

Directions:

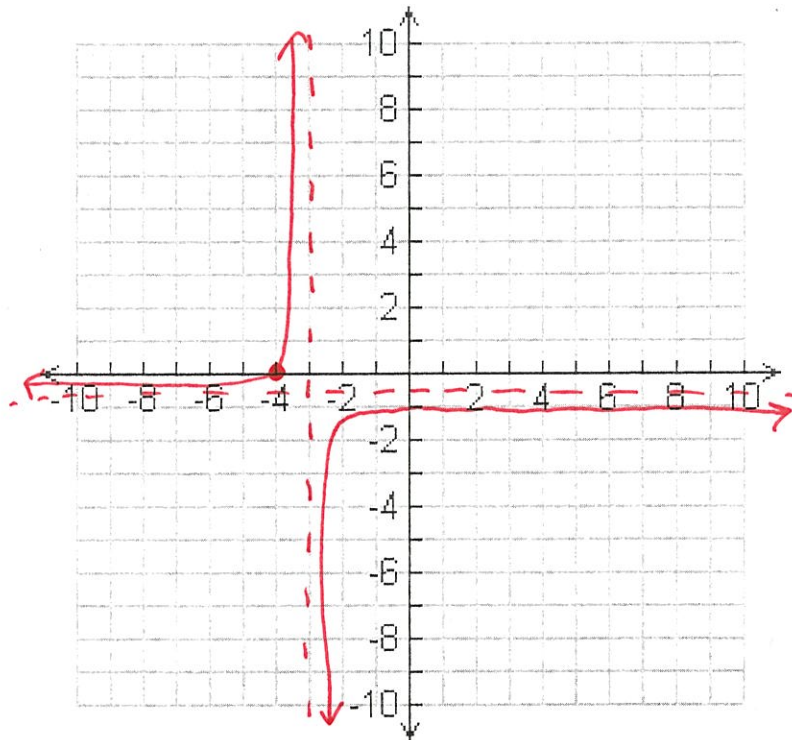
- A. Find the vertical asymptote, horizontal asymptote, domain, range and zeros of each function.
 B. Graph the rational function.

