Pre-Calculus
UNIT 2: Rational Functions – SECTION 3 WORKSHEET

Name: _____
Date: _____

GRAPHING RATIONAL FUNCTIONS

To Identify Types of Discontinuity:

Step 1: **HOLES (Removable Discontinuities)**
- ✓ Factor numerator & denominator
- ✓ Simplify
- ✓ If anything cancels, then there is a hole **(**More than one factor cancels → More than one hole)
- ✓ Find the ordered pair, (x, y), substitute *x* into the ***SIMPLIFIED EQUATION*** to get *y*

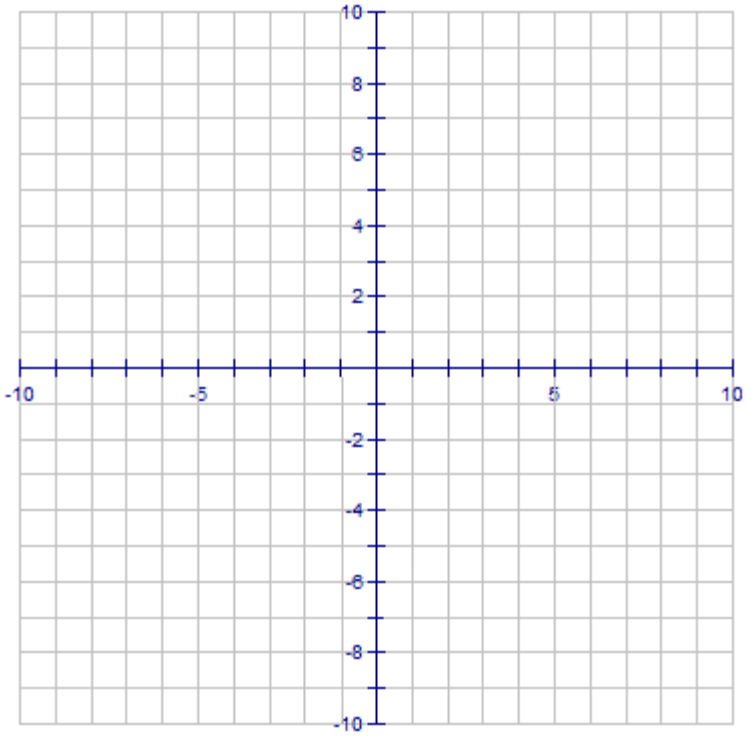
Step 2: **VERTICAL ASYMPTOTES *(USE SIMPLIFIED EQUATION)***
- ✓ Set simplified equation denominator = 0, solve for *x*

Step 3: **HORIZONTAL ASYMPTOTES – *Two Cases (USE SIMPLIFIED EQUATION)***
- ✓ Degree of Denominator = Degree of Numerator → $y =$ ratio of leading coefficients
- ✓ Degree of Denominator > Degree of Numerator → $y = 0$

Step 4: **SLANT ASYMPTOTES *(Exists only if Horizontal Asymptote is not present) (USE SIMPLIFIED EQUATION)***
- ✓ Degree of Numerator is ***ONE*** degree larger than the Degree of Denominator
- ✓ Use Long Division
- ✓ Ignore the remainder
- ✓ Answer in the form $y = mx + b$

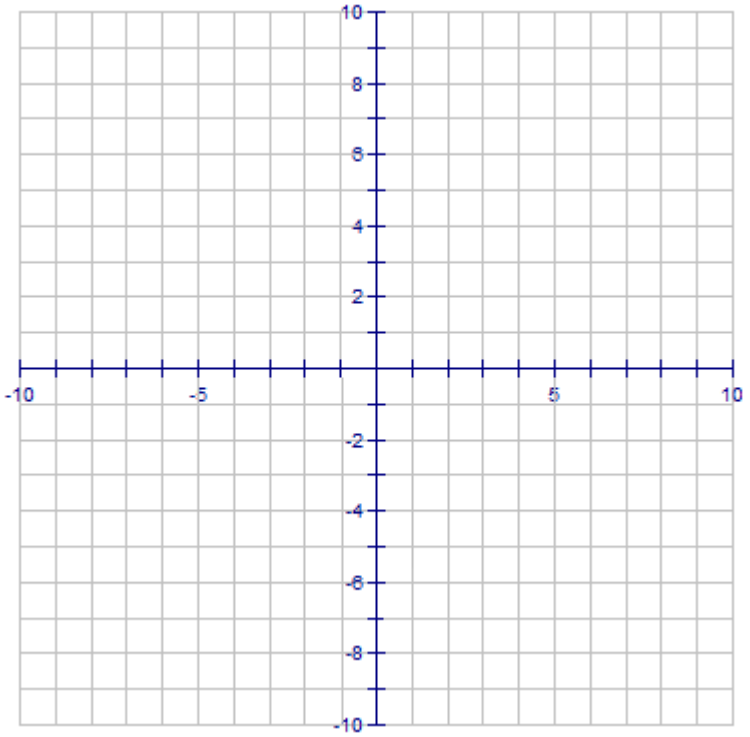
Directions: State each discontinuity, x-intercept, and y-intercept. Then sketch a graph.

