Review 2.6-2.8

Solve the equation algebraically. Identify any extraneous solutions.

$x \neq 0$

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

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

$x^2+2x=15$

$x^2+2x-15=0$

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

$\boxed{x=-5}$ $\boxed{x=3}$

$-5+2=\frac{15}{-5}$ $3+2=\frac{15}{3}$

Solve the equation algebraically. Identify any extraneous solutions.

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

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

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

$$3x^2-6x + x+5 = 7$$

$$3x^2-5x-2=0 \rightarrow (3x+1)(x-2)$$

$$\boxed{x=-\frac{1}{3}} \quad x \neq 2$$

Solve the equation algebraically. Identify any extraneous solutions.

$x \neq 0$

$x \neq -1$

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

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

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

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

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

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

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

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

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

Solve the polynomial using factoring and a sign chart

$-1 \quad 1 \quad 2$

$$(x+1)(x^2-3x+2) < 0$$

$\boxed{(x+1)(x-2)(x-1)}$

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

$f(-2)=(-1)(-4)(-3) < 0$ $\boxed{(-\infty,-1)}$

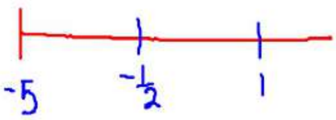
$f(0)=(1)(-1)(-1) > 0$

$f(1.5)=(2.5)(-.5)(.5) < 0$ $\boxed{(1,2)}$

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

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

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



Zero

$\sqrt{x+5}=0$

$x+5=0$

$x=-5$

Undefined

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

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

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

$x+5\ge 0$

$x\ge -5$

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

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

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

Solve the polynomial using a sign chart

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

Zero

$x^2-4=0$

$x=\pm 2$

undefined

$x^2+4 \neq 0$

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

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

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

Solve the polynomial using a sign chart

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

$\begin{array}{r} {}^{3}2.5 \\ \underline{\times\; 6} \\ 15.0 \end{array}$

$-5 \quad 2 \quad 3$

<u>zero</u>

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

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

$x=-5 \quad x=2$

<u>undefined</u>

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

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

$x=3$

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

$f(0)=-10/9<0$

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

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

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
$x \neq -3$

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

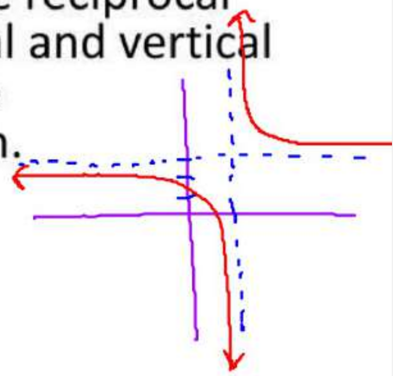
(Left) $\lim_{x \to -3^-} f(x) = -\infty$

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

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

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

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.



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

Right 1

$$\begin{array}{r|rr} 1 & 3 & -2 \\ & & 3 \\ \hline & 3 & 1 \end{array}$$

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

up 3
right 1

HA

$y = 3$

$\lim_{x \to \pm\infty} f(x) = 3$

VA

$x - 1 = 0$

$x = 1$

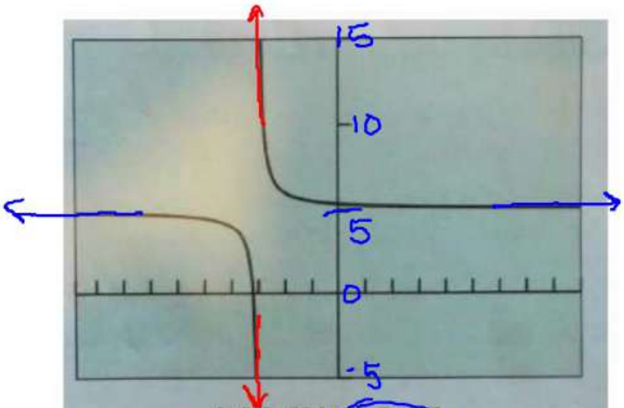
$\boxed{\lim_{x \to 1^-} f(x) = -\infty}$

$f(0) = \frac{-2}{-1} > 0$ $f(.9) = \frac{2.7-2}{-.1} < 0$

$\boxed{\lim_{x \to 1^+} f(x) = \infty}$

$f(2) = \frac{4}{1} > 0$ $f(1.1) = \frac{3.3-2}{.1}$

Evaluate the limit based on the graph shown



[−9.8, 9] by [−5, 15]

Left of asy

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

17. $\lim_{x \to -\infty} f(x) = 5$ (HA)

Left end

Right of asy

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

18. $\lim_{x \to \infty} f(x) = 5$ (HA)

Right End