Supplement to 4.2: Rational Exponents

Friday, March 15, 2019 2:02 PM

radicals: $\sqrt{2}$

a radical uses the symbol $\sqrt{}$ ← square root

$\sqrt[3]{}$ ← cube root

$\sqrt[4]{}$ ← 4th root

$\sqrt[n]{}$ ← nth root

n is called the index

review: $\sqrt{9} = 3$

$\sqrt[3]{125} = 5$ because $5^3 = 125$

in general, $\sqrt[n]{a} = x$ means that $x^n = a$

<u>rational exponents</u>

$$x^{1/n} = \sqrt[n]{x}$$

so $x^{1/2} = \sqrt{x}$

$9^{1/2} = \sqrt{9} = 3$

examples: simplify $25^{1/2} = \sqrt{25} = 5$

$$32^{1/5} = \sqrt[5]{32} = 2$$

$$27^{1/3} = \sqrt[3]{27} = 3$$

on a calculator:

$$25^{1/2} = 25 \; \boxed{y^x} \; 0.5$$

$$27^{1/3} = 27 \; \boxed{y^x} \; (1 / 3)$$

what about more complicated fractions?

$$x^{2/3} = (x^2)^{1/3} = (x^{1/3})^2$$

$$x^{m/n} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$$

examples: $9^{3/2} = (9^3)^{1/2}$ but 9^3 is a big number!

$$= (9^{1/2})^3$$

$$= 3^3$$

$$= 27$$

example: for non-integer roots, give a decimal approximation.

$$7^{2/5} = (7^2)^{1/5}$$

$$= (49)^{1/5}$$

$$= 2.17791$$

one last thing:

$\sqrt{-4}$ = not a real number