H. Algebra II Semester II Review
Part 5 – Rational Functions

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5.a Manipulating Rational Expressions and Complex Fractions

Simplify the following rational expressions.

1. $\frac{x}{x-1}-\frac{1}{x+1}$

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

3. $\frac{\frac{2}{3}-\frac{5}{6}}{\frac{1}{3}+\frac{2}{9}}$

4. $\frac{\frac{1}{x^2}-\frac{1}{y^2}}{\frac{1}{x^2}+\frac{2}{xy}+\frac{1}{y^2}}$

Simplified expressions should only contain one ratio, should not have complex fractions and all fractions should be reduced.

5.b Solving Rational Equations

Solve the following rational equations

1. $\frac{3}{x}+\frac{x}{x-2}=\frac{12}{x^2-2x}$

2. $\frac{x(x-4)}{15}+\frac{1}{4}=0$

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

4. $\frac{2x^2-5x-3}{x^3-2x^2-x+2}=0$

Take note of restrictions on x due to division by zero before you begin solving. Screen your answers for these values to avoid extraneous solutions.

5.c Rational Function Characteristics and Graphs

First find the listed characteristics of the following rational functions, then sketch a graph of the function.

Characteristics:

- **domain**
- **x-Intercept(s)**
- **y-intercept**
- **vertical asymptote(s)**
- **horizontal asymptote**
- **hole discontinuities**

1. $f(x)=\frac{3x-1}{3x^2+20x-7}$

2. $f(x)=\frac{4x^2}{x^2+1}$

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

4. $f(x)=\frac{x^2+3x}{x^2+x-6}$