$$\sqrt[4]{81} < \sqrt[4]{125} < \sqrt[4]{256}$$

$\boxed{3, 4}$

1^4

2^4

3^4

4^4

29.) $\left(\sqrt[4]{16}\right)^{-7}$

$$2^{-7} = \frac{1}{2^7} = \frac{1}{128}$$

49)

$$x^4 = 81$$

$$x = \pm 3$$

$$x^2 = 81$$

$$x = \pm 9$$

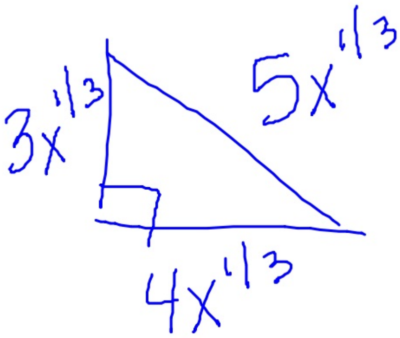
69.) $-\frac{1}{6}\sqrt{4x} - \frac{1}{6}\sqrt{9x}$

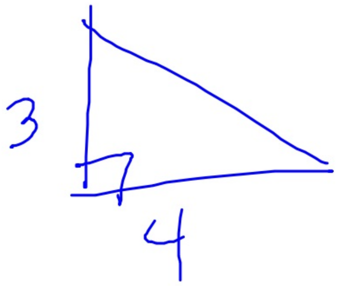
$-\frac{2}{6}\sqrt{x} - \frac{3}{6}\sqrt{x}$

$-\frac{5}{6}\sqrt{x}$

20) $\dfrac{\sqrt{3}}{\sqrt{75}} = \dfrac{1}{\sqrt{25}} = \dfrac{1}{5}$

68.





$$P = 12x^{1/3}$$

$$A = \frac{1}{2}(4x^{1/3})(3x^{1/3})$$

$$= 6x^{2/3}$$

30.) $6\sqrt[3]{5} + 4\sqrt[3]{625}$

$+ 4\sqrt[3]{125}\sqrt[3]{5}$

$6\sqrt[3]{5} + 20\sqrt[3]{5}$

$26\sqrt[3]{5}$

21.) $\dfrac{\sqrt[4]{36} \cdot \sqrt[4]{9}}{\sqrt[4]{4}}$

$\sqrt[4]{9} \cdot \sqrt[4]{9}$

$\sqrt[4]{81}$

3

$$-6\sqrt[7]{2} + 2\sqrt[7]{256}$$

$$-6\sqrt[7]{2} + 2\sqrt[7]{128}\cdot\sqrt[7]{2}$$

12.) $\dfrac{3\sqrt{7^3}+4\sqrt{7^3}}{\sqrt{7^3}}$

$$\frac{7\sqrt{7^3}}{\sqrt{7^5}} = \frac{7}{\sqrt{7^2}} = \frac{7}{7}$$

$$= 1$$

$$\frac{\sqrt[5]{12}}{\sqrt[5]{256}} = \frac{\sqrt[5]{3}}{\sqrt[5]{64}} \cdot \frac{\sqrt[5]{16}}{\sqrt[5]{16}}$$

