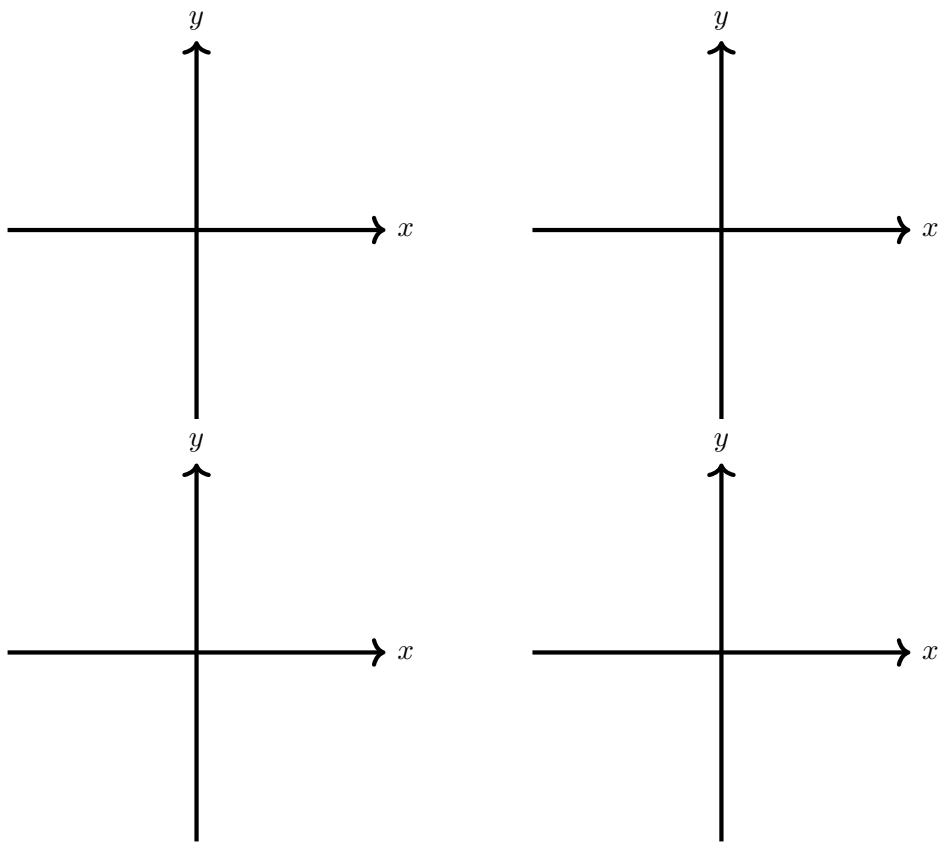
ALGEBRA 2 HONORS
PROBLEM SET 02

DUE DATE: JANUARY 18, 2024

Question 1. Let $f(x) = \dfrac{1}{x^2}$, $g(x) = \dfrac{3x^3 - 12x}{x^4 + 3x^3 + 2x^2}$, $h(x) = \dfrac{x^2 + 2x + 1}{x^2 + 10x + 9}$, and $k(x) = \dfrac{2x^2 + 4x + 2}{x^2 + 2x + 1}$.

For each of these functions, find the

(1) Domain
(2) (x, y)-coordinate of any holes
(3) x-intercepts
(4) Vertical asymptotes
(5) Horizontal asymptotes, if any
(6) Graph them using a sign chart!



Question 2. What would be the horizontal and vertical asymptotes of the functions

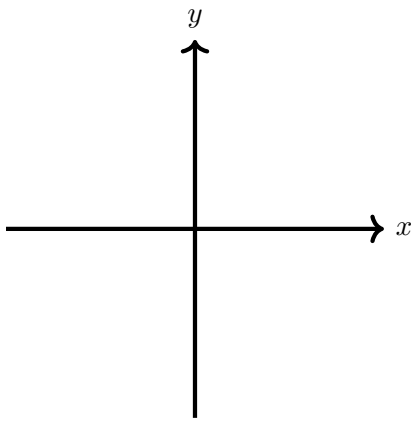
(a) $f(x) = \dfrac{4x^2}{(x-1)(x+4)}$
(b) $g(x) = x + \dfrac{1}{x}$

Question 3. Find all x such that

(a) $\dfrac{x(x+8)}{x+2} > 0$
(b) $\dfrac{x(x+8)}{x+2} \leq 4$
(c) $\dfrac{2}{x-1} > \dfrac{3}{4x+5}$

Question 4. Let $f(x) = \dfrac{5}{(x-1)^2} + x - 2$

(1) Find the domain
(2) Find the vertical asymptotes
(3) Find the horizontal/oblique asymptotes, if they exist
(4) Find the coordinates of any holes
(5) Find the x-intercepts
(6) Sketch a graph



Question 5. Simplify the following rational expressions

(a) $\dfrac{x+1}{x+2} + \dfrac{x+2}{x-2}$
(b) $\dfrac{x+1}{x+2} \cdot \dfrac{x+2}{x-2}$

(c) $\dfrac{x+1}{x+2} \div \dfrac{x+2}{x-2}$

(d) $\dfrac{1}{x-1} + \dfrac{2}{x+1}$

(e) $\dfrac{3}{x+1} \cdot \dfrac{4}{x-1}$

(f) $\dfrac{\dfrac{1}{x-1} + \dfrac{2}{x+1}}{\dfrac{3}{x+1} \cdot \dfrac{4}{x-1}}$