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



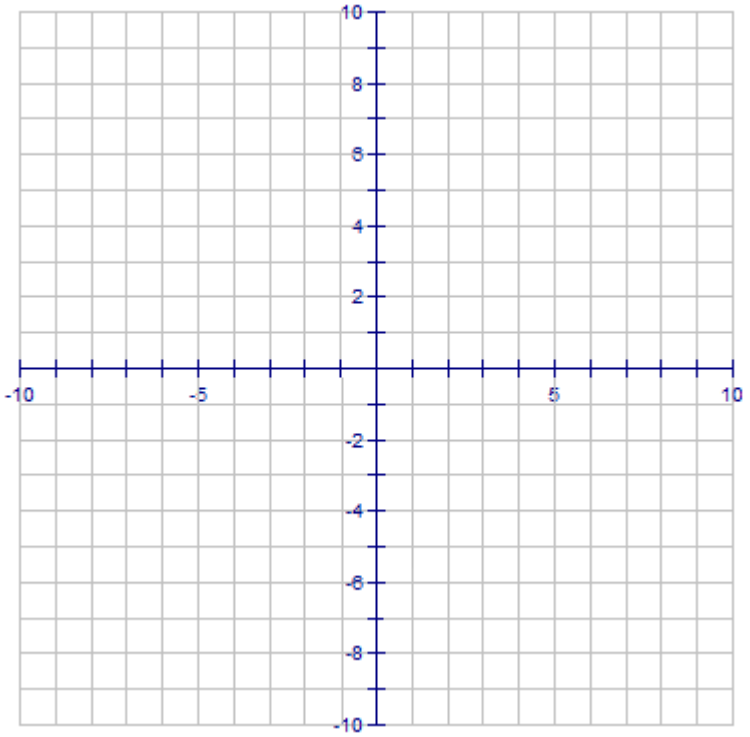
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



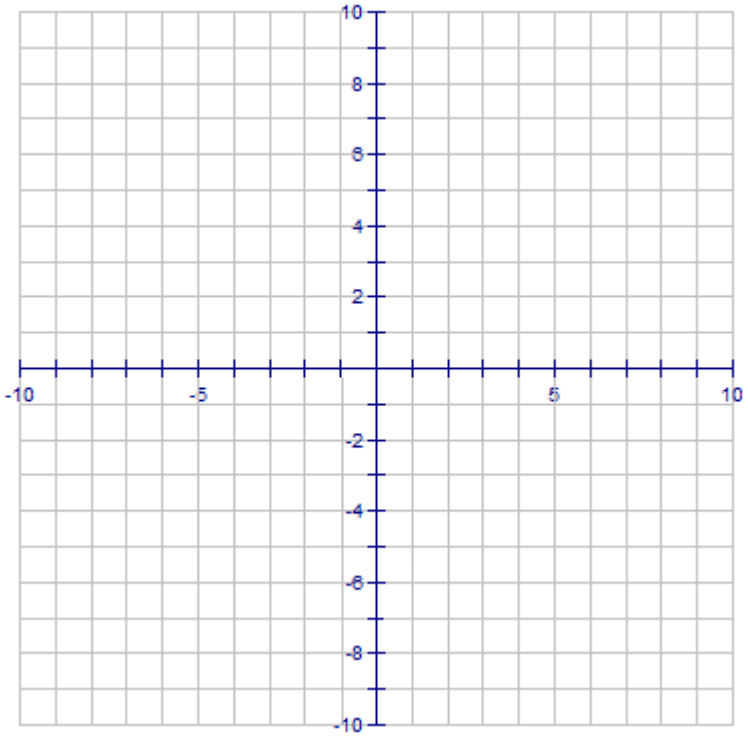
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

3.) $f(x) = \frac{-5}{x^2-2x-3}$



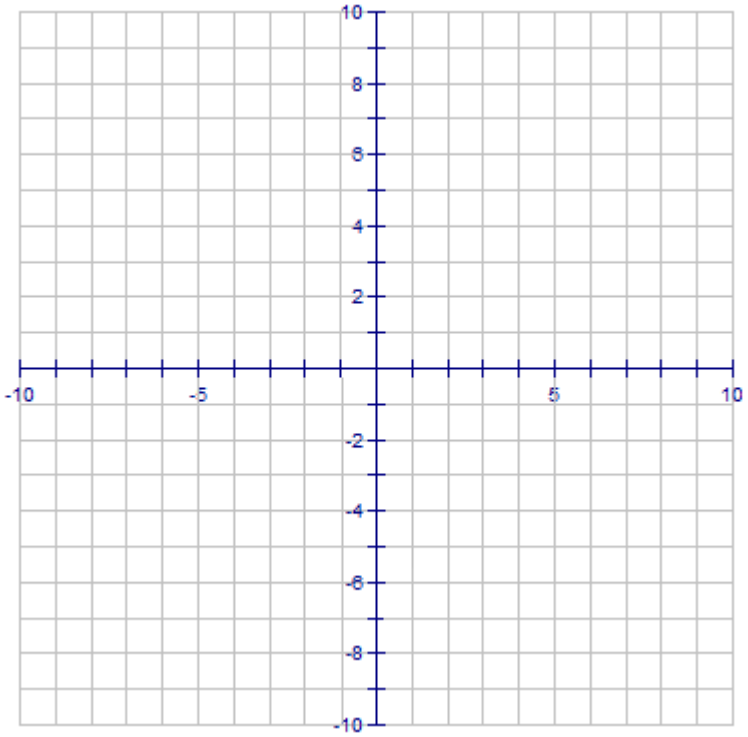
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

