

General Instructions: If there is any work to show, show it!

1. Perform the indicated operations and simplify your answer:

a) $\frac{w^2 + 5w - 14}{3w + 18} \div \frac{5w + 35}{w + 6}$

$$\frac{(w+7)(w-2)}{3(w+6)} \cdot \frac{5(w+7)}{(w+6)}$$

$$\frac{(w+7)(w-2)}{3(w+6)} \cdot \frac{(w+6)}{5(w+7)}$$

$$= \frac{w-2}{15} \text{ or } \frac{1}{15}(w-2)$$

$$\text{or } \frac{1}{15}w - \frac{2}{15}$$

$$\text{or } 0.067w - 0.133$$

$(w+3)(w-1)$ $(w+4)(w-4)$

b) $\frac{w^2 + 2w - 3}{w^2 + 7w + 12} \cdot \frac{w^2 - 16}{w^2 - 3w - 4}$

$(w+3)(w+4)$ $(w-4)(w+1)$

$$\frac{w-1}{w+1}$$

2. Perform the indicated operations and simplify your answer:

a) $\frac{w-3}{w^2 - 5w + 4} - \frac{2}{w^2 - 3w - 4} + \frac{3w}{w^2 - 1}$

$(w-1)(w-4)$ $(w-4)(w+1)$ $(w+1)(w-1)$

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

$$\frac{w^2 - 2w - 3 - 2w + 2 + 3w^2 - 12w}{(w-1)(w+1)(w-4)}$$

$$\frac{4w^2 - 16w - 1}{(w-1)(w+1)(w-4)}$$

$$w^3 - 4w^2 - w + 4$$

b) $\frac{\frac{3}{3w} + 3}{\frac{4}{5} + \frac{1}{5w}} = \frac{\frac{3}{3w} + \frac{3}{1} \cdot \frac{3w}{3w}}{\frac{w}{w} \cdot \frac{4}{5} + \frac{1}{5w}}$

$$= \frac{3 + 9w}{3w}$$

$$\frac{4w + 1}{5w}$$

$$= \frac{3 + 9w}{3w} \cdot \frac{5w}{4w + 1}$$

$$= \frac{3(1 + 3w) \cdot 5}{3(4w + 1)}$$

$$= \frac{5(1 + 3w)}{4w + 1} \text{ or } \frac{5 + 15w}{4w + 1}$$

3. Find the solution to each equation if one exists. If there is no solution, say so. You may write your answer as a fraction or decimal. If it is a fraction, reduce it. If it is a decimal, round it off to three decimal places.

$$\begin{array}{r} \text{a) } 3w - 4 = 15 \\ +4 \quad +4 \end{array}$$

$$3w = 19$$

$$w = \frac{19}{3} \text{ or } 6\frac{1}{3} \text{ or } 6.333$$

$$\text{b) } \frac{3}{4} - \frac{1}{w} = \frac{3}{w} - \frac{2}{5}$$

$$20w \cdot \left[\frac{3}{4} - \frac{1}{w} = \frac{3}{w} - \frac{2}{5} \right] \cdot 20w$$

$$\begin{array}{r} 15w - 20 = 60 - 8w \\ +8w \qquad \qquad \qquad +8w \end{array}$$

$$\begin{array}{r} 23w - 20 = 60 \\ +20 \quad +20 \end{array}$$

$$23w = 80$$

$$w = \frac{80}{23} \text{ or } 3\frac{11}{23} \text{ or}$$

$$3.478$$

$$\text{c) } 3(4w + 1) = 3(w - 5) - 7$$

$$12w + 3 = 3w - 15 - 7$$

$$\begin{array}{r} 12w + 3 = 3w - 22 \\ -3w \qquad -3w \end{array}$$

$$\begin{array}{r} 9w + 3 = -22 \\ -3 \end{array}$$

$$9w = -25$$

$$w = -\frac{25}{9} \text{ or } -2\frac{7}{9}$$

$$\text{or } -2.778$$

General Instructions: If there is any work to show, show it!

