Name: _____

Complex Rational Functions

Exercise 1: Simplify the following. No answers should contain negative exponents.

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

2) $\dfrac{\frac{a}{4}-\frac{a}{5}}{\frac{a}{3}+\frac{a}{4}}$

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

4) $\dfrac{\frac{5}{3x}-\frac{1}{3}}{\frac{25-x^2}{x}}$

5) $\dfrac{\frac{2}{a}+\frac{3}{b}}{\frac{5}{a}-\frac{4}{b}}$

6) $\dfrac{\frac{7}{x}-\frac{2}{y}}{\frac{3}{x}+\frac{4}{y}}$

7) $\dfrac{x-\frac{6}{x-1}}{x-\frac{9}{x}}$

8) $\dfrac{x-\frac{4}{x}}{x+\frac{10}{x+7}}$

9) $\dfrac{\frac{2}{x-5}-\frac{3}{x+5}}{\frac{2}{x^2-25}}$

10) $\dfrac{\frac{6x}{x^2+x-2}}{\frac{4}{x+2}-\frac{1}{x-1}}$

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

12) $\dfrac{\frac{2}{x+1}-\frac{5}{x-2}}{\frac{3}{x-2}+\frac{2}{x}}$

13) $\dfrac{x+2-\frac{15}{x}}{x-7+\frac{12}{x}}$

14) $\dfrac{x+9+\frac{14}{x}}{x+6-\frac{7}{x}}$

Exercise 2: Rewrite the expression so that it contains positive exponents rather than negative exponent then simplify it.

1) $\dfrac{x^{-1}}{x^{-1}+1}$

2) $\dfrac{3-x^{-1}}{x^{-1}}$

3) $\dfrac{x^{-1}+y^{-1}}{x^{-1}-y^{-1}}$

4) $\dfrac{c^{-1}+d^{-1}}{c^{-2}+d^{-2}}$

5) $\dfrac{x^{-2}-y^{-2}}{x^{-1}+y^{-1}}$

6) $\dfrac{a^{-1}-b^{-1}}{b^{-2}-a^{-2}}$

7) $\dfrac{c^{-1}-d^{-1}}{c^{-3}-d^{-3}}$

8) $\dfrac{x^{-3}+y^{-3}}{x^{-1}+y^{-1}}$

9) $\dfrac{a^{-3}+b^{-3}}{a^{-2}+b^{-2}}$

10) $\dfrac{x^{-2}-y^{-2}}{x^{-3}+y^{-3}}$

11) $1+\dfrac{1}{1+x^{-1}}$

12) $1-\dfrac{1}{1+x^{-2}}$

13) $4-\dfrac{5}{5+x^{-1}}$

14) $\dfrac{2}{2+x^{-1}}-3$

Exercise 3: Let $f(x)=\dfrac{81x^2-49}{3x^2+16x+5}$ and $g(x)=\dfrac{7-9x}{18x+6}$.

1) Find the domain of $f(x)$ and $g(x)$
2) Find an equation of the product function $f(x)\bullet g(x)$.
3) Find an equation of the quotient function $\dfrac{g(x)}{f(x)}$.

Exercise 4: Let $f(x)=2-\dfrac{5}{x+2}$ and $g(x)=\dfrac{x}{x+2}+\dfrac{x+1}{x^2-4x-12}$.

1) Find the domain of $f(x)$ and $g(x)$
2) Find an equation of the quotient function $\dfrac{f(x)}{g(x)}$.