4.) $f(x) = \frac{x^3+4x^2-21x}{x^2+4x-21}$



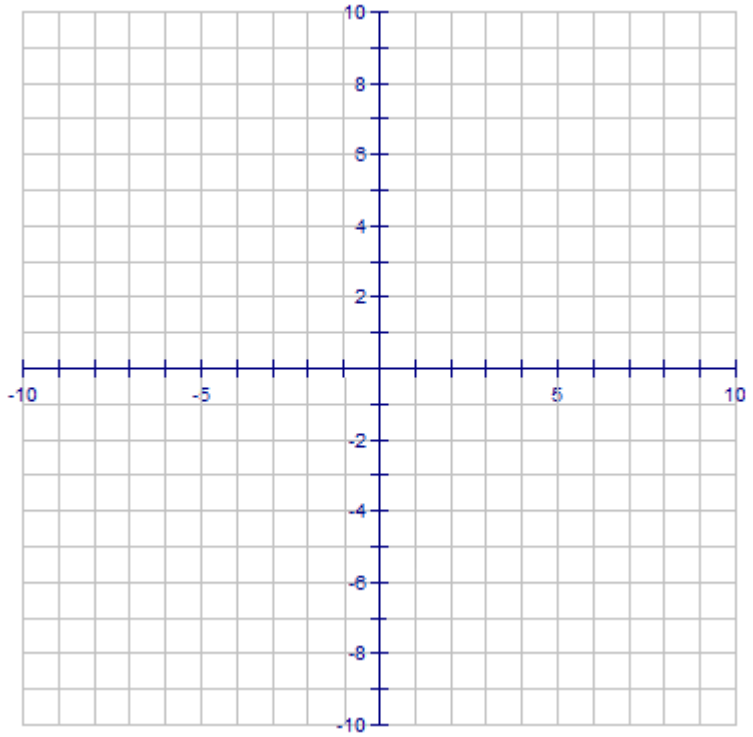
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

5.) $f(x) = \frac{x^2+5x+8}{x+3}$



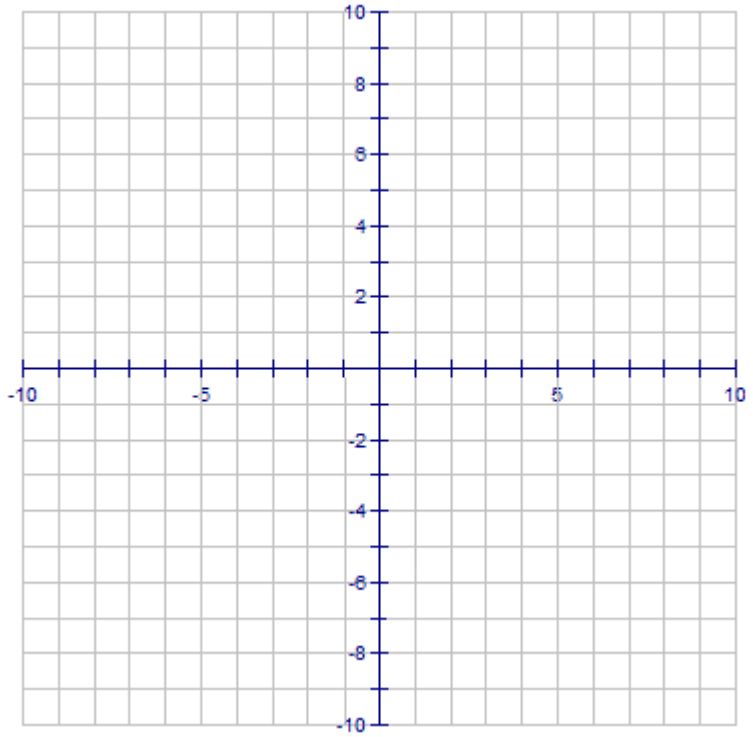
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



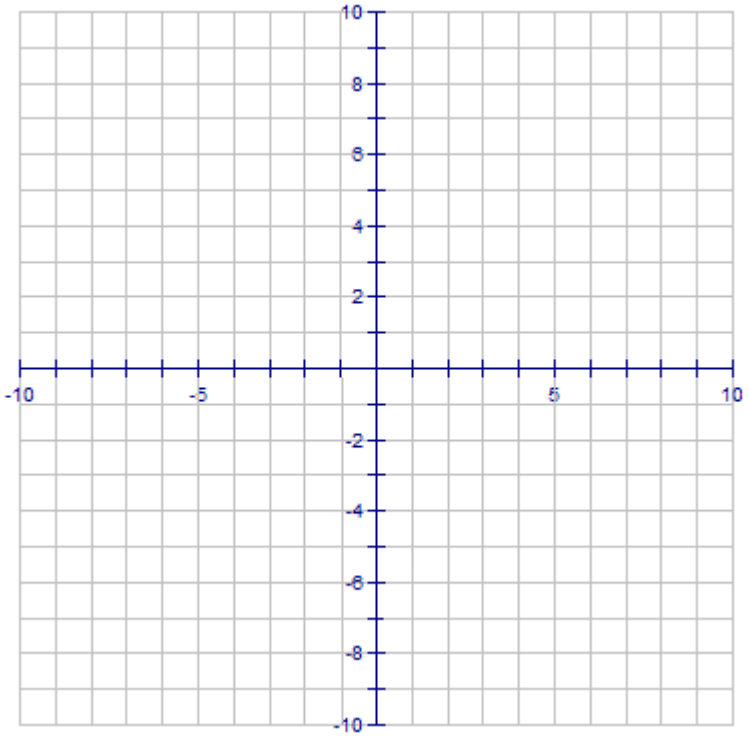
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



