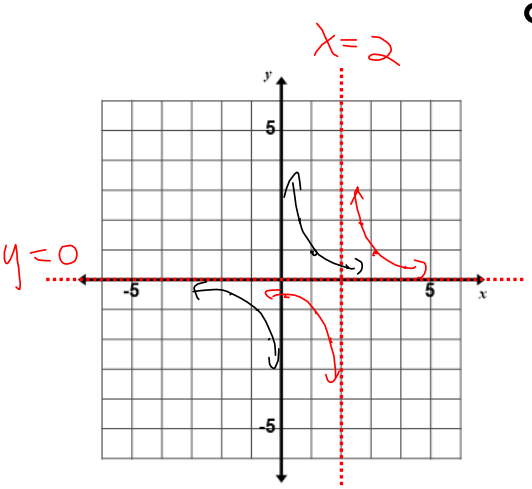
Rest. $x \neq 2$



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

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

hz. 2 units right



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.

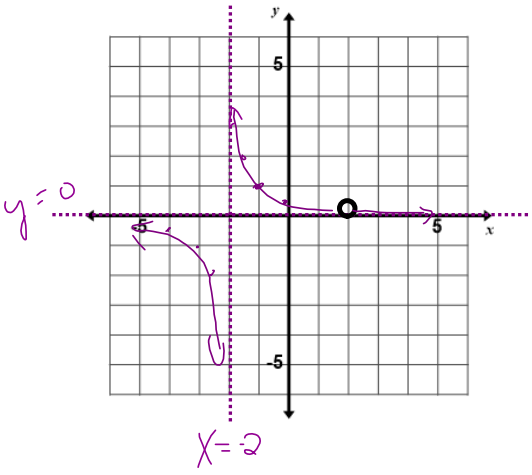
Ex.3 Graph $h(x)=\dfrac{x-2}{x^2-4}$

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

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

V.A. $x=-2$

BUT hole @ $x=2$

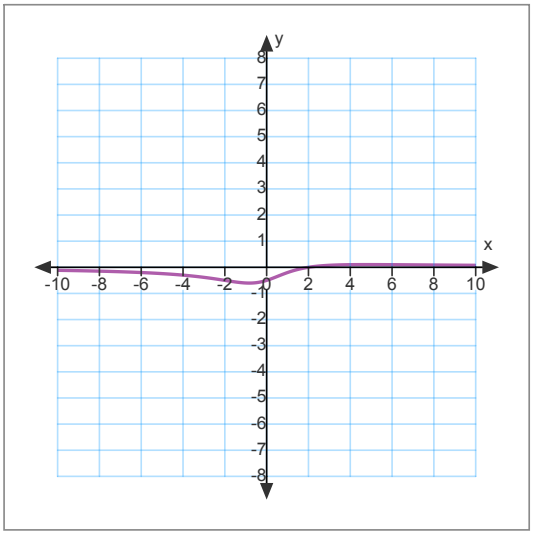


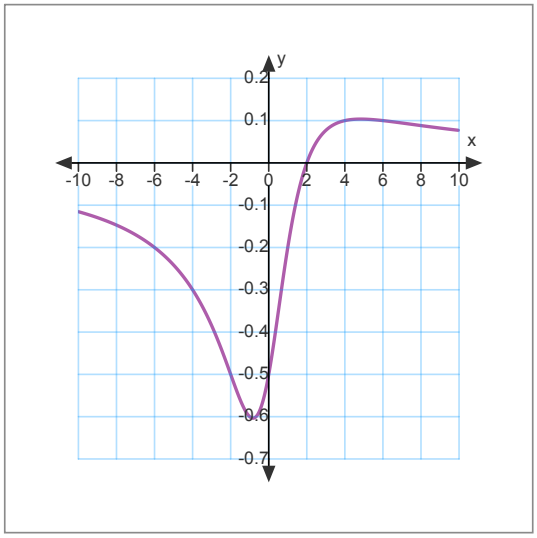
Ex.4 As an extra, let's discuss: $m(x)=\dfrac{x-2}{x^2+4}$ **You will NOT be expected to graph this.**

no restrictions, $x^2+4\neq 0$ did not reduce/cancel,

no asymptotes $x^2\neq -4$ no holes

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





Ex.5 Determine any vertical asymptotes or holes for:

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

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

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

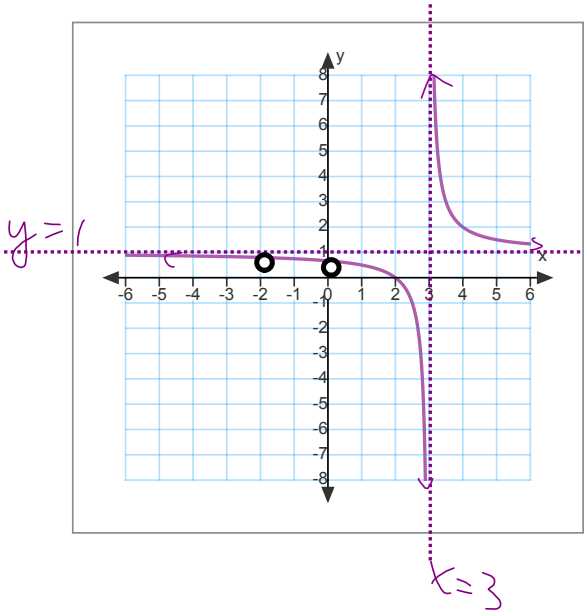
$$=\frac{x-2}{x-3}$$

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

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

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

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



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

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 76-77 #1 – 5, 7, 8, 10, 12* – 19
*use web fix

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.

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