

Chp 0 (Review)

Order of operations

P (parentheses)

E (exponents)

MD (multiplication and division)

AS (addition and subtraction)

> from left to right

Number Systems

\mathbb{N} = natural #s

\mathbb{W} = whole #s

\mathbb{Z} = integers

\mathbb{Q} = rational #s

\mathbb{R} = real #s

Interval Notation

$-\infty < x < a$, $(-\infty, a)$

$a < x < \infty$, (a, ∞)

$a < x < b$, (a, b)

$a \leq x \leq b$, $[a, b]$

$b \leq x < a$, $[b, a)$

$a < x \leq b$, $(a, b]$

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Set notation

\cap	intersection	$(A \cap B)$
\cup	union	$(A \cup B)$
c	complement	(A^c)
$-$	subtraction	$(A - B)$

Ex 1 Evaluate

(a)
$$\frac{(-5)(-3) - (-2)(3)}{-9+2}$$

(b)
$$\frac{|3 - |4-1||}{-|5^2 - 3^2|}$$

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Rules of Exponents

Example

$$\textcircled{1} a^0 = 1 \quad \underline{\underline{\text{if}}} \quad a \neq 0$$

$$\textcircled{2} a^m \cdot a^n = a^{m+n}$$

$$\textcircled{3} \frac{a^m}{a^n} = a^{m-n} \quad (a \neq 0)$$

$$\textcircled{4} (ab)^m = a^m b^m$$

$$\textcircled{5} \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

$$\textcircled{6} (a^m)^n = a^{mn}$$

* 0^0 undefined ... but why?

$$\textcircled{7} a^{-n} = \frac{1}{a^n} \quad (a \neq 0)$$

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Ex 2 Simplify

(a) $(-32x^5)^{-3}$

(b) $\left(\frac{4x^{-1}y^{-40}}{2^{-2}x^4y^{-10}}\right)^{-2}$

(c) $\left(\frac{-2}{5}\right)^{-4}$

(d) $(-8a^{-3}b^2c) \div (2a^5b^4)$

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Rational Exponents

$$\textcircled{1} \sqrt[n]{a} = b \Leftrightarrow a = b^n$$

(principal n^{th} root)

$$\textcircled{2} a^{1/n} = \sqrt[n]{a}$$

$$\textcircled{3} a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

Ex 3 Simplify

$$(a) (-8)^{-2/3}$$

$$(b) (x^{-2/3})^{-2/5}$$

$$(c) x^{-2} \cdot x^{5/3}$$

$$(d) \sqrt{32x^5y}$$

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Ex 4 simplify.

(a) $\sqrt[3]{16x^2y} \sqrt[3]{3x^2y}$

(b) $\frac{\sqrt[3]{-16x^3y^4}}{\sqrt[3]{128y^2}}$

(c) $\frac{\sqrt[4]{mx^3}}{\sqrt[4]{y^2w^5}}$ (rationalize denominator)

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Polynomials

$$a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0$$

$$a_i \in \mathbb{R}$$

$n = \text{degree}$

a_i are all coefficients

$a_n = \text{leading coefficient}$

Ex 5 Simplify

(a) $2(x^3 + 3)(2x^3 - 5)$

(b) $(16x^2 + 4xy^2 + 8x) \div (4xy)$

(c) $(x^4 + 3x^3 - x + 1) \div (x^2 + 1)$

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Ex 6 Factor completely.

(a) $x^2 + 6x + 8$

(b) $4x^2 - 8x - 60$

(c) $x^4 - 3x^2 - 4$

(d) $x^3 + 6x^2 + 12x + 8$

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Fractions (Polynomial)

Ex 7 Simplify.

$$(a) \frac{x^2y^2 - 4x^3y}{x^2y - 2x^2y^2}$$

$$(b) \frac{x^2 - 5x - 6}{x^2 - 5x + 4} \cdot \frac{x^2 - x - 12}{x^3 - 6x^2} \cdot \frac{x - x^3}{x^2 - 2x + 1}$$

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

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EX 8 Simplify.

$$(a) \frac{1 - \frac{2}{x-2}}{x-6 + \frac{10}{x+1}}$$

$$(b) \frac{x^{-2} + xy^{-2}}{(x^2y)^{-2}}$$

$$(c) \frac{x-3}{x-\sqrt{3}}$$

(rationalize denominator)