Algebra 2

Ch. 9 Handout 9.5

Adding/Subtracting Rational Expressions

A **complex fraction** is a fraction that has a fraction in its numerator or denominator or in both its numerator and denominator.

Examples: $$\frac{\left(\frac{1}{x}\right)}{\left(\frac{y}{1}\right)};\quad \frac{\left(3\right)}{\left(1-\frac{1}{2y}\right)};\quad \frac{\left(\frac{x-2}{x}-\frac{2}{x+1}\right)}{\left(\frac{3}{x-1}-\frac{1}{x+1}\right)}$$

Simplify each complex fraction.

12. $$\frac{\left(\frac{1(y)}{x(y)} + \frac{1(x)}{y(x)}\right)}{\left(\frac{2(x)}{y(x)} - \frac{1(y)}{x(y)}\right)} = \frac{\frac{y+x}{xy}}{\frac{2x-y}{xy}} = \left(\frac{y+x}{xy}\right) \div \left(\frac{2x-y}{xy}\right)$$

$$= \frac{y+x}{\cancel{xy}} \cdot \frac{\cancel{xy}}{2x-y}$$

$$= \boxed{\frac{y+x}{2x-y}}$$

Simplify each complex fraction.

13. $$\frac{\left(\frac{1}{x}\right)}{\left(\frac{y}{1}\right)} = \frac{1}{x} \div \frac{y}{1} = \frac{1}{x} \cdot \frac{1}{y} = \boxed{\frac{1}{xy}}$$

Simplify each complex fraction.

14. $$\frac{(3)}{\left(\frac{1}{1}\frac{(2y)}{(2y)} - \frac{1}{2y}\right)} = \frac{\frac{3}{1}}{\frac{2y-1}{2y}} = \left(\frac{3}{1}\right) \div \left(\frac{2y-1}{2y}\right)$$

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

$$= \boxed{\frac{6y}{2y-1}}$$

Simplify each complex fraction.

15. $$\dfrac{\dfrac{(x-2)(x+1)}{x(x+1)} - \dfrac{2(x)}{(x+1)(x)}}{\dfrac{3(x+1)}{(x-1)(x+1)} - \dfrac{1(x-1)}{(x+1)(x-1)}} = \dfrac{\dfrac{(x-2)(x+1) - 2x}{x(x+1)}}{\dfrac{3(x+1) - (x-1)}{(x-1)(x+1)}}$$

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

$$= \dfrac{x^2-3x-2}{x\cancel{(x+1)}} \cdot \dfrac{(x-1)\cancel{(x+1)}}{2(x+2)} = \boxed{\dfrac{(x-1)(x^2-3x-2)}{2x(x+2)}}$$

Simplify each complex fraction.

$$\frac{\left(\frac{1(y)}{xy(y)} - \frac{1(x)}{y^2(x)}\right)}{\left(\frac{1(y)}{x^2y(y)} - \frac{1(x)}{xy^2(x)}\right)} = \frac{\left(\frac{y-x}{xy^2}\right)}{\left(\frac{y-x}{x^2y^2}\right)} = \left(\frac{y-x}{xy^2}\right) \div \left(\frac{y-x}{x^2y^2}\right)$$

$$= \frac{\cancel{(y-x)}}{\cancel{x}\cancel{y^2}} \cdot \frac{\overset{x}{\cancel{x^2}}\cancel{y^2}}{\cancel{(y-x)}} = \boxed{x}$$

Pg 518 (22-30, 44-49)