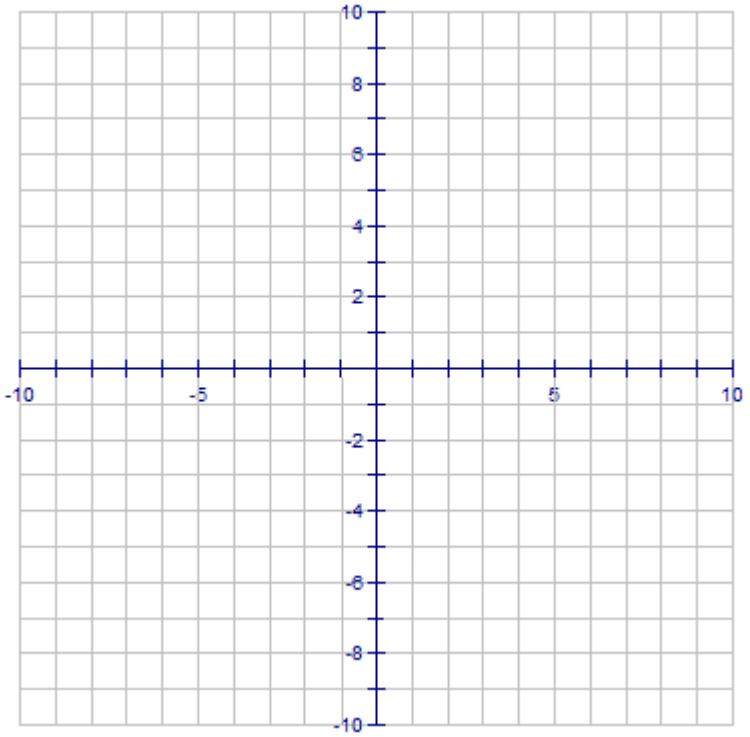
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

8.) $f(x) = \frac{3x^2}{x^2-1}$



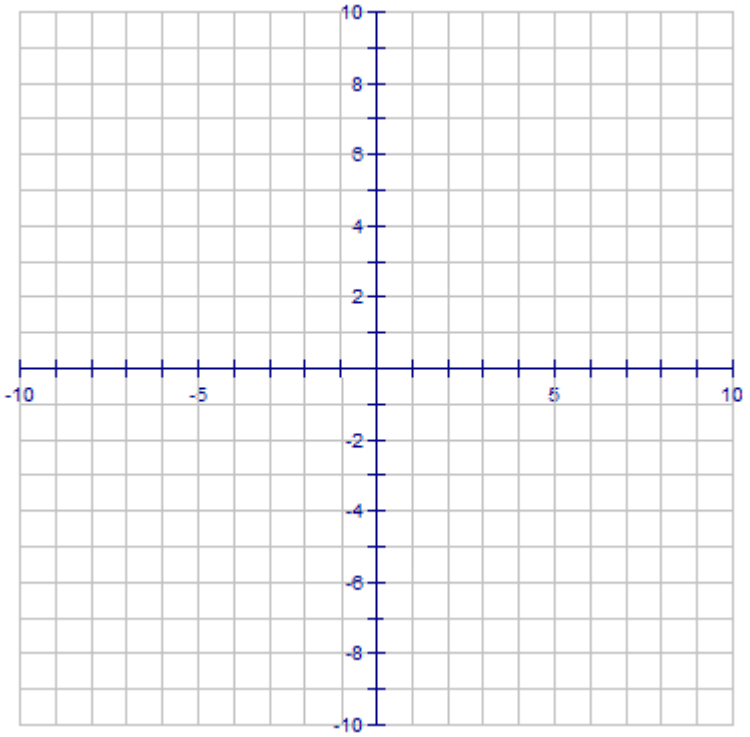
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

9.) $f(x) = \frac{x^2+7x+12}{x^2+11x+28}$



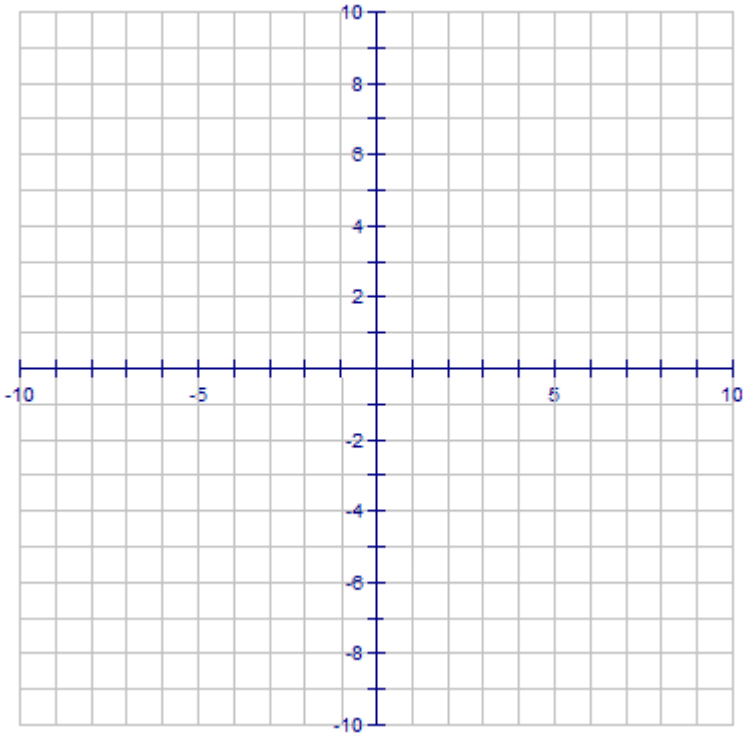
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



