Name:

A rational function is a function of the form

$$f(x) = \frac{g(x)}{h(x)},$$

where g(x) and h(x) are polynomials. A rational function is in *lowest form* if the numerator and the denominator have no common zeros. Assume that f(x) = g(x)/h(x) is a rational function in lowest form.

The degree of f(x) is  $\max\{\deg(g), \deg(h)\}.$ 

The roots of f(x) are the zeros of g(x); that is, they are the solutions to g(x) = 0.

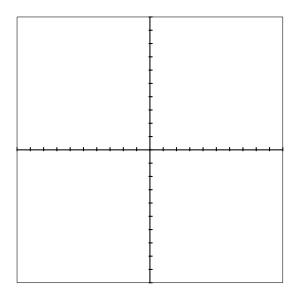
The poles of f(x) the zeros of h(x); that is, they are the solutions to h(x) = 0.

The *y-intercept* of f(x) is the point (0, f(0)).

The x-intercepts of f(x) are the points (r,0), where r is a root of f(x).

The vertical asymptotes of f(x) are the lines x = p, where p is a pole of f(x).

The polynomial asymptote of f(x) is the polynomial equation y = q(x), where q(x) is the quotient when q(x) is divided by h(x) using polynomial division.



**Problem 1:**  $f(x) = \frac{2}{x-1}$ 

Degree:

Roots:

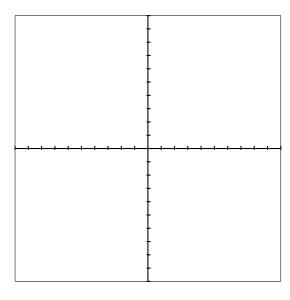
Poles:

y-intercept:

x-intercepts:

Vertical Asymptotes:

Polynomial Asymptote:



**Problem 2:**  $f(x) = \frac{6x+3}{2x-4}$ 

Degree:

Roots:

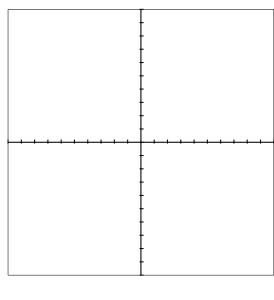
Poles:

y-intercept:

x-intercepts:

Vertical Asymptotes:

Polynomial Asymptote:



Problem 3:

$$f(x) = \frac{x^2 - 2x - 15}{x + 1}$$

Degree:

**Roots:** 

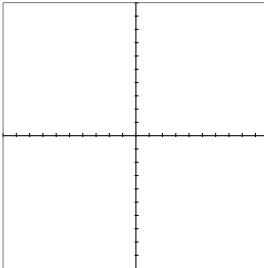
Poles:

y-intercept:

x-intercepts:

Vertical Asymptotes:

Polynomial Asymptote:



Problem 4:

$$f(x) = \frac{x^2 - 49}{x^2 - 25}$$

Degree:

**Roots:** 

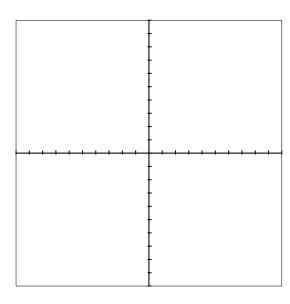
Poles:

y-intercept:

x-intercepts:

Vertical Asymptotes:

Polynomial Asymptote:



Problem 5:

$$f(x) = \frac{x^3 - x}{x^2 - 9}$$

Degree:

**Roots:** 

Poles:

y-intercept:

x-intercepts:

Vertical Asymptotes:

Polynomial Asymptote: