

Review 2.6-2.8

Solve the equation algebraically. Identify any extraneous solutions.

$$x + 2 = \frac{15}{x}$$

$x \neq 0$

$$\begin{aligned} x &+ 2 = \frac{15}{x} \\ (x) &\quad + \quad \frac{2(x)}{(x)} = \frac{15}{x} \end{aligned}$$
$$\begin{aligned} x^2 + 2x &= 15 \\ x^2 + 2x - 15 &= 0 \\ (x + 5)(x - 3) &= 0 \\ x = -5 &\quad x = 3 \end{aligned}$$
$$\begin{aligned} -5 + 2 &= \frac{15}{-5} \\ 3 + 2 &= \frac{15}{3} \end{aligned}$$

Solve the equation algebraically. Identify any extraneous solutions.

$$\begin{array}{l} x \neq -5 \\ x \neq 2 \end{array}$$

$$\frac{3x}{x+5} + \frac{1}{x-2} = \frac{7}{x^2 + 3x - 10}$$

$$\frac{3x(x-2)}{(x+5)(x-2)} + \frac{1(x+5)}{(x-2)(x+5)} = \frac{7}{(x+5)(x-2)} .$$

$$\begin{aligned} 3x^2 - 6x + x + 5 &= 7 \\ 3x^2 - 5x - 2 &= 0 \end{aligned} \quad \begin{array}{l} \curvearrowright (3x+1)(x-2) \\ \boxed{x = -\frac{1}{3}} \quad x \neq 2 \end{array}$$

Solve the equation algebraically. Identify any extraneous solutions.

$$x \neq 0$$

$$x \neq -1$$

$$\frac{x-3}{x} - \frac{3}{x+1} + \frac{3}{x^2+x} = 0$$

$$\frac{(x-3)(x+1)}{x(x+1)} - \frac{3(x)}{(x+1)x} + \frac{3}{x(x+1)} = 0$$

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

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

$$\frac{5-3}{5} - \frac{3}{6} + \frac{3}{30} = 0$$

$$\frac{2}{5} - \frac{3}{6} + \frac{3}{30} = 0$$

$$\frac{12}{30} - \frac{15}{30} + \frac{3}{30} = 0$$

$$x(x-5) = 0$$

$$x \neq 0 \quad \boxed{x=5}$$

Solve the polynomial using factoring and a sign chart

$$\begin{array}{c} + - + \\ \hline -1 \quad 1 \quad \frac{1}{2} \end{array} \quad (x+1)(x^2 - 3x + 2) < 0$$

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

$$x = -1, 2, 1$$

$$f(-2) = (-1)(-4)(-3) < 0 \quad (-\infty, -1)$$

$$f(0) = (1)(-1)(-1) > 0 \quad (1, 2)$$

$$f(1.5) = (2.5)(-0.5)(0.5) < 0$$

$$f(3) = (4)(2)(3) > 0$$

Determine the real values of x that cause the function to be zero, undefined, positive and negative

zero

$$\sqrt{x+5} = 0$$

$$x+5 = 0$$

$$x = -5$$

$$f(x) = \frac{\sqrt{x+5}}{(2x+1)(x-1)}$$

undefined

$$2x+1=0 \quad x-1=0$$

$$x = -\frac{1}{2} \quad x = 1 \quad x \leq -5$$

$$\sqrt{x+5} \geq 0$$

$$x+5 \geq 0$$

$$x \geq -5$$

$$f(-1) = \frac{\sqrt{4}}{(-1)(-2)} > 0 \quad \text{positive } (-5, -\frac{1}{2})$$