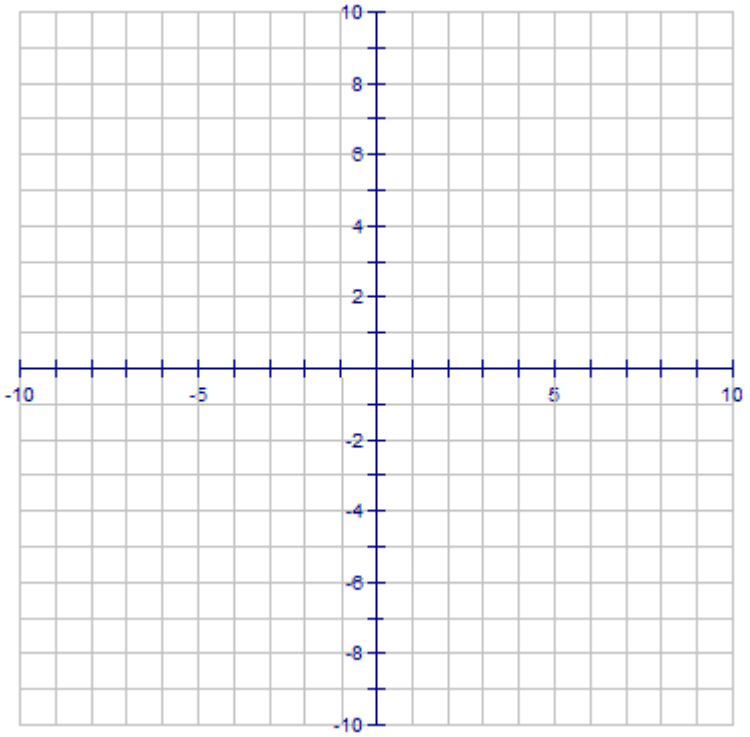
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

11.) $f(x) = \frac{x+8}{x^2+5x-24}$



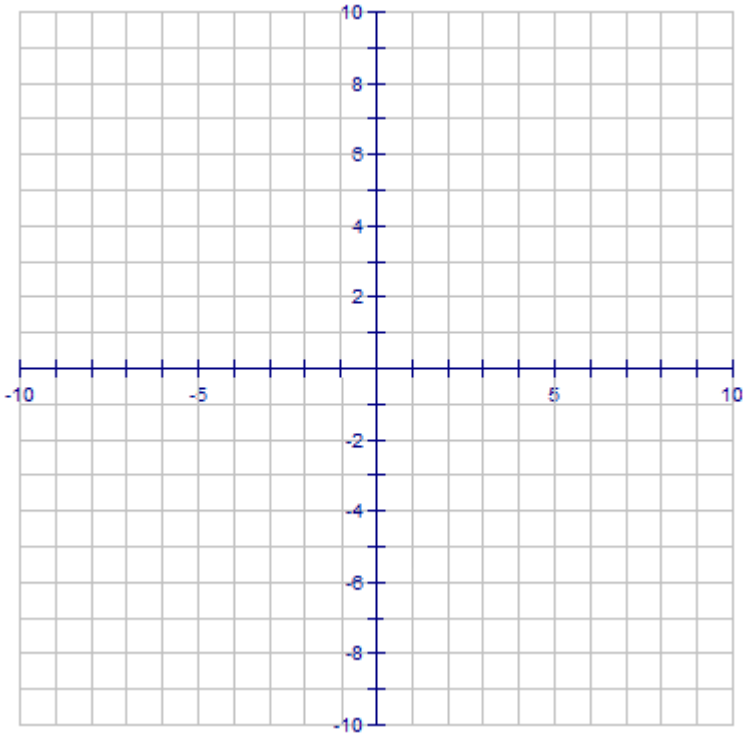
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



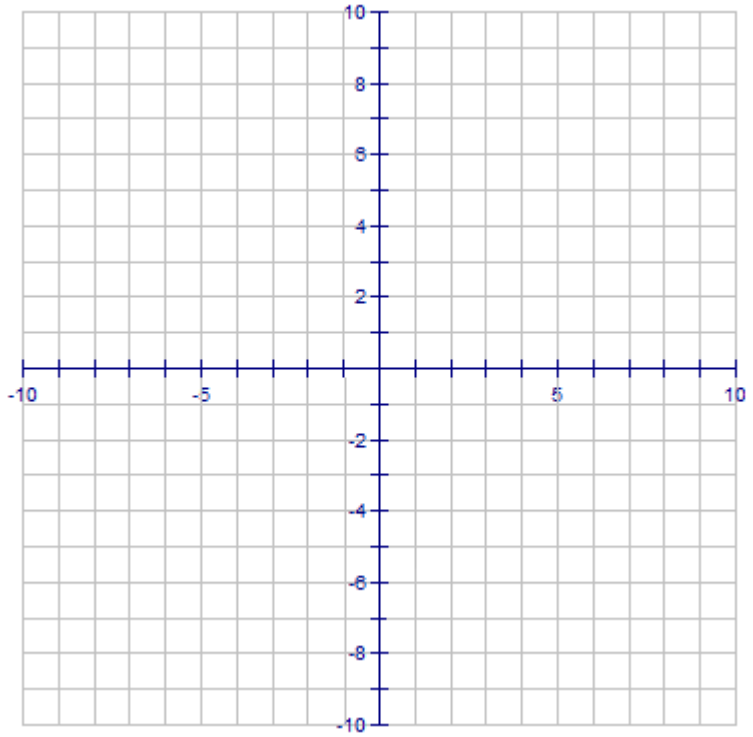
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



