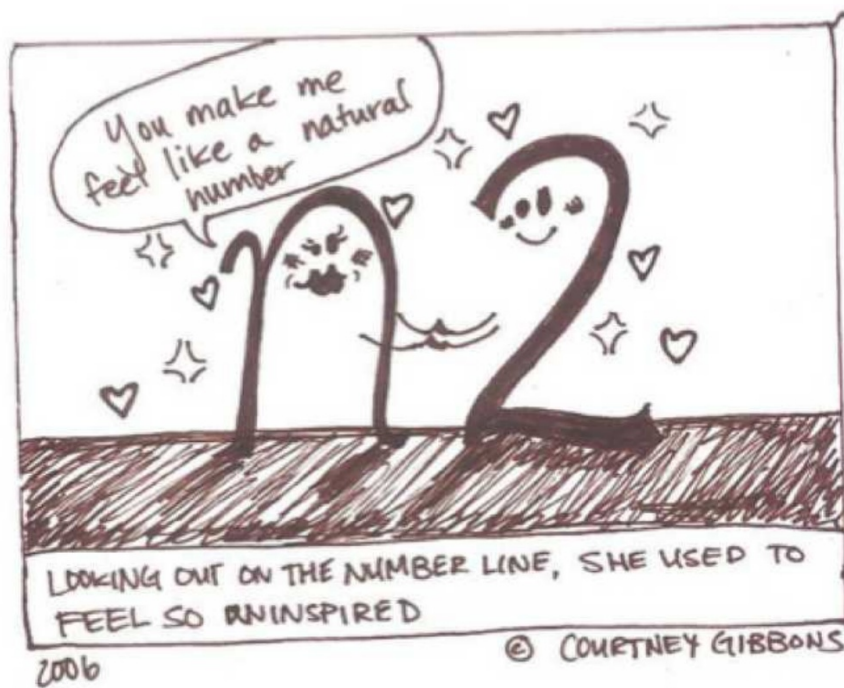


3.2 cont. Simplifying nth Roots



ex: Simplify. If no real value exists, write "nonreal."

a) $\sqrt[3]{40}$

b) $-\sqrt[4]{162}$

c) $\sqrt[5]{-250}$

ex: Simplify. If no real value exists, write "nonreal."

$$\text{a) } \sqrt[3]{40} = \sqrt[3]{8} \sqrt[3]{5} = 2\sqrt[3]{5}$$

$$\text{b) } -\sqrt[4]{162} = -\sqrt[4]{81} \sqrt[4]{2} \\ = -3\sqrt[4]{2}$$

$$\text{c) } \sqrt[5]{-250} = -\sqrt[5]{250}$$

ex: Simplify. If no real value exists, write "nonreal."

d) $\frac{5}{\sqrt[3]{25}}$

e) $-25^{3/2}$

f) $(-25)^{3/2}$

ex: Simplify. If no real value exists, write "nonreal."

$$d) \frac{5}{\sqrt[3]{25}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}} = \frac{5\sqrt[3]{5}}{5} = \sqrt[3]{5}$$

$$e) -25^{3/2} = -1 \cdot 25^{3/2} = -125 \quad 25^{3/2} = (\sqrt{25})^3$$

$$f) (-25)^{3/2} = \sqrt[2]{(-25)^3} \text{ nonreal}$$

Simplifying nth Roots Involving Variables

$$\sqrt{3^2}$$

↓

$$3$$

$$\sqrt[n]{x^n} = \begin{cases} |x|, & \text{if } n \text{ is even} \\ x, & \text{if } n \text{ is odd} \end{cases}$$

$$\sqrt{(-3)^2}$$

↓

$$\sqrt{9}$$

↓

$$3$$

ex: Simplify. Use absolute value when necessary. *← only with even indexes*

$$\begin{aligned} \text{a) } \sqrt[3]{x^4} &= \sqrt[3]{x^3 \cdot x^1} \\ &= x\sqrt[3]{x} \end{aligned}$$

$$\sqrt[3]{\cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x} = x\sqrt[3]{x}$$

ex: Simplify. Use absolute value when necessary.

$$\text{b) } \sqrt[5]{x^{22}} = \sqrt[5]{x^{20}x^2}$$
$$x^4 \sqrt[5]{x^2}$$

$$\text{c) } \sqrt[7]{x^{17}} = x^2 \sqrt[7]{x^3}$$

$$\text{d) } \sqrt[9]{x^{21}} = x^2 \sqrt[9]{x^3}$$

ex: Simplify. Use absolute value when necessary.

e) $\sqrt[3]{16x^4y^6z^2}$

$$2xy^2\sqrt[3]{2xz^2}$$

f) $\sqrt[5]{-96xy^{10}z^{14}} = -2y^2z^2\sqrt[5]{3xz^4}$

ex: Simplify. Use absolute value when necessary.

$$g) \sqrt{x} = \sqrt{x}$$

$$h) \sqrt{x^4} = |x^2| = x^2$$

$$i) \sqrt{x^6} = |x^3|$$

ex: Simplify. Use absolute value when necessary.

$$j) \sqrt[4]{x^8} = x^2$$

$$\sqrt[4]{2^5}$$

$$\sqrt[4]{(-2)^5}$$

$$k) \sqrt[4]{x^5}$$

$$x \sqrt[4]{x}$$

ex: Simplify. Use absolute value when necessary.

$$l) \sqrt[6]{x^6 y^{12} z^{20}}$$

$$|x y^2 z^3| \sqrt[6]{z^2}$$

$$|x z^3| y^2 \sqrt[6]{z^2}$$

$$m) \sqrt[4]{48x^3 y^{12} z^{24}} = 2|y^3| z^6 \sqrt[4]{3x^3}$$

ex: Simplify. Use absolute value when necessary.

n) $\sqrt{200x^3y^4z^2}$ *x is positive*

$|10xy^2z|\sqrt{2x}$

o) $\sqrt[3]{-16xy^3z^{10}} = -2yz^3\sqrt[3]{2xz}$

Review

Simplify.

$$-81^{\frac{3}{4}}$$

Review

Simplify.

$$\frac{10}{\sqrt[5]{-16}}$$

Review

Between which two consecutive integers does the expression lie?

$$\sqrt[3]{-7}$$

Review

Between which two consecutive integers does the expression lie?

$$4^{3/4}$$