

## 2.7 Graphs of Rational Functions Day 1

### Guidelines for Graphing Rational Functions (pg. 152)

Let  $f(x) = N(x)/D(x)$ , where  $N(x)$  and  $D(x)$  are polynomials.

1. Simplify  $f$ , if possible.
2. Find and plot the  $y$ -intercept (if any) by evaluating  $f(0)$ .
3. Find the zeros of the numerator (if any) by solving the equation  $N(x) = 0$ . Then plot the corresponding  $x$ -intercepts.
4. Find the zeros of the denominator (in any) by solving the equation  $D(x) = 0$ . Then sketch the corresponding vertical asymptotes using dashed vertical lines.
5. Find and sketch the horizontal asymptote (if any) of the graph using a dashed horizontal line.
6. Plot at least one point between and one point beyond each  $x$ -intercept and vertical asymptote.
7. Use smooth curves to complete the graph between and beyond the vertical asymptotes.

Ex1) Sketch  $g(x) = \frac{3}{x-2}$

$x=0$  or  $f(0) = \frac{3}{0-2} = -\frac{3}{2}$   $(0, -\frac{3}{2})$   
 Yint:

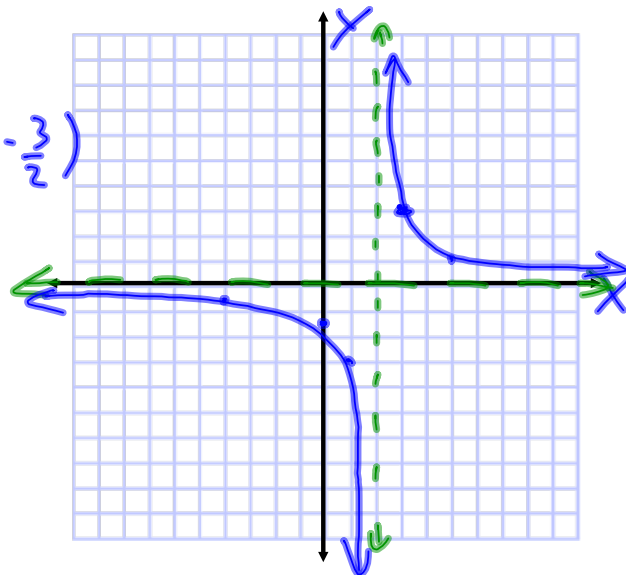
num: none  
 Xint: none

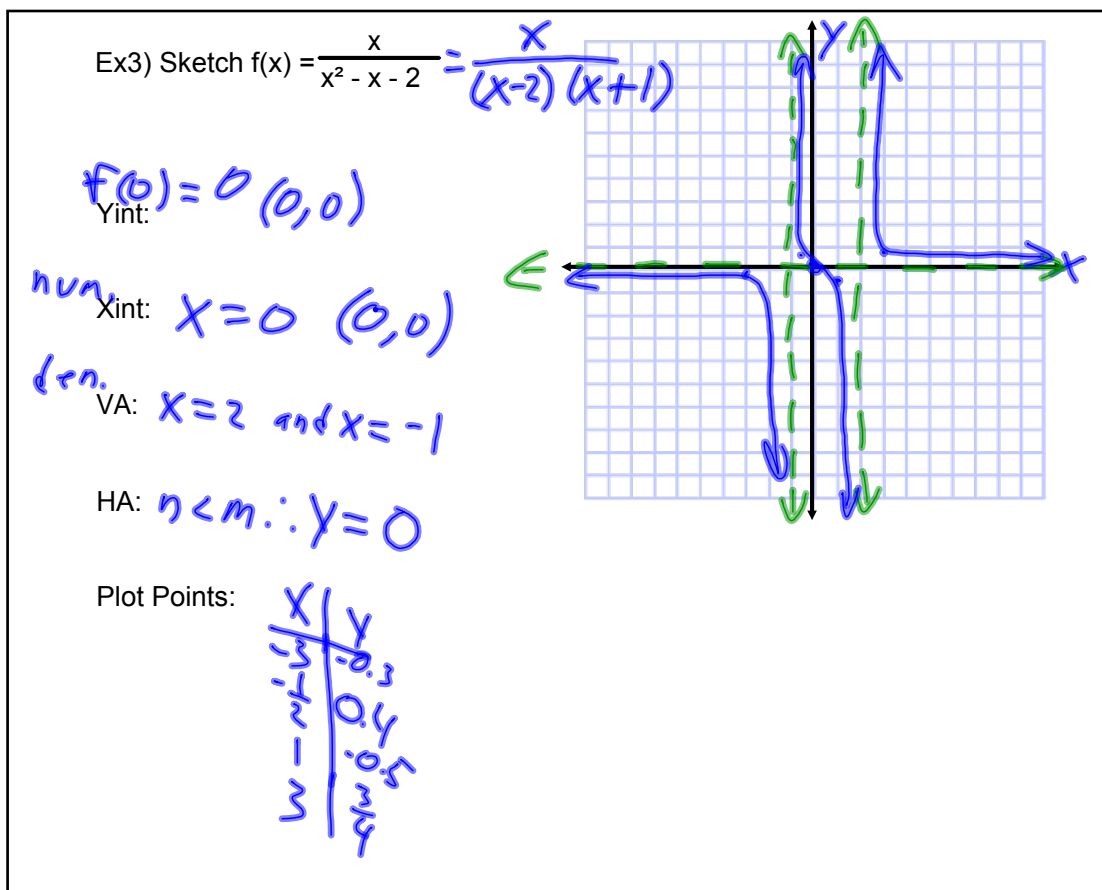
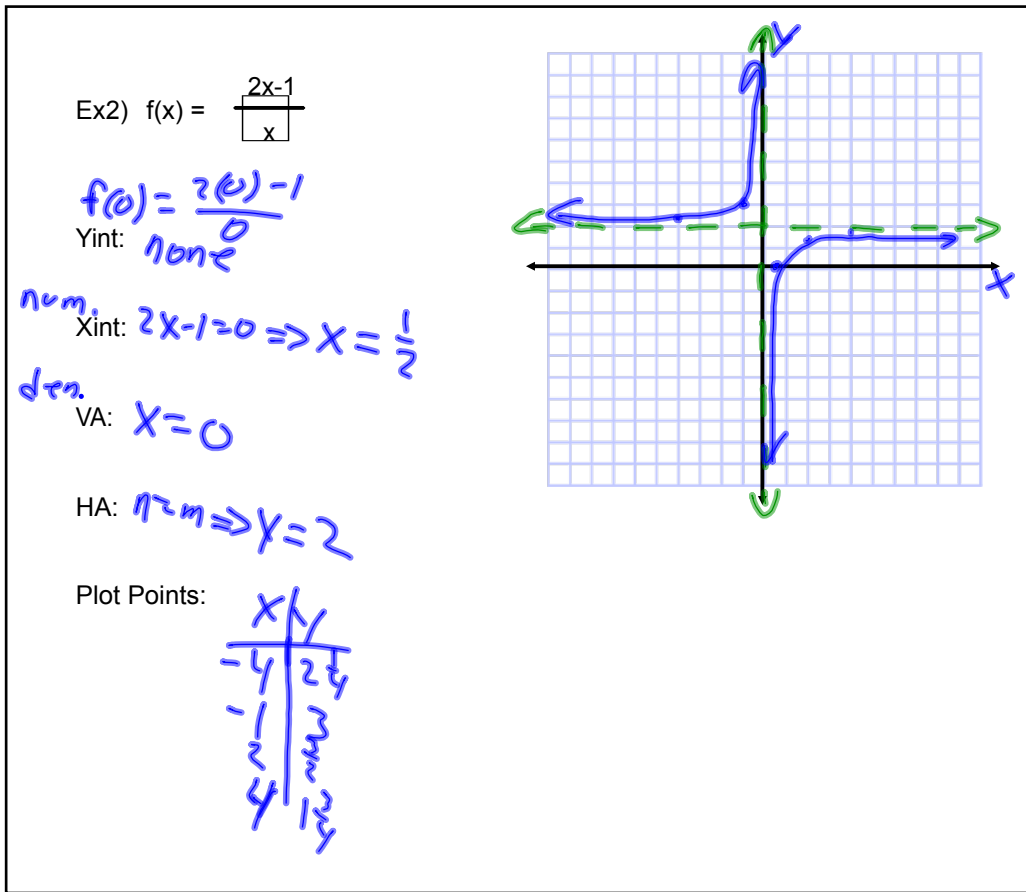
den:  $x-2=0 \Rightarrow x=2$   
 VA:

HA:  $n < m \Rightarrow y=0$

Plot Points:

x	y
-4	-1.5
-2	-1.5
0	-1.5
2	1.5
4	1.5





$$\text{Ex4) } f(x) = \frac{x^2 - 9}{x^2 - 2x - 3} = \frac{(x+3)(x-3)}{(x-3)(x+1)}$$

Yint:  $f(0) = 3$   $(0, 3)$   $f(x) = \frac{x+3}{x+1}$

num:  $x+3=0 \Rightarrow x=-3$   $(-3, 0)$

den: VA:  $x=-1$   
hole at  $x=3$

HA:  $\eta = m \Rightarrow y=1$

Plot Points:

x	y
-5	$\frac{1}{2}$
-3	0
-1	2