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

VA: $X = -3$ $-2x-6=0$
 $-2x=6$
 $x=-3$

HA: $y = -1/2$
 deg num = deg den

D: $(-\infty, -3), (-3, \infty)$



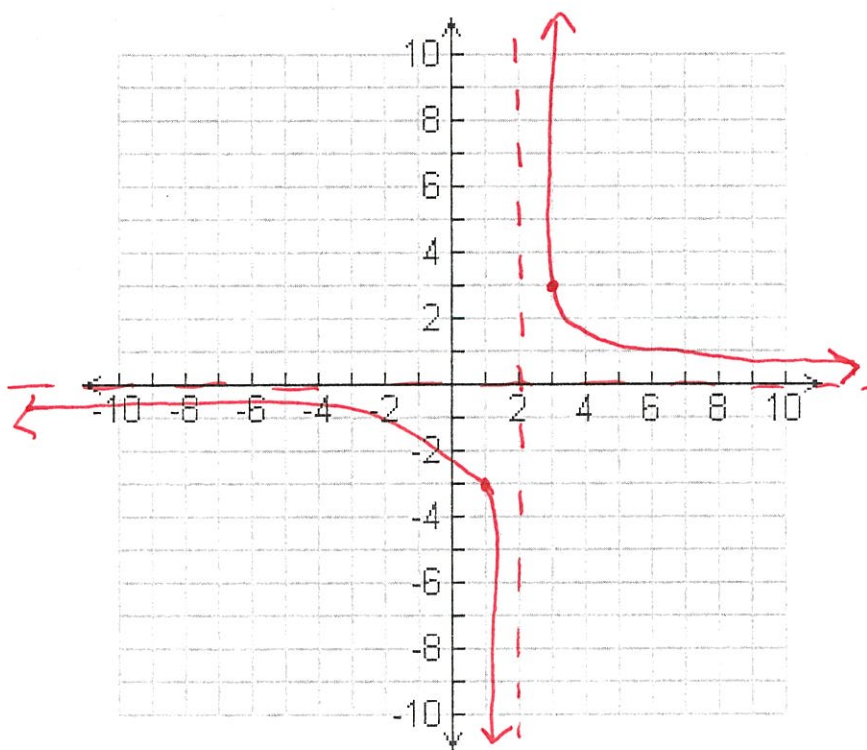
Zeros: $(-4, 0)$
 $x+4=0$
 $x=-4$

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

VA: $X = 2$ $x-2=0$
 $x=2$

HA: $y = 0$
 deg num < deg den

D: $(-\infty, 2), (2, \infty)$



Zeros: none

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

VA: $x=0$

HA: none
deg num > deg den

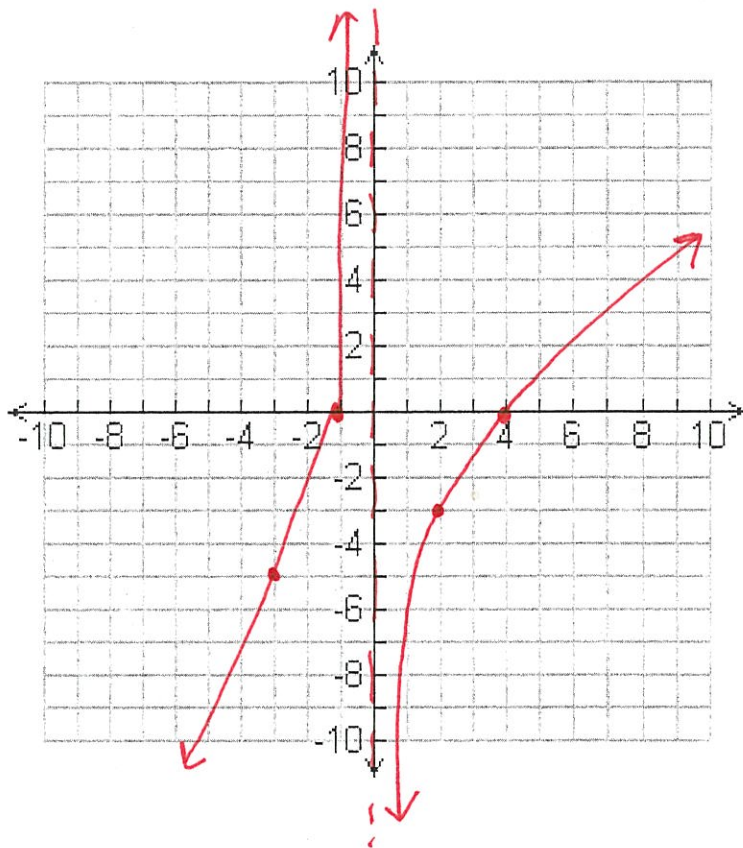
D: $(-\infty, 0), (0, \infty)$

Zeros: $(4, 0), (-1, 0)$

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

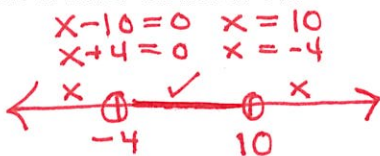
$$(x-4)(x+1) = 0$$

$$x=4, x=-1$$



Directions: Solve each rational inequality. Be sure to create a number line and test values. Your final answer should be in interval notation.

$$4. \frac{3x-2}{x+4} < 2$$



$$\frac{3x-2}{x+4} - \frac{2}{1} < 0$$

$$(-4, 10)$$

$$\frac{3x-2}{x+4} - \frac{2(x+4)}{x+4} < 0$$

$$\frac{3x-2-2x-8}{x+4} < 0 \rightarrow \frac{x-10}{x+4} < 0$$

$$6. \frac{3x-5}{x-1} > 4$$

$$\frac{3x-5}{x-1} - \frac{4}{1} > 0$$

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

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

$$\frac{3x-5-4(x-1)}{x-1} > 0$$

$$\frac{3x-5-4x+4}{x-1} > 0$$

$$\frac{-x-1}{x-1} > 0$$



$$5. \frac{x^2-2x-8}{x+4} \geq 0$$

$$x^2-2x-8=0$$

$$(x-4)(x+2)=0$$

$$x=4, x=-2$$

$$x+4=0$$

$$x=-4$$

$$(-4, -2], [4, \infty)$$



$$7. \frac{5}{x-3} \geq \frac{4}{x-2}$$

$$\frac{5}{x-3} - \frac{4}{x-2} \geq 0$$

$$\frac{5(x-2) - 4(x-3)}{(x-3)(x-2)} \geq 0$$

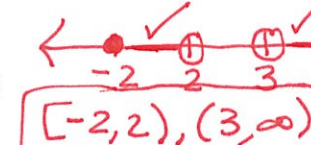
$$\frac{5x-10-4x+12}{(x-3)(x-2)} \geq 0$$

$$\frac{x+2}{(x-3)(x-2)} \geq 0$$

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

$$x-3=0 \quad x=3$$

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



Directions:

