Math 120 Intermediate Algebra
Rational Expressions and Functions: Multiplying and Dividing

Defn A polynomial divided by another nonzero polynomial is called a rational expression. If \( P \) and \( Q \) are polynomials in \( x \) with \( Q \neq 0 \), then \( r(x) = \frac{p}{q} \) is called a rational function.

Ex 1 Multiply to obtain equivalent expressions. Do not simplify.
\[
\frac{x-4}{x+5} \cdot \frac{x-5}{x-5}
\]

Ex 2 Simplify by removing a factor equal to 1.

a) \( \frac{10yz^4}{40y^2z^9} \)

b) \( \frac{21}{6x-9} \)

Ex 3 Simplify. List all restrictions on the domain.
\[
g(x) = \frac{8x-16}{x^2-4}
\]

Ex 4 Multiply or divide and simplify if possible.

a) \( \frac{y^2+10y+25}{y^2-9} \cdot \frac{y^2+3y}{y+5} \)

b) \( \frac{a^3-b^3}{3a^2+9ab+6b^2} \cdot \frac{a^2+2ab+b^2}{a^2-b^2} \)

c) \( \frac{4a^2-1}{a^2-4} \div \frac{2a-1}{2-a} \)

d) (if time permits) \( \frac{5x^2-5y^2}{27x^3+8y^3} \div \frac{x^2-2xy+y^2}{9x^2-6xy+4y^2} \cdot \frac{6x+4y}{10x-15y} \)

Probs from \( \frac{1}{x} \) Handout

Good Exercises:

- \( f(x) = \frac{1}{2} (x + 1)^3 \)
- \( g(x) = \frac{3}{4} |x + 2| \)
- \( h(x) = -\frac{1}{3} (x + 1)^2 - 2 \)