$$\frac{\sqrt[5]{48}}{4}$$

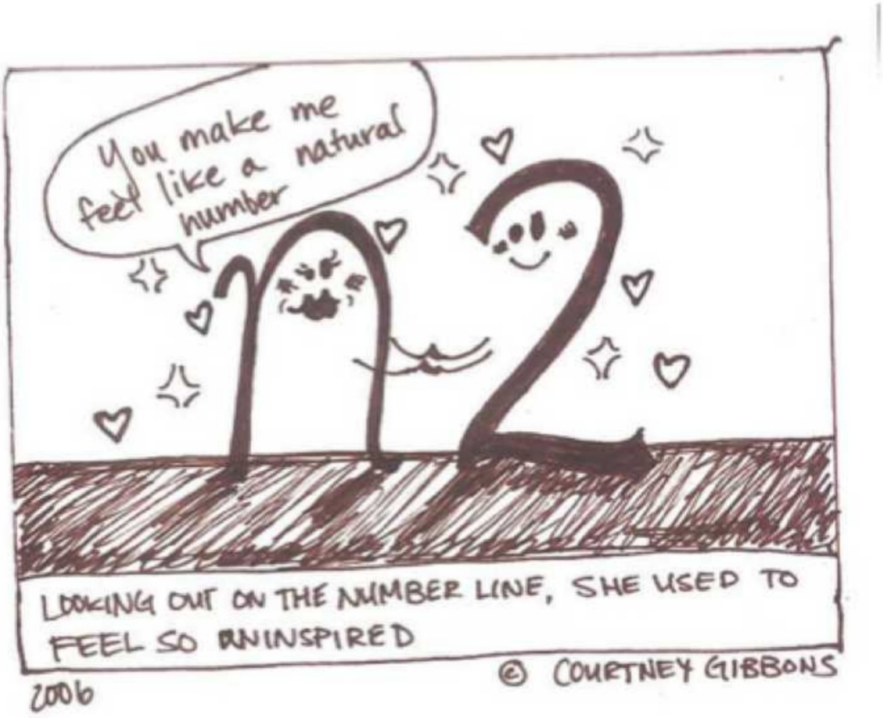
b) $10\left(\sqrt[3]{54}\right)^{-1}$

$$\frac{10}{\sqrt[3]{54}} = \frac{10}{\sqrt[3]{27}\cdot\sqrt[3]{2}}$$

$$\frac{10}{3\sqrt[3]{2}}\cdot\frac{\sqrt[3]{4}}{\sqrt[3]{4}} = \frac{10\sqrt[3]{4}}{6} = \frac{5\sqrt[3]{4}}{3}$$

8^{213}

3.2 cont. Simplifying nth Roots



HW:

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

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

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

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

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

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

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

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

Simplifying nth Roots Involving Variables

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

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

$\sqrt[3]{2^3} = 2$

$\sqrt[4]{(-3)^4}$

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

$\sqrt[4]{3^4}$

$\sqrt[3]{x^3}$

-2

ex: Simplify. Use absolute value when necessary.

a) $\sqrt[3]{x^4} = \sqrt[3]{xxxx} = \sqrt[3]{x^3} \cdot x$

$x\sqrt[3]{x}$

ex: Simplify. Use absolute value when necessary.

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

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

$= x^2 \sqrt[7]{x^3}$

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

ex: Simplify. Use absolute value when necessary.

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

$\sqrt[3]{8 \cdot 2(x)^3 \cdot x(y^2)^3 z^2} = 2xy^2\sqrt[3]{2xz^2}$

$32 \cdot 3$

f) $\sqrt[5]{-96xy^{10}z^{14}}$

$-2y^2z^2\sqrt[5]{3xz^4}$

ex: Simplify. Use absolute value when necessary.

even/even/odd

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

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

$\sqrt{3^4} = \sqrt{81} = 9$

$\sqrt{(-3)^4} = \sqrt{81} = 9$

i) $\sqrt[2]{x^6} = |x^3|$

$\sqrt{(2)^6} = 8$

$\sqrt{(-2)^6} = 8$

ex: Simplify. Use absolute value when necessary.

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

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

ex: Simplify. Use absolute value when necessary.

l) $\sqrt[6]{x^6y^{12}z^{20}}$ $= |x|y^2|z^3|\sqrt[6]{z^2}$

$\sqrt[6]{(z^3)^6 z^2}$ $|xz^3|y^2\sqrt[6]{z^2}$

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

$2|y^3|z^6\sqrt[4]{3x^3}$

ex: Simplify. Use absolute value when necessary.

n) $\sqrt{200x^3y^4z}$

$10xy^2\sqrt{2xz}$

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

$-2yz^3\sqrt[3]{2xz}$

Review

Simplify.

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

-27

Review

Simplify.

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

$-5\sqrt[5]{2}$

Review

Between which two consecutive integers does the expression lie?

$\cancel{\sqrt[3]{-7}}$ $\sqrt[4]{-20}$

N|A

Review

Between which two consecutive integers does the expression lie?

$$\cancel{4^{3/4}} \qquad 2^{4/3} = \sqrt[3]{16}$$

2, 3