10/22/2012 - Sec 8.3 Math 1010

8.2 # ~~80~~

~~70~~

~~60~~

~~90~~

95

#60

$$\frac{\sqrt[4]{w^3}}{\sqrt[6]{w}} = \frac{w^{3/4}}{w^{1/6}} = w^{3/4 - 1/6}$$

$$= w^{7/12} \leftarrow \text{index of Radical}$$

$$\frac{3 \cdot 3}{3 \cdot 4} - \frac{1 \cdot 2}{6 \cdot 2}$$

$$\frac{9}{12} - \frac{2}{12} = \frac{7}{12}$$

$$\boxed{\sqrt[12]{w^7}}$$

#70

$$2 + 3/4 = 11/4$$

$$\frac{z^{3/4}}{z^{5/4} \cdot z^{-2}} = \frac{z^{3/4} \cdot z^{2}}{z^{5/4}}$$

$$= \frac{z^{11/4}}{z^{5/4}} \qquad \frac{11}{4} - \frac{5}{4}$$

$$\frac{6}{4} = \frac{3}{2}$$

$$= \boxed{z^{3/2}}$$

Product Rule

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

Quotient Rule

$$\frac{a^m}{a^n} = a^{m-n}$$

Negative Exp

$$a^{-n} = \frac{1}{a^n}$$

$$\frac{1}{a^{-n}} = a^n$$

#80

$$\left(\frac{m^{-2/3}}{a^{-3/4}}\right)^4 \left(m^{-3/8} a^{1/4}\right)^{-2}$$

$$\left(\frac{a^{3/4}}{m^{2/3}}\right)^4 \left(\frac{a^{1/4}}{m^{3/8}}\right)^{-2}$$

$$\left(\frac{a^{3/4}}{m^{2/3}}\right)^4 \left(\frac{m^{3/8}}{a^{1/4}}\right)^{2}$$

$$\frac{a^{\frac{3}{4}\cdot 4}}{m^{\frac{2}{3}\cdot 4}} \cdot \frac{m^{\frac{3}{8}\cdot 2}}{a^{1/4 \cdot 2}}$$