1. Perform the indicated operations and simplify your answer:

a) $\frac{x^2 + x - 12}{x^2 - 25} \cdot \frac{x^2 + 7x + 10}{x^2 + 6x + 8}$

$$\frac{(x+1)(x-3)}{(x+5)(x-5)} \cdot \frac{(x+5)(x+2)}{(x+2)(x+4)}$$

$$\frac{x-3}{x-5}$$

b) $\frac{2(x-3)}{3x+12} \div \frac{x-3}{x^2+5x+4}$

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

$$\frac{2(x+1)}{3} \text{ or } \frac{2x+2}{3}$$

$$\text{or } \frac{2}{3}(x+1) \text{ or } \frac{2}{3}x + \frac{2}{3}$$

2. Perform the indicated operations and simplify your answer:

a) $\frac{x-3}{x^2-5x+4} + \frac{2}{x^2-3x-4} - \frac{3x}{x^2-1}$

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

$$\frac{x^2 - 2x - 3 + 2x - 2 - 3x^2 + 12x}{(x+1)(x-1)(x-4)}$$

$$\frac{-2x^2 + 12x - 5}{(x+1)(x-1)(x-4)}$$

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

b) $\frac{2}{3x} + 3 = \frac{2}{3x} + \frac{3}{1} \cdot \frac{3x}{3x}$

$$= \frac{2+9x}{3x}$$

$$\frac{3x+1}{5x}$$

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

$$\frac{5(2+9x)}{3(3x+1)} \text{ or } \frac{10+45x}{9x+3}$$

3. Find the solution to each equation if one exists. If there is no solution, say so. You may write your answer as a fraction or decimal. If it is a fraction, reduce it. If it is a decimal, round it off to three decimal places.

a) $2x + 4 = 15$
-4 -4

$$2x = 11$$

$$x = \frac{11}{2} \text{ or } 5\frac{1}{2}$$

$$\text{or } 5.5$$

b) $2(3x + 1) = 3(x - 5) + 7$

$$6x + 2 = 3x - 15 + 7$$

$$6x + 2 = 3x - 8$$

-3x -3x

$$3x + 2 = -8$$

-2 -2

$$3x = -10$$

$$x = -\frac{10}{3} \text{ or } -3\frac{1}{3} \text{ or } -3.33\bar{3}$$

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

$$15x \left[\frac{2}{x} - \frac{3}{5} \right] = \left[\frac{3}{x} + \frac{1}{3} \right] \cdot 15x$$

$$30 - 9x = 45 + 5x$$

-5x -5x

$$30 - 14x = 45$$

-30 -30

$$-14x = 15$$

$$x = -\frac{15}{14} \text{ or } -1\frac{1}{14} \text{ or } -1.071$$

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a) $2x + 4 = 15$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$2x = 11$$

$$x = \frac{11}{2} \text{ or } 5\frac{1}{2}$$

$$\text{or } 5.5$$

b) $2(3x + 1) = 3(x - 5) + 7$

$$6x + 2 = 3x - 15 + 7$$

$$\begin{array}{r} 6x + 2 = 3x - 8 \\ -3x \quad -2 \quad -3x \quad -2 \\ \hline \end{array}$$

$$3x = -10$$

$$x = -\frac{10}{3} \text{ or } -3\frac{1}{3}$$

$$\text{or } -3.333$$

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

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

$$\begin{array}{r} 30 - 9x = 45 + 5x \\ -30 \quad -5x \quad -30 \quad -5x \\ \hline \end{array}$$

$$-14x = 15$$

$$x = -\frac{15}{14} \text{ or } -1\frac{1}{14}$$

$$\text{or } -1.071$$

d) $3x - 2 < 5(x + 7)$

$$\begin{array}{r} 3x - 2 < 5x + 35 \\ -5x + 2 \quad -5x + 2 \\ \hline \end{array}$$

$$-2x < 37$$

$$x > -\frac{37}{2}$$

$$\text{or } x > -18\frac{1}{2}$$

$$\text{or } x > -18.5$$

e) $\frac{6x+5}{3x-1} = \frac{2x-3}{x+2} \quad x \neq \frac{1}{3} \text{ or } -2$

$$(6x+5)(x+2) = (2x-3)(3x-1)$$

$$\begin{array}{r} 6x^2 + 17x + 10 = 6x^2 - 11x + 3 \\ +11x \quad -10 \quad +11x \quad -10 \\ \hline \end{array}$$

$$28x = -7$$

$$x = -\frac{7}{28} = -\frac{1}{4} \text{ or } -0.25$$

f) $2(3+x) - 5(x+1) > 10$

$$6 + 2x - 5x - 5 > 10$$

$$1 - 3x > 10$$

$$-1 \quad -1$$

$$-3x > 9$$

$$x < -3$$

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a) $3w - 4 = 15$

$$3w = 19$$

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$$\text{or } 6\frac{1}{3} \text{ or } 6.333$$