$$f(0) = \frac{\sqrt{5}}{(1)(-1)} < 0 \quad \text{negative } (-\frac{1}{2}, 1)$$

$$f(2) = \frac{\sqrt{7}}{(5)(1)} > 0 \quad \text{positive } (1, \infty)$$

Solve the polynomial using a sign chart

zero
 $x^2 - 4 = 0$
 $x = \pm 2$

undefined
 $x^2 + 4 \neq 0$

$$\frac{x^2 - 4}{x^2 + 4} > 0$$



$$f(-3) = \frac{5}{13} > 0 \quad (-\infty, -2)$$

$$f(0) = -\frac{4}{4} < 0$$

$$f(3) = \frac{5}{13} > 0 \quad (2, \infty)$$

Solve the polynomial using a sign chart

$\frac{3}{2} \frac{2.5}{6}$
 $\frac{6}{150}$

zero
 $x^2 + 3x - 10 = 0$

$(x+5)(x-2)$

$x = -5 \quad x = 2$

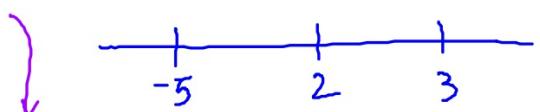
undefined

$x^2 - 6x + 9 = 0$

$(x-3)(x-3) = 0$

$x = 3$

$$\frac{x^2 + 3x - 10}{x^2 - 6x + 9} > 0$$



$$f(-6) = \frac{36 - 18 - 10}{36 + 36 + 9} > 0 \quad \boxed{(-\infty, -5)}$$

$$f(0) = \frac{-10}{9} < 0$$

$$f(2.5) = \frac{6.25 + 7.5 - 10}{6.25 - 15 + 9} > 0 \quad \boxed{(2, 3)}$$

$$f(4) = \frac{16 + 12 - 10}{16 - 24 + 9} > 0 \quad \boxed{(3, \infty)}$$

Find the domain of the function f . Use limits to describe the behavior of $f(x)$ at value(s) of x not in its domain.

Domain

$$x \neq -3$$

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

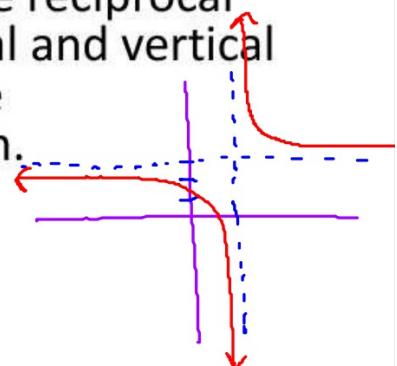
(Left) $\lim_{x \rightarrow -3^-} f(x) = -\infty$

$$f(-4) = \frac{1}{-4+3} < 0$$

(Right) $\lim_{x \rightarrow -3^+} f(x) = \infty$

$$f(0) = \frac{1}{0+3} > 0$$

Describe how the graph of the given function can be obtained by transforming the graph of the reciprocal function $g(x) = 1/x$. Identify the horizontal and vertical asymptotes and use limits to describe the corresponding behavior. Sketch the graph.



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

$$\begin{array}{r} 3 \quad -2 \\ \hline 3 \quad 1 \end{array}$$

Right 1

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

up 3
right 1

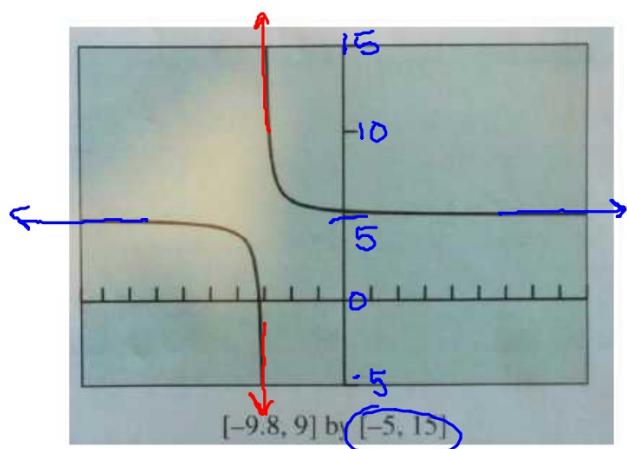
HA: $y = 3$
 $\lim_{x \rightarrow \pm\infty} f(x) = 3$

VA: $x - 1 = 0$
 $x = 1$

$\lim_{x \rightarrow 1^-} f(x) = -\infty$
 $f(0) = \frac{-2}{-1} > 0$ $f(1) = \frac{2 \cdot 1 - 2}{1 - 1} < 0$

$\lim_{x \rightarrow 1^+} f(x) = \infty$
 $f(2) = \frac{4}{1} > 0$ $f(1.1) = \frac{3.3 - 2}{.1}$

Evaluate the limit based on the graph shown



15. $\lim_{x \rightarrow -3^+} f(x) = -\infty$

17. $\lim_{x \rightarrow -\infty} f(x) = 5$ (+A)
Left end

16. $\lim_{x \rightarrow -3^-} f(x) = -\infty$

18. $\lim_{x \rightarrow \infty} f(x) = 5$ (HA)
Right End

