

Non-Calculator

Perform the indicated operations and simplify.

1. $\frac{x}{x} \cdot \frac{7}{6x} - \frac{x+4}{2x^2} \cdot \frac{3}{3}$

LCD = $6x^2$

$$= \frac{7x}{6x^2} - \frac{3x+12}{6x^2}$$

$$= \frac{4x-12}{6x^2} = \frac{4(x-3)}{3 \cdot 6x^2} = \boxed{\frac{2(x-3)}{3x^2}}$$

$$\frac{(x+5)(x-3)}{(x+5) \cdot 2x-1} + \frac{x+5}{2x^2+9x-5}$$

LCD = $(2x-1)(x+5)$

$$= \frac{x^2+2x-15}{(2x-1)(x+5)} + \frac{x+5}{(2x-1)(x+5)}$$

$$= \frac{x^2+3x-10}{(2x-1)(x+5)} = \frac{(x+5)(x-2)}{(2x-1)(x+5)} = \boxed{\frac{(x-2)}{(2x-1)}}$$

3. $\frac{2x}{x+4} \cdot \frac{3x+12}{10x^3}$

$$= \frac{2x(3)(x+4)}{(x+4)(10)(x^3)^2}$$

$$= \boxed{\frac{3}{5x^2}}$$

4. $\frac{4x-24}{x^2-6x+5} \div \frac{-6x+36}{x^2-8x+15} = \frac{4(x-6)}{(x-5)(x-1)} \cdot \frac{(x-5)(x-3)}{-6(x-6)}$

$$= \frac{4(x-3)}{-6(x-1)} = \boxed{\frac{2(x-3)}{-3(x-1)}}$$

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

$$= \frac{3x+2}{(x+2)(x-2)} = \frac{(3x+2)}{(x+2)(x-2)} \cdot \frac{(x+2)(x-2)}{6} = \boxed{\frac{(3x+2)}{6}}$$

Solve for x.

LCD = 6

6. $\left[\frac{x}{2} + \frac{1}{3} = \frac{5}{6} \right] 6$

$$3x + 2x = 5$$

$$5x = 5$$

$$\boxed{x = 1}$$

LCD = $(x+6)(x+2)$

7. $\left[\frac{6}{x^2+8x+12} + \frac{4}{x+6} = \frac{4}{x+2} \right] \frac{(x+6)(x+2)}{1}$

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

$$6 + 4x + 8 = 4x + 24$$

$$4x + 14 = 4x + 24$$

$$-4x \quad -4x$$

$$14 \neq 24$$

$$\boxed{\text{No Solution}}$$

Find the indicated information for the following rational functions.

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

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

VA: $x = -4, x = -3$

HA: $y = 0$

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

x-int: $(1, 0)$

y-int: $(0, -1/12)$

Hole (y-value)

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

y-int

$y = \frac{(0-1)}{(0+4)(0+3)} = -\frac{1}{12}$

X-int

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

$0 = x-1$
 $1 = x$

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

Slant

$$\begin{array}{r} \downarrow \\ -3 \quad 0 \quad 2 \\ \underline{-3 \quad -3} \\ -3x-3 \end{array}$$

Slant Asymptote: $y = -3x-3$

VA: $x = 1$

10. Write a rational function that has the following characteristics.

VA: $x = 1$ and $x = -2$

HA: $y = 0$

Hole: $(-3, 1/40)$

$f(x) = \frac{(x+3)}{10(x-1)(x+2)(x+3)}$

For Hole... $x = -3$

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

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

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

Need $1/40$?

11. State the end behavior of the following functions:

a. $f(x) = \frac{-35x^{52}-x^{34}+6}{5x^2+2}$

$\frac{-35x^{52}}{5x^2} = -7x^{50}$



b. $g(x) = \frac{(2x+3)^2(-x+1)^3}{6-x^2}$

$= \frac{(2x)^2(-x)^3}{-x^2} = \frac{-4x^5}{-x^2} = 4x^3$



12. Solve for x.

$2(x-3)^2 + 6 = 54$

$2(x-3)^2 = 48$

$(x-3)^2 = 24$

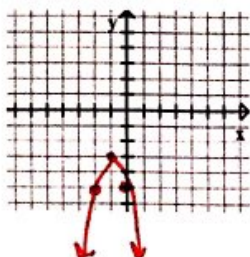
$x-3 = \pm\sqrt{24}$

$x-3 = \pm 2\sqrt{6}$

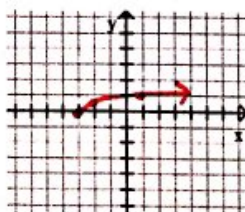
$x = 3 \pm 2\sqrt{6}$

13. Graph the following.

a. $f(x) = -2(x+1)^2 - 3$



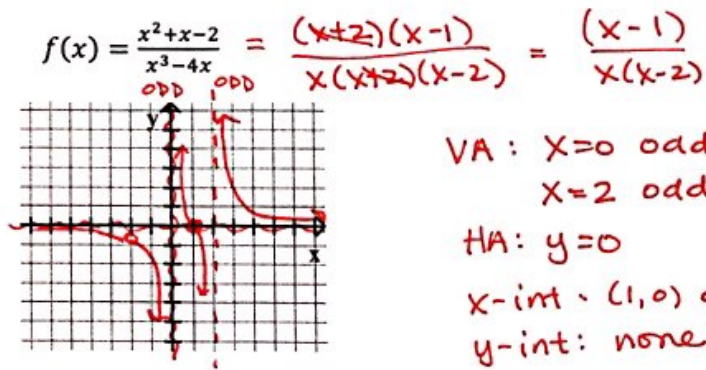
b. $g(x) = \frac{1}{2}\sqrt{x+3}$



c. $h(x) = 2|x-1|$



14. Graph the following. Make sure you identify asymptotes, holes, and intercepts.



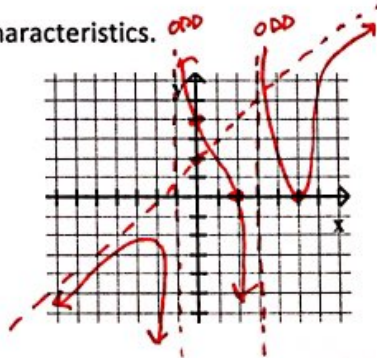
VA: $x=0$ odd
 $x=2$ odd
 HA: $y=0$
 x-int: $(1,0)$ odd
 y-int: none

Hole: $(-2, -3/8)$
 y-value of hole
 $\frac{-2-1}{-2(-2-2)} = \frac{-3}{8}$

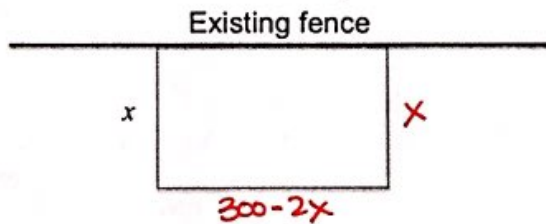
Calculator Section

15. Sketch a graph with the following characteristics.

- VA: $x = -1$ (odd)
- VA: $x = 3$ (odd)
- SA: $y = x + 2$
- y-int: $(0, 4)$
- x-int: $(2, 0)$ odd
- x-int: $(5, 0)$ even



16. You have 300 feet of fencing.



- a. Write an equation for the area in terms of the width.
- b. Find the maximum area. Include units.
- c. Find the dimensions that will yield the maximum area. Include units.

- a) $A(x) = x(300 - 2x)$
- b) 11,250 ft²
- c) 75 ft by 150 ft

