

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

Graph

1.) $f(x) = \frac{x^2+4x-5}{x^2+9x+20}$

Holes: $(-5, 6)$

Vertical Asymptotes: $x = -4$

Horizontal Asymptotes: $y = 1$

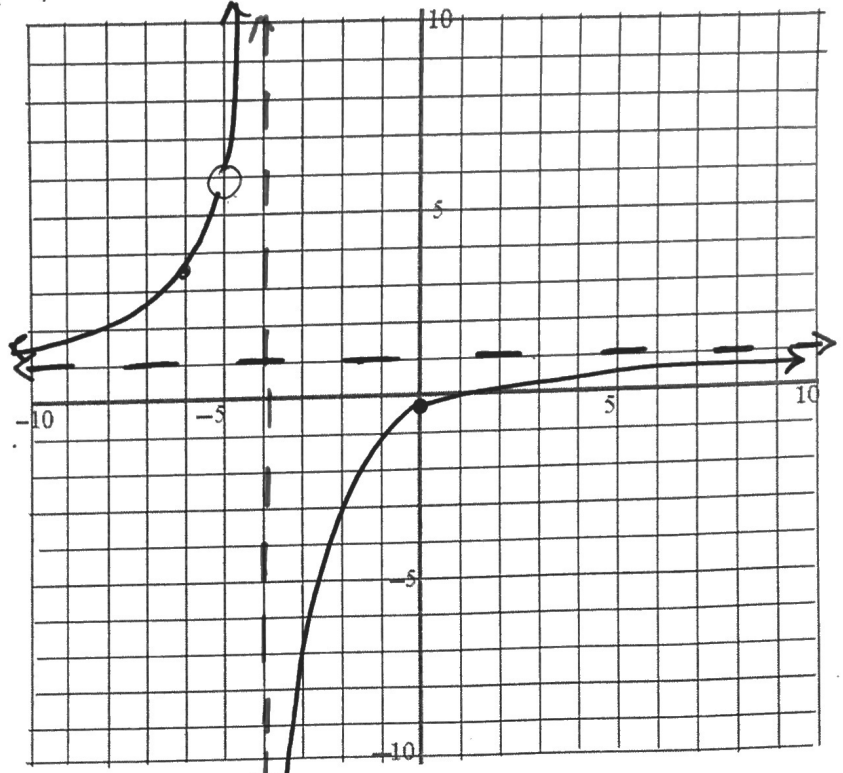
Domain: $(-\infty, -5) \cup (-5, -4) \cup (-4, \infty)$

Range: $(-\infty, 1) \cup (1, 6) \cup (6, \infty)$

End Behavior:

As $x \rightarrow \infty$, $f(x) \rightarrow 1$

As $x \rightarrow -\infty$, $f(x) \rightarrow 1$



Perform indicated operation.

Solve.

6.) $\frac{x}{x-2} + \frac{1}{x-4} = \frac{2}{x^2-6x+8}$
LCD: $(x-4)(x-2)$

$$x(x-4) + 1(x-2) = 2$$

$$x^2 - 4x + x - 2 = 2$$

$$x^2 - 3x - 4 = 0$$

~~Handwritten scribbles and crossed-out work.~~

$x = 4$ extraneous $x = -1$

8.) $\frac{4}{x^2-8x+12} = \frac{x}{x-2} + \frac{1}{x-6}$
LCD: $(x-6)(x-2)$

$$4 = x(x-6) + 1(x-2)$$

$$4 = x^2 - 6x + x - 2$$

$$4 = x^2 - 5x - 2$$

$$x^2 - 5x - 6 = 0$$

~~Handwritten scribbles and crossed-out work.~~
 $x = -1$
extraneous

7.) $\frac{3}{2x} - \frac{2x}{x+1} = -2$
LCD: $2x(x+1)$

$$3(x+1) - 2x \cdot 2x = -2 \cdot 2x(x+1)$$

$$3x + 3 - 4x^2 = -4x(x+1)$$

$$-4x^2 + 3x + 1 = -4x^2 - 4x$$

$$3x + 3 = -4x$$

$x = \frac{-3}{7}$

9.) $\frac{2x-3}{x-1} + \frac{1}{x-3} = \frac{2}{x^2-4x+3}$
LCD: $(x-3)(x-1)$

$$2x(x-3) + 1(x-1) = 2$$

$$2x^2 - 6x + x - 1 = 2$$

$$2x^2 - 5x - 1 = 2$$

$$2x^2 - 5x - 3 = 0$$

$$(2x^2 - 6x)(x-3) = 0$$

$$2x(x-3) + 1(x-3) = 0$$

$$(2x+1)(x-3) = 0$$

~~Handwritten scribbles and crossed-out work.~~
 $x = -\frac{1}{2}$
 $x = 3$ extraneous

Solve the following rational equations. (Don't forget to check for extraneous answers)

