

Name: Key

Date: _____

Find the vertical & horizontal asymptotes, x & y ints, holes, and domain & range. Graph when appropriate:

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

Vert: $x=2$ Hor: $y=0$
 x-Int.: NONE y-int: $(0, -1/2)$
 holes: NONE
 Domain: $\mathbb{R}, x \neq 2$ Range: $\mathbb{R}, y \neq 0$

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

Vert: $x=0$ Hor: NONE
 x-Int.: $(4,0)(-3,0)$ y-int: NONE
 holes: NONE
 Domain: $\mathbb{R}, x \neq 0$ Range: \mathbb{R}

3. $f(x) = \frac{x^2 - 5x + 6}{x^2 - 4x + 3}$ $\frac{(x-3)(x-2)}{(x-3)(x-1)}$

Vert: $x=1$ Hor: $y=1$
 x-Int.: $(2,0)$ y-int: $(0, 2)$
 holes: $(3, 1/2)$
 Domain: $\mathbb{R}, x \neq 1, 3$ Range: $\mathbb{R}, y \neq 1, 1/2$

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

Vert: NONE Hor: NONE
 x-Int.: $(0,0)$ y-int: $(0,0)$
 holes: $(-1, -1)$
 Domain: $\mathbb{R}, x \neq -1$ Range: $\mathbb{R}, y \neq -1$

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

Vert: $x=3$ $x=-1$ Hor: $y=2$
 x-Int.: $(0,0)(2,0)$ y-int: $(0,0)$
 holes: NONE
 Domain: $\mathbb{R}, x \neq 3, -1$ Range: $\mathbb{R}, y \neq 2$

Write a rational function with the following characteristics:

6. vertical asymptotes of $x=1, x=-2$.

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

7. vertical asymptote of $x=-1$, a horizontal asymptote of $y=2$ and a zero at $x=3$.

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

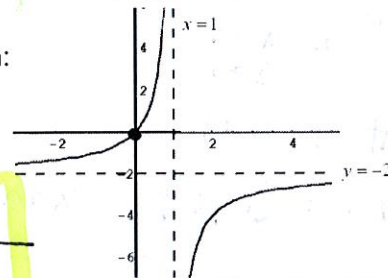
8. vertical asymptotes of $x=0, x=5/2$ and horizontal asymptote of $y=2$.

$f(x) = \frac{4x^2}{x(2x-5)}$

9. Using the graph:

V.A. = $x=1$
 H.A. = $y=-2$
 $(0,0)$

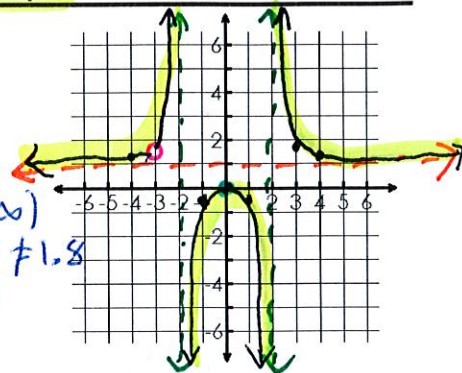
$f(x) = \frac{-2x}{(x-1)}$



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

$\frac{x^2(x+3)}{(x+2)(x-2)(x+3)}$
 $\frac{x^2}{(x+2)(x-2)}$

Vert: $x=-2$ $x=2$ Hor: $y=1$
 x-Int.: $(0,0)$ y-int: $(0,0)$
 holes: $(-3, 1.8)$
 Domain: $\mathbb{R}, x \neq -2, 2$ Range: $y \neq 1$



$$11. f(x) = \frac{5}{x+3}$$

Vert: $x = -3$ Hor: $y = 0$
 x-Int.: NONE y-int: $(0, 1.67)$
 holes: NONE
 Domain: \mathbb{R} Range: \mathbb{R}
 $x \neq -3$ $y \neq 0$

$$12. f(x) = \frac{3x-6}{x^2+x-6} = \frac{3(x-2)}{(x+3)(x-2)}$$

Vert: $x = -3$ Hor: $y = 0$
 x-Int.: NONE y-int: $(0, 1)$
 holes: $(2, 0.6)$
 Domain: \mathbb{R} Range: \mathbb{R}
 $x \neq -3, 2$ $y \neq 0, 0.6$

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

Vert: $x = 1$ $x = -1$ Hor: NONE
 x-Int.: $(0, 0)$ y-int: $(0, 0)$
 holes: NONE
 Domain: \mathbb{R} Range: \mathbb{R}
 $x \neq 1, -1$

$$14. f(x) = \frac{x^3+x^2-12x}{4x^2-12x} = \frac{x(x^2+x-12)}{4x(x-3)} = \frac{x(x+4)(x-3)}{4x(x-3)}$$

Vert: NONE Hor: NONE
 x-Int.: $(-4, 0)$ y-int: $(0, 1)$
 holes: $(0, 1)$ $(3, 1.75)$
 Domain: \mathbb{R} Range: \mathbb{R}
 $x \neq 0, 3$ $y \neq 1, 1.75$

$$15. f(x) = \frac{x^2-2x-3}{x-2} = \frac{(x-3)(x+1)}{(x-2)}$$

Vert: $x = 2$ Hor: NONE
 x-Int.: $(3, 0)$ $(-1, 0)$ y-int: $(0, 1.5)$
 holes: NONE
 Domain: \mathbb{R} Range: \mathbb{R}
 $x = 2$

Write a rational function with the following characteristics:

16. Vertical asymptotes of $x = 0$ and $x = \frac{4}{3}$
 and horizontal asymptote of $y = -2$

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

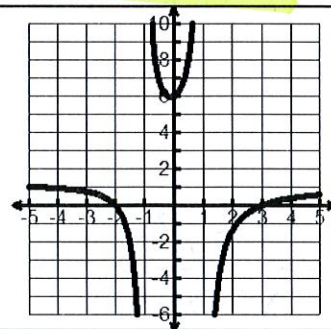
17. No vertical asymptotes and a y-intercept of $(0, 5)$

$$f(x) = \frac{25}{x^2+5}$$

18. Using the graph:

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

V.A. $x = -1$
 $x = 1$
 H.A. $y = 1$
 y-int $(0, 6)$ x-int: $(-2, 0)$
 $(3, 0)$



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

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

Vert: $x = 1$ Hor: $y = 0$
 x-Int.: NONE y-int: $(0, -1)$
 holes: $(-4, -2)$
 Domain: \mathbb{R} Range: \mathbb{R}
 $x \neq 1, -4$ $y \neq 0, -2$

