Objective: Graph more complex rational functions.

Concept

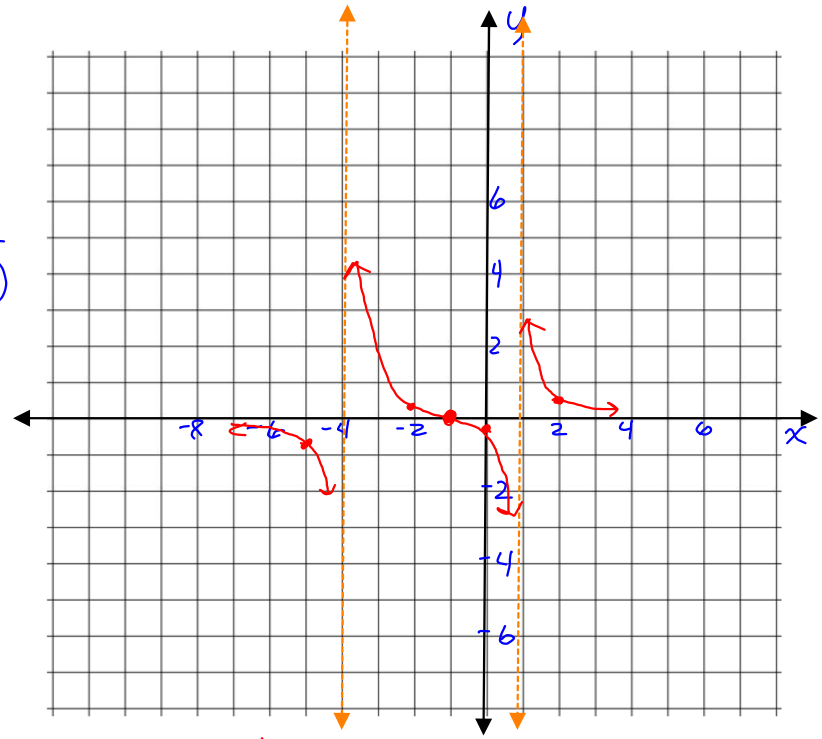
Graphing Rational Functions of the Form $f(x) = \frac{p(x)}{q(x)}$

1. From the form $f(x) = \frac{p(x)}{q(x)}$, factor both numerator and denominator of the function, and reduce to find the simplest form of the function.
2. Find any holes.
3. Find all vertical and horizontal asymptotes.
4. Find all zeros, if they exist.
5. Find the y-intercept, if it exists.
6. Graph the asymptotes (as dashed lines), graph any intercepts, and graph enough other points to accurately sketch each piece of the curve.

Objective: Graph more complex rational functions.

Ex) Graph the function.

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



① $f(x) = \frac{x+1}{(x+4)(x-1)}$

② no hole

③ *vert. asy.

$x+4=0$ $\quad$ $x-1=0$

* $x=-4$ $\quad$ * $x=1$

horiz. asy.

$\frac{x}{x^2} = \frac{1}{x} \rightarrow y=0$

④ points

zero $= -1$

y-int $(0, -1/4)$

let $x=-2$ $\quad (-2, 1/6)$

$y = \frac{-1}{4-6-4} = \frac{-1}{-6}$

let $x=-5$ $\quad (-5, -2/3)$

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

let $x=2$

$y = \frac{3}{6} = \frac{1}{2}$

Objective: Graph more complex rational functions.

Ex) Graph the function.

