## Exam 5 Review

Note: This is not a complete list of topics – you should study your lecture notes and homework in addition to reviewing the items listed here.

- 1. vocabulary
  - a. rational expression
  - b. simplify
  - c. factor
  - d. LCD
  - e. domain
- 2. finding the domain
  - a. Determine which values make the denominator equal to zero, and <u>exclude</u> those.
  - b. domain:  $\{x \mid x \neq \_, \_\}$
- 3. simplifying factor and reduce any common factors

$$\underbrace{\text{ex}} \quad \frac{x^2 + 3x + 2}{x^2 - 4} = \frac{(x+1)(x+2)}{(x+2)(x-2)} = \frac{x+1}{x-2}$$

4. multiplying – factor and reduce before multiplying

$$\underbrace{\text{ex}} \quad \frac{x^2 + 3x + 2}{x^2 - 4} \cdot \frac{x^2 - 2x}{x} = \frac{(x+1)(x+2)}{(x+2)(x-2)} \cdot \frac{x(x-2)}{x} = x+1$$

5. dividing – multiply by the reciprocal

$$\boxed{ex} \quad \frac{x^2 + 3x + 2}{x^2 - 4} \div \frac{x^2 - 5x - 6}{x} = \frac{(x + 2)(x + 1)}{(x + 2)(x - 2)} \cdot \frac{x}{(x - 6)(x + 1)} = \frac{x}{(x - 2)(x - 6)}$$

- 6. finding the LCD
  - a. factor each denominator as completely as possible
  - b. list each factor along with the highest power that appears
  - c. *LCD* = product of those factors

$$\underbrace{ex} \quad \frac{4}{x+2} + \frac{x}{(x-1)^2} - \frac{x^2}{x^2 + x - 2}$$
$$x+2 = (x+2)$$
$$(x-1)^2 = (x-1)^2$$
$$x^2 + x - 2 = (x+2)(x-1)$$
$$LCD = (x+2)(x-1)^2$$

## 7. adding/subtracting

- a. find the LCD
- b. build each expression up so it has the LCD
- c. add/subtract
- d. simplify (if possible)

- 8. simplifying complex rational expressions
  - a. find the LCD of the individual rational expressions
  - b. multiply the overall numerator and denominator by the LCD
  - c. simplify and reduce (if possible)

$$\frac{x}{\frac{y}{\frac{x}{x}+y}}{x} \qquad \qquad LCD = xy$$

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

- 9. solving rational equations
  - a. find the LCD
  - b. multiply both sides of the equation by the LCD
  - c. simplify and solve
  - d. check (be sure your solution does not make a denominator zero in the original equation)

$$\begin{array}{l} \overbrace{x} x + \frac{6}{x} = -7 \\ LCD = x \\ x \left( x + \frac{6}{x} \right) = x(-7) \\ x \cdot x + x \cdot \frac{6}{x} = x(-7) \\ x^2 + 6 = -7x \end{array} \qquad \begin{array}{l} x^2 + 7x + 6 = 0 \\ (x + 1)(x + 6) = 0 \\ x + 1 = 0 \quad or \quad x + 6 = 0 \\ x = -1, -6 \end{array}$$