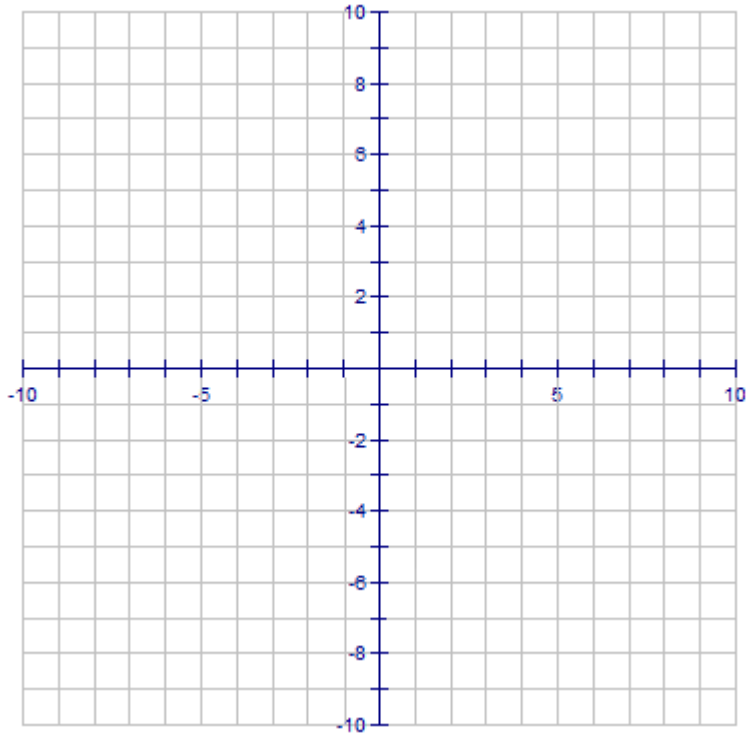
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

14.) $f(x) = \frac{x^2+x-6}{(x-2)(x^2+5x-36)}$



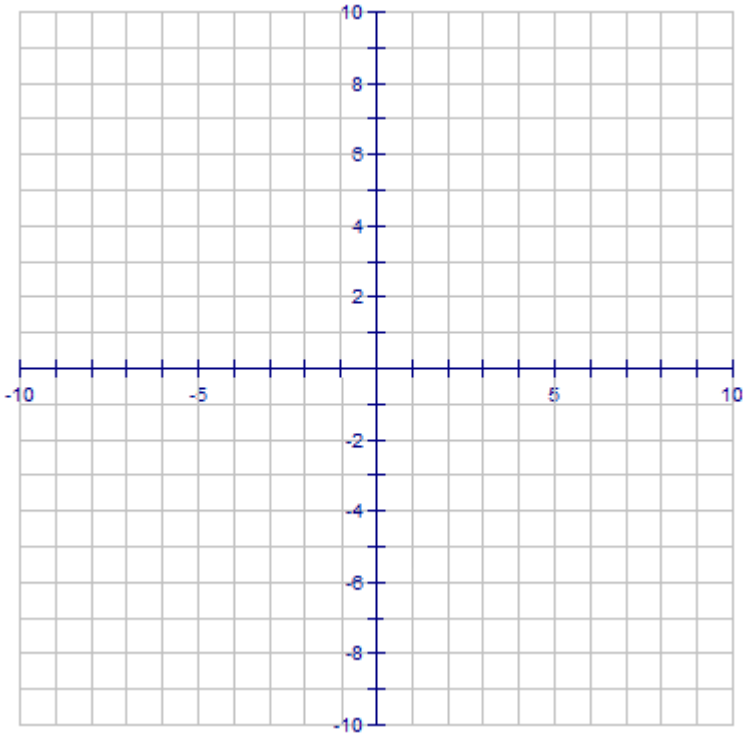
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

15.) $f(x) = \frac{x^2-6x-7}{x^2+3x-4}$



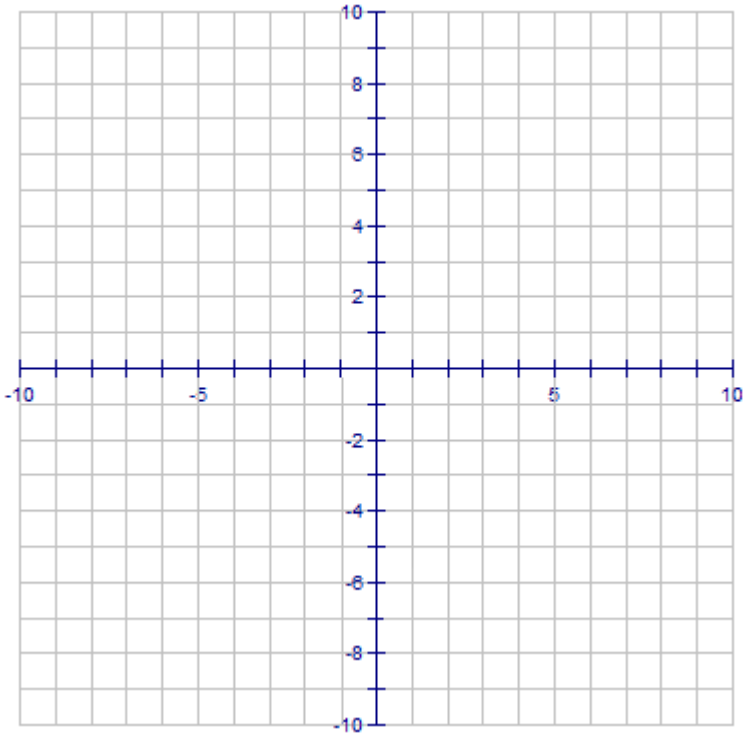
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



