

**Math 1050 ~ College Algebra**

**13 Graphing Rational Functions**

$$\begin{cases} -3x + 4y = 5 \\ 2x - y = -10 \end{cases}$$

$$\begin{bmatrix} -3 & 4 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -10 \end{bmatrix}$$

$$\sum_{k=1}^m k = \frac{m(m+1)}{2}$$

$$\sum_{k=0}^n z^k = \frac{1-z^{n+1}}{1-z}$$

**Learning Objectives**

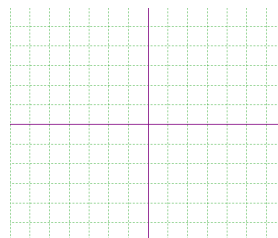
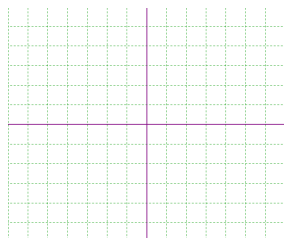
- Graph irreducible rational functions with denominators of degree greater than one and numerators having the same or a lesser degree.

In our toolkit of functions, we have two rational functions.

Ex 1: Sketch these using transformations of the toolkit function.

a)  $g(x) = \frac{4}{(x+1)} - 2$

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



Not all rational functions can be put in this form. It is helpful to follow the steps in the previous lesson to get a graph of a rational function.

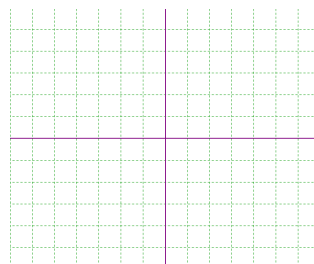
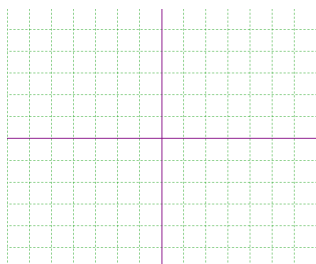
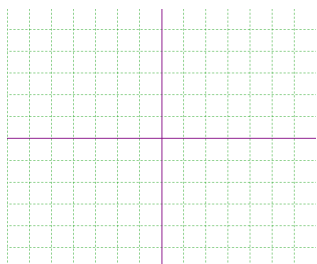
1. Determine the domain and plot vertical asymptotes.
2. Find and plot the x- and y- intercepts.
3. Determine and plot the end-behavior asymptotes.
4. Use a sign-line and the value of other points to complete the graph.

Ex 2: For each of these, determine the x and y-intercepts, vertical and horizontal asymptotes and sketch a graph.

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

b)  $g(x) = \frac{3-x}{x^2+4}$

c)  $h(x) = \frac{2x^2-5x-3}{x^2+x-2}$



Ex 3: Analyze and graph.

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