13.) $\frac{3}{k-3} + \frac{4}{k-4} = \frac{25}{k^2-7k+12}$ LCD: $(k-3)(k-4)$

14.) $\frac{c+1}{c-3} = 4 - \frac{12}{c^2-2c-3}$ LCD: $(c-3)(c+1)$

$$3(k-4) + 4(k-3) = 25$$

$$3k-12 + 4k-12 = 25$$

$$7k - 24 = 25$$

$$+24 +24 \quad -$$

$$\frac{7k}{7} = \frac{49}{7}$$

$$\boxed{k=7}$$

$$(c+1)(c+1) = 4(c-3)(c+1) - 12$$

$$c^2 + 2c + 1 = 4c^2 - 8c - 12 - 12$$

$$c^2 + 2c + 1 = 4c^2 - 8c - 24$$

$$-c^2 - 2c - 1 \quad -c^2 - 2c - 1$$

$$0 = 3c^2 - 10c - 25$$

$$(3c^2 - 15c) + (5c - 25)$$

$$3c(c-5) + 5(c-5) = 0$$

$$(3c+5)(c-5) = 0$$

$$\boxed{c = -\frac{5}{3}} \quad \boxed{c = 5}$$

$$\frac{-75}{-10} = \frac{15}{2}$$

15.) $\frac{1}{2h} + \frac{5}{h} = \frac{3}{h-1}$ LCD: $2h(h-1)$

16.) $\frac{4}{w-2} = \frac{-1}{w+3}$

17.) $\frac{6}{x-1} = \frac{4}{x-2} + \frac{2}{x+1}$ LCD: $(x+1)(x-2)$

$$1 \cdot (h-1) + 5 \cdot 2(h-1) = 3 \cdot 2h$$

$$h-1 + 10h-10 = 6h$$

$$11h - 11 = 6h$$

$$-11h \quad -11h$$

$$\frac{-11}{-5} = \frac{-5h}{-5}$$

$$\boxed{h = \frac{11}{5}}$$

$$4(w+3) = -1(w-2)$$

$$4w + 12 = -w + 2$$

$$+w - 12 \quad +w - 12$$

$$\frac{5w}{5} = \frac{-10}{5}$$

$$\boxed{w = -2}$$

$$6(x+1)(x-2) = 4(x+1)(x-1) + 2(x+1)(x-2)$$

$$6(x^2 - x - 2) = 4(x^2 - 1) + 2(x^2 - 3x + 2)$$

$$6x^2 - 6x - 12 = 4x^2 - 4 + 2x^2 - 6x + 4$$

$$6x^2 - 6x - 12 = 6x^2 - 6x$$

$$-6x^2 + 6x \quad -6x^2 + 6x$$

$$-12 \neq 0$$

$$\boxed{\text{No solution}}$$

Graph each of the following and find the information listed below.

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

Holes: $(1, -1/2)$

Vertical Asymptotes: $x=3$

Horizontal Asymptotes: $y=0$

Solutions: N/A

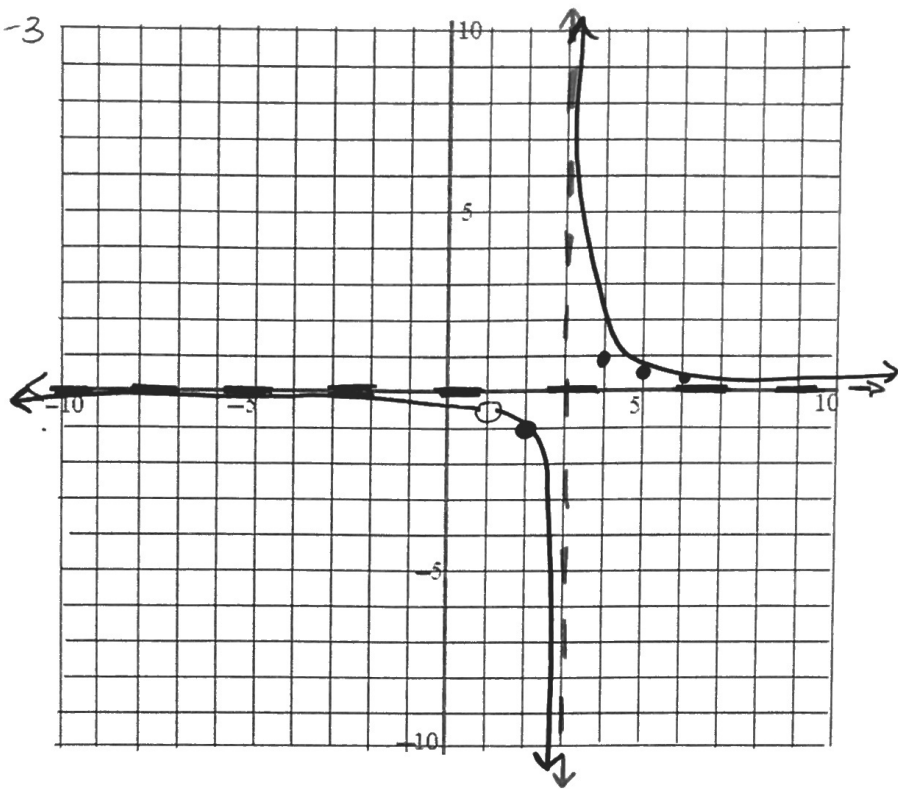
Domain: $(-\infty, 1) \cup (1, 3) \cup (3, \infty)$

Range: $(-\infty, -1/2) \cup (-1/2, 0) \cup (0, \infty)$

End Behavior:

As $x \rightarrow \infty, f(x) \rightarrow 0$

As $x \rightarrow -\infty, f(x) \rightarrow 0$



19.) $h(x) = \frac{x^2-6x+8}{x^2-x-2} \rightarrow \frac{\cancel{(x-2)}(x-4)}{\cancel{(x-2)}(x+1)} = \frac{x-4}{x+1}$

Holes: $(2, -2/3)$

Vertical Asymptotes: $x=-1$

Horizontal Asymptotes: $y=1$

Solutions: $(4, 0)$

Domain: $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$

Range: $(-\infty, -2/3) \cup (-2/3, 1) \cup (1, \infty)$

End Behavior:

As $x \rightarrow \infty, f(x) \rightarrow 1$

As $x \rightarrow -\infty, f(x) \rightarrow 1$

