

Chapter 1.3: Simplifying & Evaluating

As we go through the year re-exploring old concepts and learning new ones, you will have to be adept at manipulating expressions using skills you have learned in the past. This mathematical agility, if you've lost it or never had it, comes through a simple 3-step procedure: practice, practice, practice.

We simplified expressions involving exponents in section 1.1. In general, simplifying an expression is making it as concise, small, pretty, and efficient as possible. This includes, but is not limited to combining like terms, combining & dividing out common factors, eliminating complex fractions, and sometimes rationalizing a numerator or denominator.

Example 1:

Simplify the following radical expressions by combining like radicals

(a) $\sqrt{32} + \sqrt{200}$

(b) $\sqrt[5]{96} + \sqrt[5]{3}$

Example 2:

Simplify by rationalizing.

(a) $\frac{2}{\sqrt{3}}$

(b) $\frac{\sqrt{12}}{4}$

(c) $\frac{2}{\sqrt[3]{x^2}}$

(d) $\sqrt[4]{\frac{1}{3}}$

(e) $\frac{14}{3-\sqrt{2}}$

Example 3:

Simplify the following rational expressions

$$(a) \frac{4y^2 - 9}{2y^2 + 9y - 18} \div \frac{2y^2 + y - 3}{y^2 + 5y - 6}$$

$$(b) \frac{\frac{x^3}{x+1}}{\frac{x}{x^2 + 2x + 1}}$$

$$(c) \frac{1}{x+5} + \frac{2}{x-3}$$

$$(d) \frac{\frac{x}{y} - \frac{y}{x}}{x^{-2} - y^{-2}}$$

Example 4:

If $f(x) = 3x^2 + 2x - 4$ and $h(x) = 5 - 4x$, evaluate and simplify the following:

(a) $f(-2)$

(b) $h(f(x))$

(c) $(f \circ h)(x)$

(d) $h(f^2(-1))$

(d) $h^2(x)$

(e) $h(h(h(x)))$

(g) $\frac{f(x+h) - f(x)}{h}$