b) $\frac{3}{4} - \frac{1}{w} = \frac{3}{w} - \frac{2}{5}$

$$5.4 \cdot w \left[\frac{3}{4} - \frac{1}{w} \right] = \left[\frac{3}{w} - \frac{2}{5} \right] 5.4w$$

$$15w - 20 = 60 - 8w$$

$$+8w \quad +20 \quad +20 \quad +8w$$

$$23w = 80$$

$$w = \frac{80}{23} \text{ or } 3\frac{11}{23}$$

$$\text{or } 3.478$$

c) $3(4w + 1) = 3(w - 5) - 7$

$$12w + 3 = 3w - 15 - 7$$

$$12w + 3 = 3w - 22$$

$$-3w - 3 \quad -3w - 3$$

$$9w = -25$$

$$w = -\frac{25}{9} \text{ or } 2\frac{7}{9}$$

$$\text{or } 2.778$$

d) $\frac{4w + 1}{2w + 1} = \frac{2w - 5}{w - 1}$ ($w \neq -\frac{1}{2}$ or 1)

$$(4w + 1)(w - 1) = (2w - 5)(2w + 1)$$

$$4w^2 - 3w - 1 = 4w^2 - 8w - 5$$

$$-3w - 1 = -8w - 5$$

$$+8w + 1 \quad +8w + 1$$

$$5w = -4$$

$$w = -\frac{4}{5} \text{ or } -0.8$$

e) $3w - 2 < 4(w - 7)$

$$3w - 2 < 4w - 28$$

$$-4w + 2 \quad -4w + 2$$

$$-w < -26$$

$$w > 26$$

f) $4(2 - w) - 2(w - 1) > 11$

$$8 - 4w - 2w + 2 > 11$$

$$10 - 6w > 11$$

$$-6w > 1$$

$$w < -\frac{1}{6}$$

$$\text{or } w < -0.167$$

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$$\frac{w^2+5w-14}{3(w+6)} \div \frac{5w+35}{w+6}$$

$$\frac{(w+7)(w-2)}{3(w+6)} \cdot \frac{(w+6)}{5 \cdot (w+7)}$$

$$\frac{w-2}{15}$$

$$b) \frac{(w+3)(w-1)}{w^2+7w+12} \cdot \frac{(w+4)(w-4)}{w^2-16}$$

$$\frac{(w+3)(w-1)}{(w+3)(w+4)} \cdot \frac{(w+4)(w-4)}{(w-4)(w+4)}$$

$$\frac{w-1}{w+1}$$

2. Perform the indicated operations and simplify your answer:

$$a) \frac{2w+1}{w-2} + \frac{w-3}{w-4}$$

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

$$\frac{2w^2-7w-4+w^2-5w+6}{(w-4)(w-2)}$$

$$\frac{3w^2-12w+2}{(w-4)(w-2)}$$

$$w^2-6w+8$$

$$b) \frac{w-1}{w+1} - \frac{3}{w^2+w}$$

$$\frac{w-1}{w+1} - \frac{3}{w(w+1)}$$

$$\frac{w \cdot (w-1)}{w \cdot (w+1)} - \frac{3}{w(w+1)}$$

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

unreduced

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

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

General Instructions: If there is any work to show, show it!

1. Perform the indicated operations and simplify your answer:

$$\begin{array}{l} \cancel{(x+4)} \cancel{(x-3)} \quad \cancel{(x+2)} \cancel{(x+5)} \\ \text{a) } \frac{x^2 + x - 12}{x^2 - 25} \cdot \frac{x^2 + 7x + 10}{x^2 + 6x + 8} \\ \cancel{(x+5)} \cancel{(x-5)} \quad \cancel{(x+2)} \cancel{(x+4)} \end{array}$$

$$\frac{x-3}{x-5}$$

$$\text{b) } \frac{2x-6}{3x+12} \div \frac{x-3}{x^2+5x+4}$$

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

$$\begin{array}{l} \frac{2 \cancel{(x+1)}}{3} \text{ or } \frac{2x+2}{3} \\ \text{or } \frac{2}{3}x + \frac{2}{3} \text{ or } \frac{2}{3}(x+1) \end{array}$$

2. Perform the indicated operations and simplify your answer:

$$\text{a) } \frac{x-1}{x+1} + \frac{2}{x^2+x}$$

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

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

or

$$\text{b) } \frac{2x+1}{x-2} - \frac{x-3}{x-5}$$

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

$$\frac{2x^2 - 9x - 5 - (x^2 - 5x + 6)}{(x-5)(x-2)}$$

$$\frac{x^2 - 4x - 11}{(x-5)(x-2)}$$