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

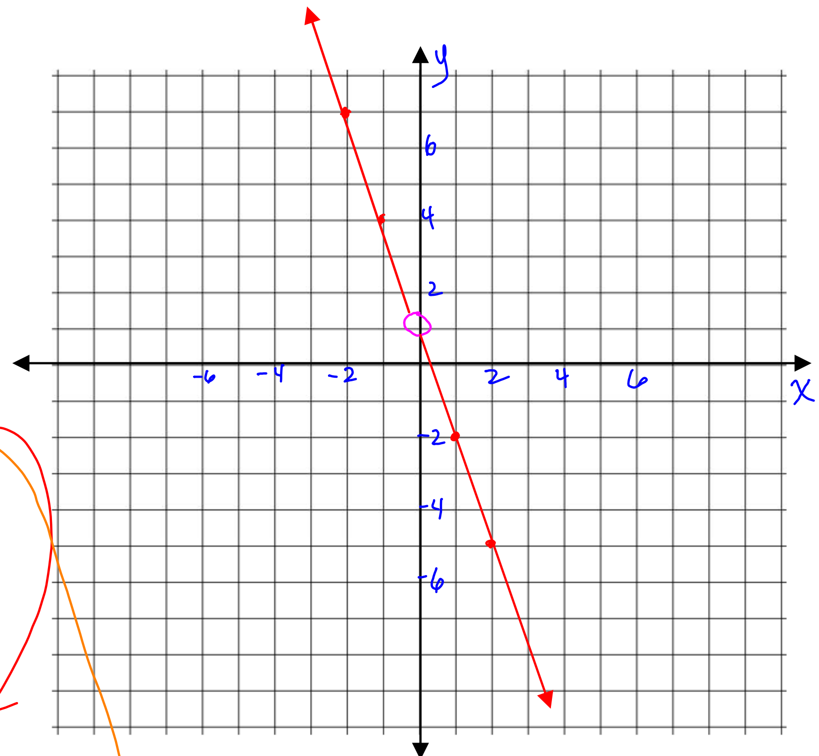
① $f(x) = \frac{\cancel{x}^{1}(1-3x)}{\cancel{x}_{1}}$

$f(x) = 1 - 3x$

② hole $(0, 1)$

$y = f(0) = 1 - 0 = 1$

③ line with a hole at $(0, 1)$



linear function

$f(x) = mx + b$ y-int.

$f(x) = \frac{dn}{1\ Rt}\,3x + 1$

slope

Objective: Graph more complex rational functions.

Ex) Graph the function.

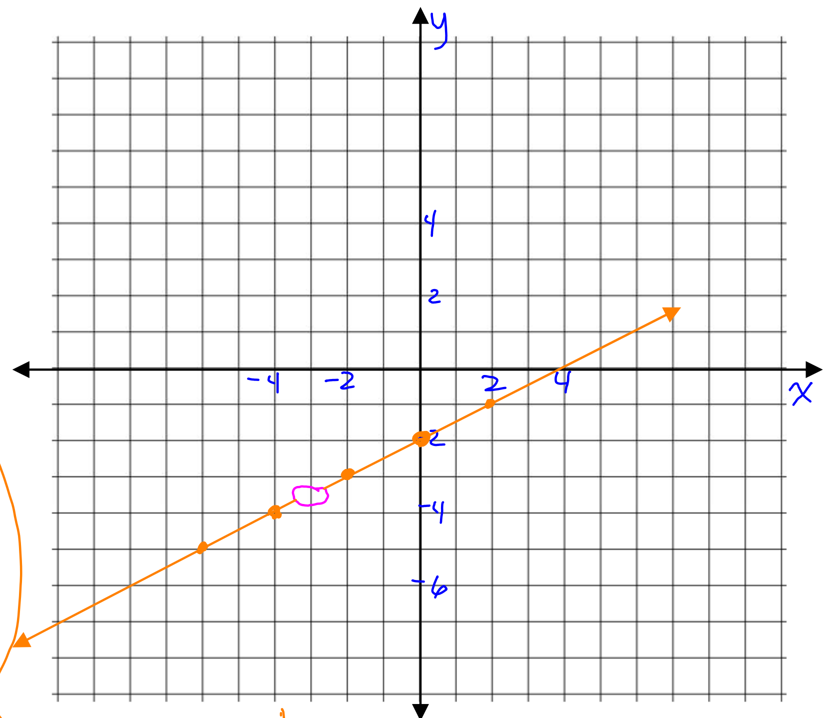
$$f(x) = \frac{x^2 - x - 12}{2x + 6}$$

① $f(x) = \frac{(x-4)\cancel{(x+3)}^{1}}{2\cancel{(x+3)}_{1}}$

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

② hole $(-3, -3\frac{1}{2})$

$y = \frac{-7}{2}$



$f(x) = \frac{1x}{2} - \frac{4}{2}$

$f(x) = \frac{\text{up } 1}{\text{rt } 2}x - 2$

slope

y-int.