

## R. 1 Introduction to Algebraic Expressions

Topics include:

- Sets of numbers
  - Natural #'s:  $\{1, 2, 3, \dots\}$
  - Whole #'s:  $\{0, 1, 2, 3, \dots\}$
  - Integers:  $\{\dots - 3, - 2, - 1, 0, 1, 2, 3, \dots\}$
  - Rational #'s:  $\{n \mid n = a/b, \text{ where } a \text{ and } b \text{ are integers, } b \neq 0\}$
- Order of Operations
  1. Parentheses/Grouping Symbols (including radicals, absolute value, etc.)
  2. Exponents
  3. Multiply & Divide
  4. Add & Subtract

**Example a:** Simplify  $11 + \frac{|3-19|}{3^2-1} - 7$

*grouping*  
*exponent*  
*divide*

$$11 + \frac{|-16|}{9-1} - 7 = 11 + \frac{16}{8} - 7$$
$$= 11 + 2 - 7 = 13 - 7 = 6$$

- Laws/Properties:
  - Commutative
    - Addition:  $a + b = b + a$
    - Multiplication:  $ab = ba$
  - Associative
    - Addition:  $(a + b) + c = a + (b + c)$
    - Multiplication:  $(ab)c = a(bc)$
  - Distributive:  $a(b + c) = ab + ac$
  - Identity
    - Addition:  $0 + a = a \rightarrow$  additive identity is 0
    - Multiplication:  $1 \times a = a \rightarrow$  multiplicative identity is 1
  - Inverse
    - Addition:  $a + (-a) = 0 \rightarrow$  additive inverse is -a
    - Multiplication:  $a \times (1/a) = 1 \rightarrow$  multiplicative inverse is  $\frac{1}{a}$
  - Multiplication by 0:  $0 \times a =$
  - Multiplication by -1:  $-1 \times a = -1(a) =$  -a
- Equivalent fractions  $\rightarrow$  both reduced forms will generally be accepted on tests

$$\frac{100}{6} = 16\frac{4}{6} = \frac{50}{3} = 16\frac{2}{3}$$

- Combining like terms;

**Ex b** Simplify:  $(4x^2 + x - 5) - 2(x^2 - 7x - 3)$

*distribute - and 2*

$$4x^2 + x - 5 - 2x^2 + 14x + 6$$
$$\underline{\hspace{10em}}$$
$$2x^2 + 15x + 1$$

