

Chapter 8 Review
Honors Algebra 2

1. Simplify the following

$$\begin{aligned} \text{a. } & \frac{6c^2+9c}{3c} \\ &= \frac{3c(2c+3)}{3c} \\ &= 2c+3 \end{aligned}$$

$$\begin{aligned} \text{b. } & \frac{x^2-4x+4}{x^2-4} \\ &= \frac{(x-2)\cancel{(x-2)}}{\cancel{(x-2)}(x+2)} \\ &= \frac{x-2}{x+2} \end{aligned}$$

$$\begin{aligned} \text{c. } & \frac{5x-25}{10} \cdot \frac{20}{6x-30} \\ &= \frac{5\cancel{(x-5)}}{10} \cdot \frac{20}{6\cancel{(x-5)}} \\ &= \frac{10}{6} \\ &= \frac{5}{3} \end{aligned}$$

$$\begin{aligned} \text{d. } & \frac{x^2-9}{x^3+4x^2+4x} \cdot \frac{2x^2+4x}{x^2+2x-15} \\ &= \frac{(x+3)\cancel{(x-3)}}{x(x+2)\cancel{(x+2)}} \cdot \frac{2x\cancel{(x+2)}}{(x+5)\cancel{(x-3)}} \\ &= \frac{2(x+3)}{(x+2)(x+5)} \end{aligned}$$

$$\begin{aligned} \text{e. } & \frac{x^2-144}{x} \div \frac{3x+36}{x} \\ &= \frac{(x-12)(x+12)}{x} \cdot \frac{x}{3x+36} \\ &= \frac{(x-12)\cancel{(x+12)}}{\cancel{x} \cdot 3\cancel{(x+12)}} \\ &= \frac{x-12}{3} \end{aligned}$$

$$\begin{aligned} \text{f. } & \frac{x^2-9}{x^2-x-20} \div \frac{4x-12}{2x-10} \\ &= \frac{(x+3)\cancel{(x-3)}}{(x-5)(x+4)} \cdot \frac{2\cancel{(x-3)}}{2(x-5)} \\ &= \frac{x+3}{2(x+4)} \end{aligned}$$

2. Add/subtract and simplify completely

$$\begin{aligned} \text{a. } & \frac{2x}{x-3} - \frac{1}{x-3} \\ &= \frac{2x-1}{x-3} \end{aligned}$$

$$\begin{aligned} \text{b. } & \frac{5}{x} + \frac{2}{3x^2} \\ &= \frac{3x}{3x} \cdot \frac{5}{x} + \frac{2}{3x^2} \\ &= \frac{15x}{3x^2} + \frac{2}{3x^2} \\ &= \frac{15x+2}{3x^2} \end{aligned}$$

$$\begin{aligned} \text{c. } & \frac{3}{x+5} - \frac{4}{x+1} \quad \frac{(x+5)}{(x+5)} \\ &= \frac{3(x+1) - 4(x+5)}{(x+1)(x+5)} \\ &= \frac{3x+3 - 4x - 20}{(x+1)(x+5)} \\ &= \frac{-17-x}{(x+1)(x+5)} \end{aligned}$$

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$$\begin{aligned}
 \text{d. } & \frac{4x}{x^2-4} - \frac{3}{x+2} \\
 &= \frac{4x}{(x+2)(x-2)} - \frac{3}{x+2} \cdot \frac{(x-2)}{(x-2)} \\
 &= \frac{4x - 3(x-2)}{(x+2)(x-2)} \\
 &= \frac{x+6}{(x+2)(x-2)}
 \end{aligned}$$

$$\begin{aligned}
 \text{e. } & \frac{x}{x^2-x-30} - \frac{1}{x+5} \\
 &= \frac{x}{(x-6)(x+5)} - \frac{1}{x+5} \cdot \frac{(x-6)}{(x-6)} \\
 &= \frac{x - (x-6)}{(x-6)(x+5)} \\
 &= \frac{6}{(x-6)(x+5)}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } & \frac{x+2}{x-1} - \frac{2}{x+6} - \frac{14}{x^2+5x-6} \\
 &= \frac{(x+6)}{(x+6)} \cdot \frac{x+2}{x-1} - \frac{2}{x+6} \cdot \frac{(x-1)}{(x-1)} - \frac{14}{(x+6)(x-1)} \\
 &= \frac{(x+6)(x+2) - 2(x-1) - 14}{(x+6)(x-1)} \\
 &= \frac{x^2 + 8x + 12 - 2x + 2 - 14}{(x+6)(x-1)} \\
 &= \frac{x^2 + 6x}{(x+6)(x-1)} - \frac{x(x+6)}{(x+6)(x-1)} \\
 &= \frac{x}{x-1}
 \end{aligned}$$

3. Simplify the complex fraction.

$$\begin{aligned}
 \text{a. } & \frac{1 + \frac{1}{x}}{1 - \frac{1}{x}} \\
 &= \frac{\frac{x}{x} + \frac{1}{x}}{\frac{x}{x} - \frac{1}{x}} \\
 &= \frac{\frac{x+1}{x}}{\frac{x-1}{x}} \\
 &= \frac{x+1}{x} \cdot \frac{x}{x-1} = \frac{x+1}{x-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } & \frac{1 + \frac{1}{2x+1}}{\frac{4x}{2x+1}} \cdot \frac{x}{x} \\
 &= \frac{2x+1+x}{x(2x+1)} \cdot \frac{2x+1}{4x} \\
 &= \frac{3x+1}{x(2x+1)} \cdot \frac{2x+1}{4x} \\
 &= \frac{3x+1}{x(4x)} = \frac{3x+1}{4x^2}
 \end{aligned}$$

4. Solve the following and check for extraneous solutions.

$$\begin{aligned}
 \text{a. } & \frac{7}{x+3} = \frac{x}{4} \\
 & x^2 + 3x = 28 \\
 & x^2 + 3x - 28 = 0 \\
 & (x+7)(x-4) = 0 \\
 & \boxed{x = -7, 4}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } & \frac{2x-3}{x+3} = \frac{3x}{x+4} \\
 & (2x-3)(x+4) = 3x(x+3) \\
 & 2x^2 + 5x - 12 = 3x^2 + 9x \\
 & 0 = x^2 + 4x + 12 \\
 & x = \frac{-4 \pm \sqrt{16 - 4(1)(12)}}{2} \leftarrow \sqrt{\text{neg}} \\
 & \boxed{\text{No Solution}}
 \end{aligned}$$

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c. $\frac{3}{x} - \frac{2}{x+1} = \frac{4}{x}$

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

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

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

$$-1 = 3x$$

$$\boxed{-\frac{1}{3} = x}$$

d. $\frac{1}{x+2} + \frac{1}{x+2} = \frac{4}{x^2-4}$

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

$$x-2 + x-2 = 4$$

$$2x-4 = 4$$

$$\boxed{x = 4}$$

5. Determine what x values make the function undefined.

a. $\frac{2x}{x^2+8x+16}$
 $(x+4)^2$

$$x = -4$$

e. $\frac{1}{x-2} + \frac{1}{x+3} = \frac{5}{x^2+x-6}$
 $(x+3)(x-2)$

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

$$x+3 + x-2 = 5$$

$$2x+1 = 5$$

$$x = 2$$

extraneous

$$\boxed{\text{No solution}}$$

b. $\frac{5-x}{x^2+5x-50}$
 $(x+10)(x-5)$

$$x = -10, 5$$

