6.1 Reducing Rational Expressions to Lowest Terms
Rational Expressions

- Rational expression – a quotient, $p/q$, of 2 polynomials $p$ and $q$ where $q \neq 0$
- Recall: 
  
  $#/0$ is undefined (zero under is undefined)
- Example: $1/x$
- To find where an expression is undefined, we want to see where the denominator $= 0$
- We can then put restrictions on it such that $x \neq$ undefined point
- Finding the domain is defining what the “input” can be so we have valid “output”
Examples

Find where the expression is undefined.

1. \( x^2 + 4x - 5/(x-4) \)

2. \( (x^2 -3x -4)/(x^2 - 18x +77) \)
Simplifying Rational Expressions

- Simplifying means reducing or factoring out any/all common factors until none remain.
- Find undefined points with original denominator not reduced form

Examples
1. \( \frac{6}{10} \)
2. \( \frac{48t^5}{56t^{11}} \)
3. \( \frac{(p^2 - 25)}{(p^2+10p+25)} \)
Ratios

- Ratio - comparison of two quantities.
- The ratio of a to b is written a/b or a:b or a to b
- Write the ratio in the order given
- Simplifying ratios - reduce to lowest terms but always leave as a fraction (never a mixed #)
- Rate - ratio that compares 2 different kinds of measure. Denominator is always = 1
  Ex:  mi/hr  beats/min  $/lb
- Most common rate equation  \( r = \frac{d}{t} \)
Examples

- Find the given rate.
  1. 146mi/4hr
  2. 36 servings/8 lb
  3. $1.62/1.25 lb