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

1. $\dfrac{-36x^2 - 48x}{18x^3 + 24x^2} = \dfrac{-12x(3x+4)}{6x^2(3x+4)} = \dfrac{-2}{x}, x \neq 0, -\dfrac{4}{3}$

$3x + 4 = 0$
$3x = -4$
$x = -\dfrac{4}{3}$

$\dfrac{12 + x}{6 + x}$

$\dfrac{12x^5}{6x} = \dfrac{12}{6} \cdot \dfrac{x^5}{x}$

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

$(3x \quad)(x \quad)$

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

$3(8) = 24$
$= (-6)(-4)$

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

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

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

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

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

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

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

$-(6x^2-17x-14)$ $6(-14)$ $3(8)$ $2(28)$

5. $\dfrac{14+17x-6x^2}{3x^2+14x+8} \div \dfrac{4x^2-49}{2x^2+15x+28}$ $6\cdot2\cdot7$ $3\cdot2\cdot4$ $2\cdot4\cdot7$

$2\cdot3\cdot2\cdot7$

$3x(2x-7)+2(2x-7)$

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

$3x(x+4)+2(x+4)$ $2x(x+4)+7(x+4)$

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

$$=-1, x\neq -4, -\tfrac{2}{3}, -\tfrac{7}{2}, \tfrac{7}{2}$$

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

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

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

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

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

$2\frac{1}{3}-\frac{5}{6}$

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

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

$= \dfrac{2(x+3)-5x}{x(x+3)} \Big/ \dfrac{3(x+3)+3x}{x(x+3)}$

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

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

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

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

$\dfrac{x-2}{1}\cdot\dfrac{5}{1}+\dfrac{8}{x-2}\cdot\dfrac{x-2}{1}=\dfrac{4x}{x-2}\cdot\dfrac{x-2}{1}$

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

$5x-10+8=4x$

$5x-2=4x$

$x=2$

no solution

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

$-5+x+7=4$

$x+2=4$

$x=2$

Solve for b.

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

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

$ab=fb+fa$

$ab-fb=fa$

$b(a-f)=fa$

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

6.4

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

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

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

$$5=7x-23$$

$$28=7x$$

$$4=x$$

no solution

6.3

43. $a+\dfrac{a}{2+\dfrac{1}{1-\frac{2}{a}}}=a+\dfrac{a}{2+\left(\frac{1}{\frac{a-2}{a}}\right)}$

$=a+\dfrac{a}{2+\left(\frac{a}{a-2}\right)}=a+\dfrac{a}{\frac{2(a-2)+a}{a-2}}$

$=a+\dfrac{a}{\frac{2a-4+a}{a-2}}=a+\dfrac{a}{\left(\frac{3a-4}{a-2}\right)}$

$=a+\dfrac{a(a-2)}{3a-4}=\dfrac{a(3a-4)+a(a-2)}{3a-4}$

$=\dfrac{3a^2-4a+a^2-2a}{3a-4}=\dfrac{4a^2-6a}{3a-4}=\dfrac{2a(2a-3)}{3a-4}$