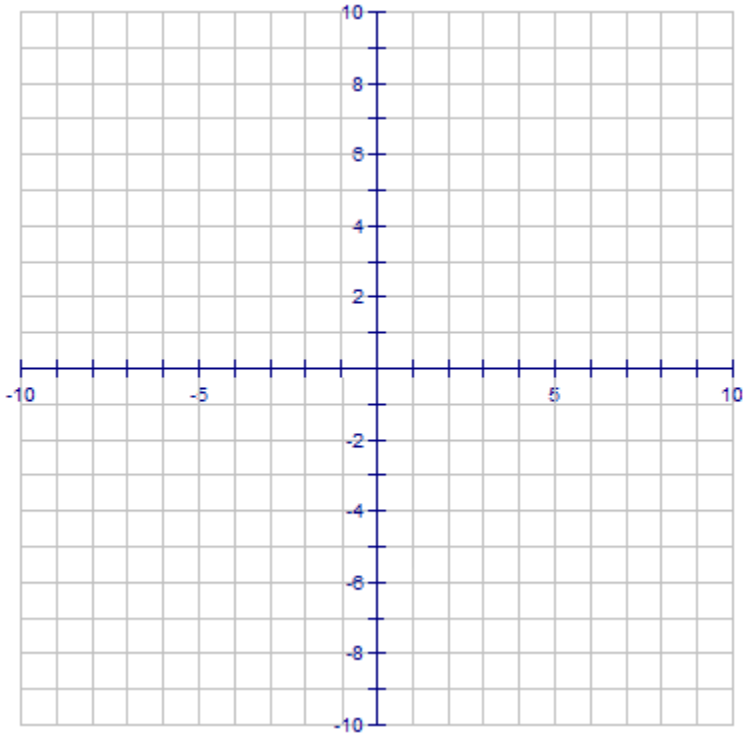
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

17.) $f(x) = \frac{x-4}{x^2+x-42}$



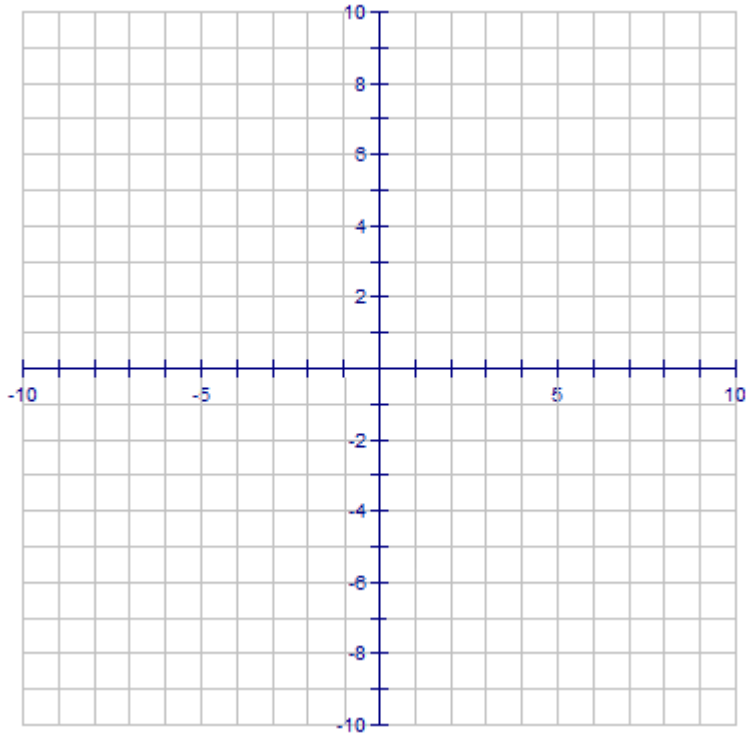
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

18.) $f(x) = \frac{x^3+3x^2-10x}{x^2+5x}$



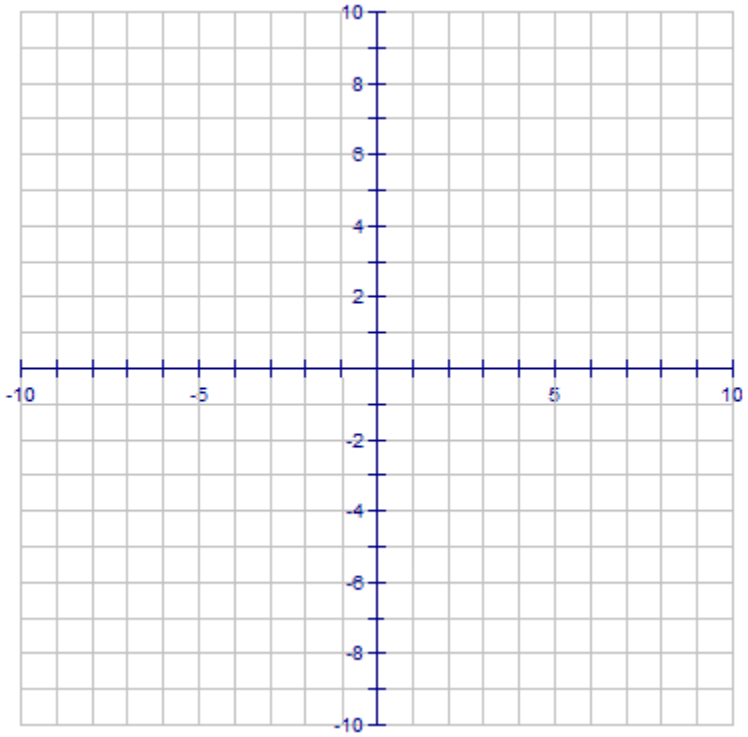
HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

