

[1] State the domain of each function.

$$[a] f(x) = \frac{2+x}{2-x} \quad [b] f(x) = \frac{x-5}{x^2-4} \quad [c] f(x) = \frac{3x+1}{x^2-x-6} \quad [d] f(x) = \frac{x+1}{x^3-3x^2-6x+8}$$

$$[e] f(x) = \frac{x^2-4}{x^3+x^2-8x-12} \quad [f] f(x) = \frac{x^3-6x^2-7x+60}{x^3+12x^2+47x+60}$$

[2] For each function, state the  $x$ -intercept(s).

$$[a] f(x) = \frac{2+x}{2-x} \quad [b] f(x) = \frac{x-2}{x^2-4} \quad [c] f(x) = \frac{x^2-9}{x^2-x-6} \quad [d] f(x) = \frac{x^2-4}{x^3-3x^2-6x+8}$$

[3] For each function, state the vertical asymptote(s).

$$[a] f(x) = \frac{2+x}{2-x} \quad [b] f(x) = \frac{x-2}{x^2-4} \quad [c] f(x) = \frac{x^2-9}{x^2-x-6} \quad [d] f(x) = \frac{x^2-4}{x^3-3x^2-6x+8}$$

[4] For each function, state the  $y$ -intercept.

$$[a] f(x) = \frac{2}{2-x} \quad [b] f(x) = \frac{x-2}{3x} \quad [c] f(x) = \frac{x^2-9}{x^2-x-6} \quad [d] f(x) = \frac{x^2-4}{x^3-3x^2-6x+8}$$

[5] For each function, state the non-vertical asymptote.

$$[a] f(x) = \frac{2}{2-x} \quad [b] f(x) = \frac{x-2}{3x} \quad [c] f(x) = \frac{3x^2-1}{x^2-x-6} \quad [d] f(x) = \frac{4+x^3}{2-x^2-x^3}$$

$$[e] f(x) = \frac{x^2-4}{x-1} \quad [f] f(x) = \frac{x^2-2x+1}{x} \quad [g] f(x) = \frac{3x^2-1}{x+3} \quad [h] f(x) = \frac{x^4}{x^2+x+1}$$

[6] For each function, state the ordered pair of the removable discontinuity (the “hole”).

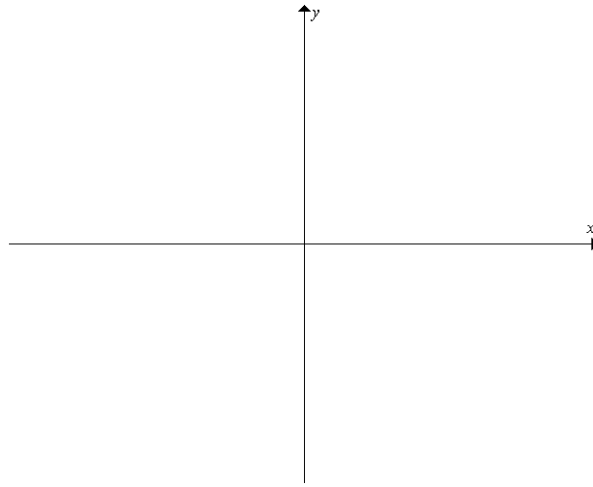
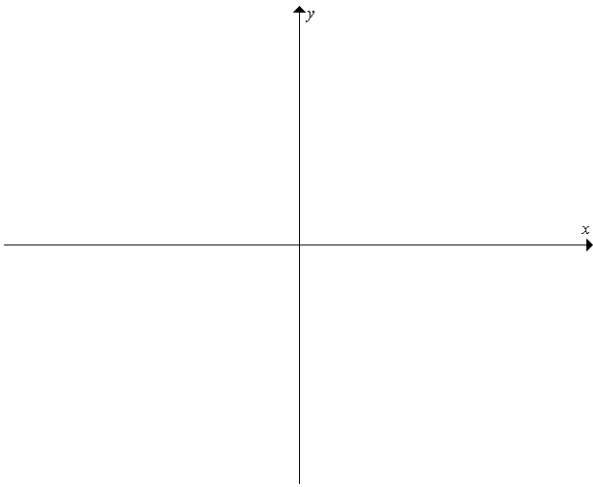
$$[a] f(x) = \frac{x+1}{x^2-1} \quad [b] f(x) = \frac{x^3-x}{2x} \quad [c] f(x) = \frac{x-3}{x^2-x-6} \quad [d] f(x) = \frac{x^2-16}{x^2+6x+8}$$

$$[e] f(x) = \frac{x+1}{x^3-x^2-x+1} \quad [f] f(x) = \frac{x^2-16}{x^3-5x^2+2x+8}$$

[7] Sketch each function.

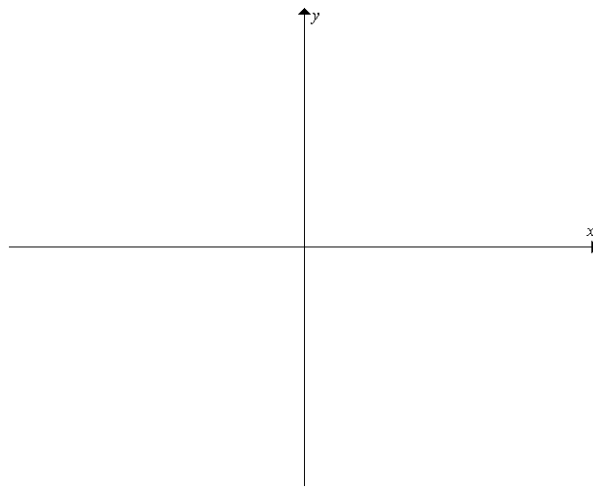
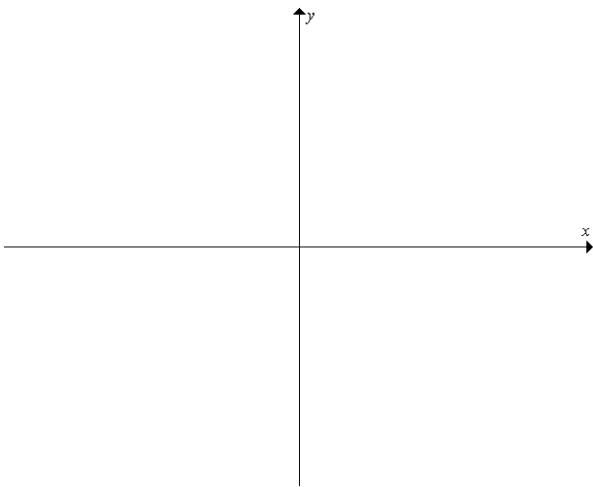
$$[a] y = \frac{x+2}{x-2}$$

$$[b] y = \frac{x^2-4}{x^2-1}$$



$$[c] y = \frac{x^2-4}{x-1}$$

$$[d] y = \frac{x^2-3x-4}{x^2-1}$$



[8] Solve each inequality and express the solution in interval notation.

$$[a] x^2 - 25 \leq 0$$

$$[b] x^2 - 4x > 0$$

$$[c] 2x^2 - 7x - 4 \geq 0$$

$$[d] 2x^3 - x^2 - 3x < 0$$

$$[a] \frac{x^2-9}{x+2} \leq 0$$

$$[b] \frac{x^2-4x}{x+5} > 0$$

$$[c] \frac{2x^2-7x-4}{x^2+3x+2} \geq 0$$

$$[d] \frac{(x-2)(x-3)(x+4)}{(x+1)(x-4)(x+5)} < 0$$