A. Identify the LCD and what the variable \neq .

B. Solve each equation. Be sure to check your answer.

8. $\frac{4}{x+2} + \frac{x+6}{x-4} = \frac{x+5}{x-4}$ LCD: $(x+2)(x-4)$
 $x \neq -2, 4$

$$\frac{4(x-4)}{(x+2)(x-4)} + \frac{(x+2)(x+6)}{(x+2)(x-4)} = \frac{(x+5)(x+2)}{(x+2)(x-4)}$$

$$4x - 16 + x^2 + 6x + 2x + 12 = x^2 + 2x + 5x + 10$$

$$x^2 + 12x - 4 = x^2 + 7x + 10$$

$$12x - 4 = 7x + 10$$

$$5x - 4 = 10$$

$$5x = 14$$

$$x = 14/5$$

$$\frac{p+6}{p} = 6 - \frac{1}{p}$$

$$p+6 = 6p - 1$$

$$6 = 5p - 1$$

$$7 = 5p$$

$$p = 7/5$$

12. $\frac{n-2}{2n^2+2n} = \frac{3}{4n+4} + \frac{1}{4n^2+4n}$ LCD: $4n(n+1)$
 $n \neq 0, -1$

$$\frac{2(n-2)}{4n(n+1)} = \frac{3(n)}{4n(n+1)} + \frac{1}{4n(n+1)}$$

$$2n - 4 = 3n + 1$$

$$-4 = n + 1$$

$$n = -5$$

14. $\frac{1}{4a^2-9a+5} = \frac{1}{a-1} - \frac{a^2+3a-18}{4a^2-9a+5}$ LCD: $(a-1)(4a-5)$
 $a \neq 1, 5/4$

$$\frac{1}{(a-1)(4a-5)} = \frac{1(4a-5)}{(a-1)(4a-5)} - \frac{a^2+3a-18}{(a-1)(4a-5)}$$

$$1 = 4a - 5 - a^2 - 3a + 18$$

$$1 = -a^2 + a + 13$$

$$0 = -a^2 + a + 12$$

$$0 = -1(a^2 - a - 12)$$

$$0 = -1(a-4)(a+3)$$

$$a = 4, a = -3$$

9. $\frac{1}{v^2-1} + \frac{v+2}{v-1} = \frac{v^2+2v-8}{v^2-1}$ LCD: $(v-1)(v+1)$
 $v \neq \pm 1$

$$\frac{1}{(v+1)(v-1)} + \frac{(v+2)(v+1)}{(v+1)(v-1)} = \frac{v^2+2v-8}{(v+1)(v-1)}$$

$$1 + v^2 + v + 2v + 2 = v^2 + 2v - 8$$

$$v^2 + 3v + 3 = v^2 + 2v - 8$$

$$3v + 3 = 2v - 8$$

$$v + 3 = -8$$

11. $\frac{1}{2p^2} + \frac{p-2}{p^2} = \frac{1}{3p^2}$ LCD: $6p^2$
 $p \neq 0$

$$\frac{1(3)}{6p^2} + \frac{6(p-2)}{6p^2} = \frac{2(1)}{6p^2}$$

$$3 + 6p - 12 = 2$$

$$6p - 9 = 2$$

$$6p = 11$$

$$p = 11/6$$

13. $\frac{1}{m^2+6m} - \frac{1}{m} = \frac{5}{m^2+6m}$ LCD: $m(m+6)$
 $m \neq 0, -6$

$$\frac{1}{m(m+6)} - \frac{1(m+6)}{m(m+6)} = \frac{5}{m(m+6)}$$

$$1 - m - 6 = 5$$

$$-m - 5 = 5$$

$$-m = 10$$

$$m = -10$$

15. $\frac{x+3}{x^2+3x-4} = \frac{x+2}{x^2-16}$ LCD: $(x+4)(x-4)(x+1)$
 $x \neq \pm 4, -1$

$$\frac{(x-4)(x+3)}{(x+4)(x-4)(x+1)} = \frac{(x-1)(x+2)}{(x+4)(x-4)(x+1)}$$

$$x^2 + 3x - 4x - 12 = x^2 + 2x - x - 2$$

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

$$-x - 12 = x - 2$$

$$-12 = 2x - 2$$

$$-10 = 2x$$

$$x = -5$$