Algebra and Function Review

Name: _____ Section: _____

The Order of Operations Matter!

- When reading an expression, you must follow **PEMDAS**:
  1. Group any expression in **P**arenthesis (or any other grouping symbols)
  2. attach **E**xponents
  3. apply **M**ultiplication and **D**ivision as you read Left to Right
  4. apply **A**ddition and **S**ubtraction as you read from Left to Right.
- You already know $2 + 1^3 = 3$ whereas $(2 + 1)^3 = 27$. Thus $x + y^3 \neq (x + y)^3$.

  Similarly, $2 * 3^2 = 18$ whereas $(2 * 3)^2 = 36$. Thus xy^2 does not equal $(xy)^2 = x^2 * y^2$.
- These ideas also show that $5 - x^2/x + y = 5 - x + y$ does not equal $(5 - x^2)/(x + y) = \dfrac{5 - x^2}{x + y}$.
- To ***rewrite*** any expression or equation, you must apply a **valid rule of algebra**.

Rules for Fractions

Let $b, e \neq 0$ in the following.

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b} \qquad \frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$$

$$\frac{a}{b} \cdot \frac{c}{e} = \frac{a \cdot c}{b \cdot e} \qquad \frac{1}{\frac{a}{b}} = \frac{b}{a}$$

$$\frac{a}{b} = \frac{a \cdot e}{b \cdot e} \qquad \frac{a \cdot c}{b} = a \cdot \frac{c}{b}$$

Rules for Exponents

Let $a, b > 0$ in the following.

$$a^r \cdot a^s = a^{r+s} = a^{(r+s)} \qquad a^{r-s} = \frac{a^r}{a^s}$$

$$(a^r)^s = a^{r \cdot s} = a^{(r \cdot s)} \qquad a^{-s} = \frac{1}{a^s}$$

$$(a \cdot b)^r = a^r \cdot b^r \qquad a^s = \frac{1}{a^{-s}}$$

$$\sqrt[r]{a \cdot b} = \sqrt[r]{a} \cdot \sqrt[r]{b} \qquad \sqrt[r]{a} = a^{1/r}$$

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Rules for Rewriting *Equations*

- To rewrite an equation (something with an = sign), you can
  - Add (or subtract) the same real number to (from) both sides of the equation.
  - Multiply (or divide) both sides of the equation by the same **nonzero** real number.
- Because a variable (like x) can take on *any* real number, *including* 0, multiplying or dividing both sides of an equation by a variable ***might*** change the equation.
- Think about why *multiplying* by a variable might *add* a solution and why *dividing* by a variable might *eliminate* a solution. How can you tell if this happens?

Graphs of Common Functions