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



HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

20.) $f(x) = \frac{x^2+x-2}{x+4}$



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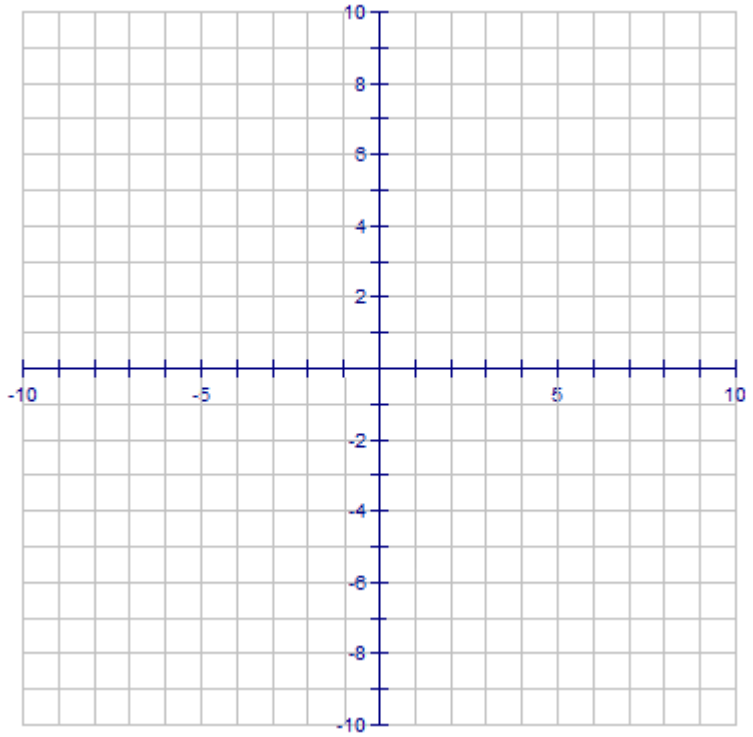
21.) $f(x) = \frac{(x-5)(x^2-8x-9)}{x^2-8x-9}$



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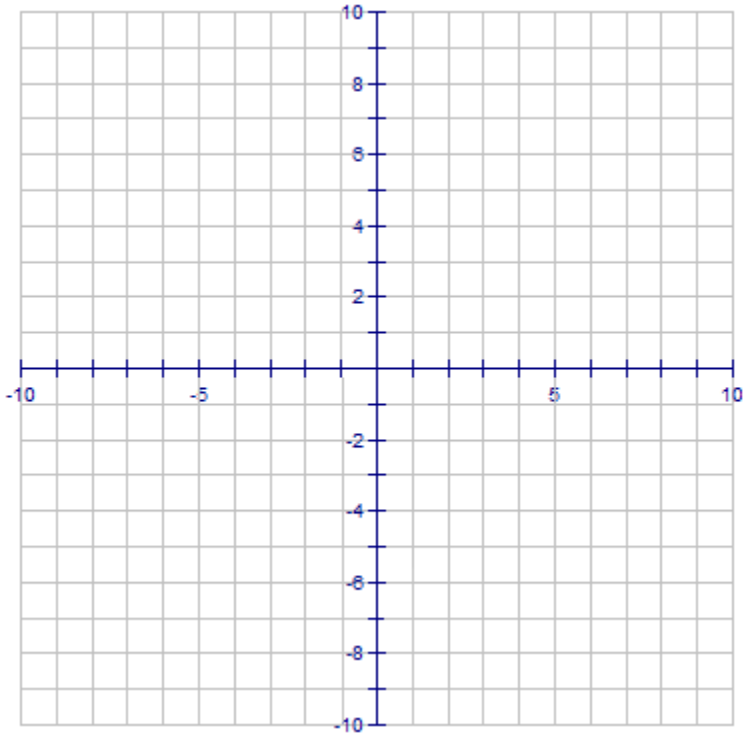
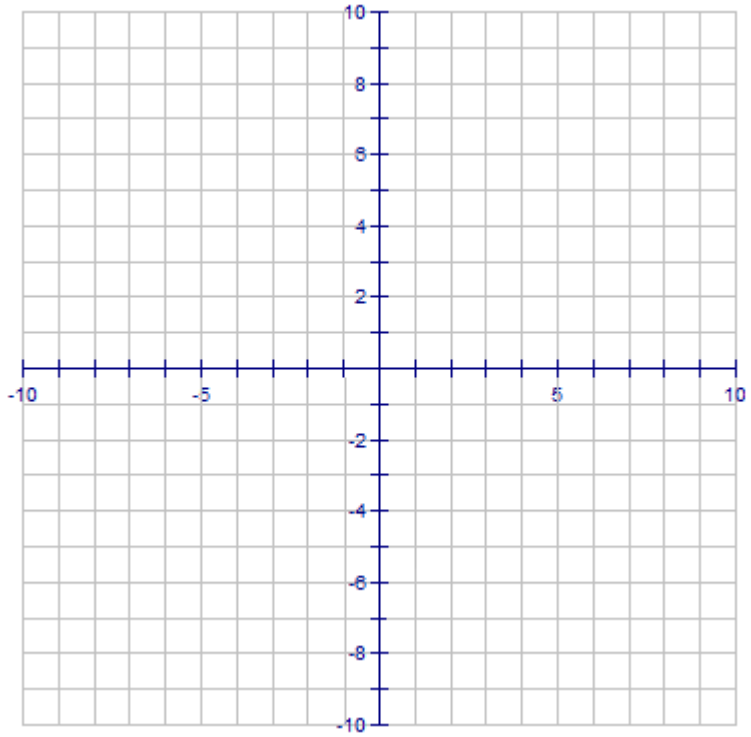
22.) $f(x) = \frac{2x^2-13x-20}{x-4}$



HOLE(S)	VERTICAL ASYMPTOTE(S)	HORIZONTAL ASYMPTOTE	SLANT ASYMPTOTE	x-intercept(s)	y-intercept

23.) $f(x) = \frac{2x^3+x^2-8x-4}{x^2-3x+2}$



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