Simplify and state the values which are not in the domain for each variable.

1. $\dfrac{-36x^2-48x}{18x^3+24x^2} = \dfrac{-12x(3x+4)}{6x^2(3x+4)} = \boxed{\dfrac{-2}{x}}$

$3x+4=0$

$3x=-4$

$x=\dfrac{-4}{3}$

$\boxed{x\neq 0, \dfrac{-4}{3}}$

6.3

17. $\dfrac{\frac{a}{a}\cdot\frac{2a}{a-1}-\frac{3}{a}\cdot\frac{a-1}{a-1}}{\frac{a}{a}\cdot\frac{1}{a-1}+\frac{2}{a}\cdot\frac{a-1}{a-1}} = \dfrac{\frac{2a^2-3(a-1)}{a(a-1)}}{\frac{a+2(a-1)}{a(a-1)}}$

$= \dfrac{2a^2-3a+3}{a(a-1)}\cdot\dfrac{a(a-1)}{a+2a-2}$

$a+2a-2$

$3a-2$

$= \boxed{\dfrac{2a^2-3a+3}{3a-2}}$, $a\neq 0, 1, \frac{2}{3}$

6.4

29. $\frac{2}{4y^2-9} + \frac{1}{2y-3} = \frac{3}{2y+3}$

$(2y-3)(2y+3)$

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

$2 + 2y + 3 = 3(2y-3)$

$2y + 5 = 6y - 9$

$14 = 4y$

$\frac{14}{4} = y$

$\boxed{\frac{7}{2} =}$

2. $\frac{x^2+x-6}{3x^2-10x+8} = \frac{(x+3)(x-2)}{3x^2-6x-4x+8}$

$3x(x-2) - 4(x-2)$

$= \frac{(x+3)(x-2)}{(x-2)(3x-4)} = \boxed{\frac{x+3}{3x-4}, x \neq 2, \frac{4}{3}}$

$x - 2 = 0$

$x = 2$

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

$= \frac{x-1}{x+1}, x \neq \pm 1$

Multiply or divide and simplify. State the values which are not in the domain for each variable.

4. $\frac{x^2+x-6}{12+x-x^2} \cdot \frac{x^2+x-20}{x^2-4x+4} = \frac{(x-2)(x+3)}{-(x-4)(x+3)} \cdot \frac{(x+5)(x-4)}{(x-2)(x-2)}$

$-(x^2-x-12)$

$(4-x)(3+x)$

$= -\left(\frac{x+5}{x-2}\right)$

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

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

$\frac{x+5}{2-x}, x \neq 2, 4, -3$

5. $\dfrac{14+17x-6x^2}{3x^2+14x+8} \div \dfrac{4x^2-49}{2x^2+15x+28}$

$= \dfrac{-(6x^2-17x-14)}{3x^2+12x+2x+8} \div \dfrac{(2x-7)(2x+7)}{2x^2+8x+7x+28}$

$= \dfrac{-[6x^2-21x+4x-14]}{3x^2+12x+2x+8} \div \dfrac{(2x-7)(2x+7)}{2x^2+8x+7x+28}$

$= \dfrac{-[3x(2x-7)+2(2x-7)]}{3x(x+4)+2(x+4)} \div \dfrac{(2x-7)(2x+7)}{2x(x+4)+7(x+4)}$

$= \dfrac{-(2x-7)(3x+2)}{(x+4)(3x+2)} \cdot \dfrac{(x+4)(2x+7)}{(2x-7)(2x+7)} = -1$

$x \neq -4, 7/2, -7/2, -2/3$

Add or subtract and simplify. State the values which are not in the domain for each variable.

6. $\dfrac{2x-3}{x+5} - \dfrac{x^2-4x-19}{x^2+8x+15}$ $(x+3)(x+5)$

$= \dfrac{(2x-3)(x+3)}{(x+5)(x+3)} - \dfrac{x^2-4x-19}{(x+3)(x+5)}$

$= \dfrac{2x^2+6x-3x-9-(x^2-4x-19)}{(x+3)(x+5)}$

$= \dfrac{x^2+7x+10}{(x+3)(x+5)} = \dfrac{(x+5)(x+2)}{(x+3)(x+5)} = \dfrac{x+2}{x+3}$,

$x \neq -3, -5$

Simplify and state the values which are not in the domain for each variable.

7. $\dfrac{\frac{2}{x}-\frac{5}{x+3}}{\frac{3}{x}+\frac{3}{x+3}}$ $\cdot\frac{x(x+3)}{x(x+3)}$

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

$$= \frac{2x+6-5x}{x(x+3)} \cdot \frac{x(x+3)}{3x+9+3x} = \frac{-3x+6}{6x+9}$$

$$= \frac{-3(x-2)}{3(2x+3)} = -\frac{x-2}{2x+3} = \frac{2-x}{2x+3}, \; x \neq 0, -\frac{3}{2}, -3$$

Solve for x. Be sure to check your solutions to make sure they make sense!

8. $\left(5+\dfrac{8}{x-2}\right)=\left(\dfrac{4x}{x-2}\right)$ $\cdot\frac{(x-2)}{1}$

$$\frac{(x-2)}{1}\cdot\frac{5}{1}+\frac{8}{x-2}\cdot\frac{x-2}{1}=\frac{4x}{x-2}\cdot\frac{x-2}{1}$$

$$5(x-2)+8=4x$$

$$5x-10+8=4x$$

$$5x-2=4x$$

$$x=2$$

no solution

9. $\left(-\frac{5}{x+7}+1\right)=\left(\frac{4}{x+7}\right)\cdot(x+7)$

$-5+x+7=4$

$x+2=4$

$x=2$

Solve for b.

10. $\left(\frac{1}{f}\right)=\left(\frac{1}{a}+\frac{1}{b}\right)\cdot abf$

Solve for x

$\frac{6x}{1}\cdot\left(\frac{1}{2}\right)=\left(\frac{1}{3}+\frac{1}{x}\right)\cdot\frac{6x}{1}$

$ab=bf+af$

$ab-bf=af$

$b(a-f)=af$

$b=\frac{af}{a-f}$

6.4

$$3\left(\frac{5}{x^2-7x+12}\right)=\left(\frac{2}{x-3}+\frac{5}{x-4}\right)\frac{(x-3)(x-4)}{1}$$

$$(x-3)(x-4)$$

$$5=2(x-4)+5(x-3)$$

$$5=2x-8+5x-15$$

$$5=7x-23$$

no solution

$$28=7x$$

$$4=x$$