$$\frac{a^3 \cdot m^{3/4}}{m^{8/3} \cdot a^{1/2}}$$

$$\frac{a^3 m^{3/4}}{m^{8/3} a^{1/2}}$$

$$a^{3-\frac{1}{2}} \quad m^{3/4 - 8/3}$$

$$\frac{3 \cdot 3}{3 \cdot 4} - \frac{8 \cdot 4}{3 \cdot 4}$$

$$\frac{9}{12} - \frac{32}{12}$$

$$a^{5/2} \quad m^{-23/12} = \boxed{\frac{a^{5/2}}{m^{23/12}}}$$

#90 $-8y^{11/7}\left(y^{3/7} - y^{-4/7}\right)$

$\underbrace{-8y^{11/7}y^{3/7}} - \underbrace{(-8)y^{11/7}y^{-4/7}}$

$-8y^{11/7+3/7} + 8y^{11/7+-4/7}$

$\boxed{-8y^{2} + 8y}$

#95 $\sqrt{y} \cdot \sqrt[3]{yz}$

$y^{1/2}(yz)^{1/3}$

$\underbrace{y^{1/2}y^{1/3}}z^{1/3}$

$y^{1/2+1/3}z^{1/3}$

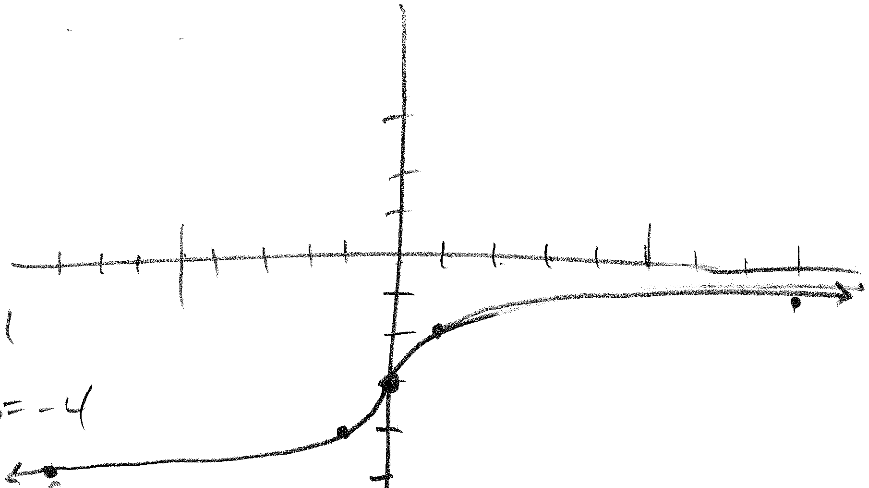
$\boxed{y^{5/6}z^{1/3}}$

Sec 8.1

\# 45

$$f(x) = \sqrt[3]{x} - 3$$

x	y
0	$\sqrt[3]{0} - 3 = -3$
1	$\sqrt[3]{1} - 3 = 1 - 3 = -2$
8	$\sqrt[3]{8} - 3 = 2 - 3 = -1$
-1	$\sqrt[3]{-1} - 3 = -1 - 3 = -4$
-8	$\sqrt[3]{-8} - 3 = -2 - 3 = -5$
64	$\sqrt[3]{64} - 3$ $4 - 3 = 1$



D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

Sec 8.3 Simplifying Radicals

Evaluate

- $\sqrt{x} + \sqrt{y} = \sqrt{x+y}$

$$\sqrt{9} + \sqrt{16} = \sqrt{9+16}$$
$$3 + 4 = \sqrt{25}$$
$$7 \neq 5$$

- $\sqrt{x} - \sqrt{y} = \sqrt{x-y}$

$$\sqrt{16} - \sqrt{9} = \sqrt{16-9}$$
$$4 - 3 = \sqrt{7}$$
$$1 \neq \sqrt{7}$$

Conclusion

$$\sqrt{x} + \sqrt{y} \neq \sqrt{x+y}$$
$$\sqrt{x} - \sqrt{y} \neq \sqrt{x-y}$$

- $\sqrt{x} \cdot \sqrt{y} = \sqrt{xy}$

$\sqrt{16} \cdot \sqrt{9} = \sqrt{16 \cdot 9}$

$4 \cdot 3 = \sqrt{144}$

$12 = 12$ ✓

Product Rule for Radicals

$$\sqrt{x} \cdot \sqrt{y} = \sqrt{xy}$$

- $\dfrac{\sqrt{x}}{\sqrt{y}} = \sqrt{\dfrac{x}{y}}$

$\dfrac{\sqrt{16}}{\sqrt{9}} = \sqrt{\dfrac{16}{9}}$

$\dfrac{4}{3} = \dfrac{4}{3}$ ✓

Quotient Rule for Radicals

$$\frac{\sqrt{x}}{\sqrt{y}} = \sqrt{\frac{x}{y}}$$

Are true for any Radical as long as the index is the same for both

$$\sqrt[4]{\frac{81}{16}} = \frac{\sqrt[4]{81}}{\sqrt[4]{16}} = \boxed{\frac{3}{2}}$$

same

$$\sqrt[3]{4} \cdot \sqrt[3]{5} = \sqrt[3]{4 \cdot 5}$$
$$= \sqrt[3]{20}$$

#18 $\sqrt[4]{3y^2} \cdot \sqrt[4]{6y} = \sqrt[4]{3y^2 \cdot 6y} = \sqrt[4]{18y^3}$

not same

#19 $\sqrt[3]{7} \cdot \sqrt[4]{3}$ product Rule doesn't apply

$\cancel{7^{1/3}} \; \cancel{3^{1/4}}$ ← simplified as possible

Simplified Radical if

1. The Radicand has No factor Raised to a power greater than or equal to the index

   Ex: $\sqrt[4]{2^5} = \sqrt[4]{2^4 \cdot 2^1} = \sqrt[4]{2^4} \cdot \sqrt[4]{2}$
   $= 2\sqrt[4]{2}$ ✓

2. The Radicand has No fractions

   Ex: $\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$ ✓

3. No denominator contains a Radical

   Ex: $\frac{1}{\sqrt{16}} = \frac{1}{4}$ ✓

4. Exponents in the Radicand and the index of the Radical have a greatest common factor of 1

   Ex: $\sqrt[6]{y^2} = y^{2/6} = y^{1/3} = \sqrt[3]{y}$

Formally: $\sqrt[km]{a^{kn}} = \sqrt[m]{a^n}$