

Mastery Learning

Two questions from last test. Do them perfectly & I'll split the difference with you. Mess up ... Nada.

MONDAY 20 minutes.

7.1 Questions

#73,

$$\sqrt[n]{\square^n} = \square$$

$$-\sqrt[3]{\frac{z^{21}}{27x^3}} = -\sqrt[3]{\frac{(z^7)^3}{3^3 x^3}} = -\sqrt[3]{\frac{(z^7)^3}{(3x)^3}} = -\sqrt[3]{\left(\frac{z^7}{3x}\right)^3}$$

$a^3 b^3 = (ab)^3$

$$= -\frac{z^7}{3x} \qquad \frac{a^3}{b^3} = \left(\frac{a}{b}\right)^3$$

$$= -\frac{\sqrt[3]{z^{21}}}{\sqrt[3]{27}\sqrt[3]{x^3}} = -\frac{z^7}{3x} \quad \text{with rules/concepts coming soon}$$

$$= -\left(\frac{z^{21}}{27x^3}\right)^{\frac{1}{3}} = -\frac{z^{(21)(\frac{1}{3})}}{27^{\frac{1}{3}}(x^3)^{\frac{1}{3}}} = -\frac{z^7}{3x}$$

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

7.2

$$\sqrt[m]{x} = x^{\frac{1}{m}} \quad \text{if } \sqrt[m]{x} \text{ is real.}$$

we've already used this for calculator stuff

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

without parentheses, this is

$$\text{just } \frac{32}{5} = 6.4$$

$$32^{1/5} = 32^1 \div 5$$

$$4^{\frac{1}{2}} = 2$$

$$\sqrt[2]{4} = 2$$

$$\sqrt{4} = 2$$

$$125^{\frac{1}{3}} = 5$$

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

$$5^3 = 125$$

Trick: write every integer as a product of powers of primes

$$\begin{array}{r} 5 \overline{)125} \\ 5 \overline{)25} \\ 5 \end{array} \Rightarrow 125^{\frac{1}{3}} = (5^3)^{\frac{1}{3}} = 5^{3 \cdot \frac{1}{3}} = 5^1$$

$$3 \cdot \frac{1}{3} = \frac{3}{1} \cdot \frac{1}{3} = \frac{3 \cdot 1}{1 \cdot 3} = \frac{3}{3} = 1$$

$$(\overline{3})(\frac{1}{\overline{3}}) = \frac{(\overline{3})(1)}{(1)(\overline{3})} = \frac{\overline{3}}{\overline{3}} = 1$$

$$\frac{m}{n} = m \cdot \frac{1}{n} = \frac{1}{n} \cdot m$$

$$x^{\frac{m}{n}} = (x^m)^{\frac{1}{n}} = (x^{\frac{1}{n}})^m$$

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

Take power
Take root

Take root
Take power

→ Preferred for ease of use.

$$4^{\frac{2}{3}} = \left(4^{\frac{1}{2}}\right)^3 = 2^3 = 8$$

$$= \left(4^3\right)^{\frac{1}{2}} = (64)^{\frac{1}{2}} = 8$$

$$125^{\frac{2}{3}} = \left(\left(125\right)^{\frac{1}{3}}\right)^2 = 5^2 = 25 \text{ Nice}$$

$$= \left(\left(125\right)^2\right)^{\frac{1}{3}} = (15625)^{\frac{1}{3}} = 25 \text{ Big numbers. Yuck.}$$

Properties of Exponents, pg 424

$$x^{\frac{1}{3}} \cdot x^{\frac{5}{3}} = x^{\frac{1}{3} + \frac{5}{3}} = x^{\frac{6}{3}} = x^2$$

$(x^{\frac{1}{3}})(x^{\frac{5}{3}})$ means the same thing. It's what I use on my homework.

$$(x^{\frac{1}{2}})(x^{\frac{2}{3}}) = x^{\frac{5}{6}}$$

$$\frac{1}{2} + \frac{1}{3} = \frac{1}{2} \cdot \frac{3}{3} + \frac{1}{3} \cdot \frac{2}{2} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

$$\frac{3}{6} + \frac{2}{6} = \frac{3+2}{6} = \frac{5}{6}$$

Again!

$$\frac{1}{2} + \frac{2}{3} = \frac{1}{2} \cdot \frac{3}{3} + \frac{2}{3} \cdot \frac{2}{2} = \frac{3}{6} + \frac{4}{6} = \frac{7}{6}, \text{ so}$$

$$(x^{\frac{1}{2}})(x^{\frac{2}{3}}) = x^{\frac{7}{6}}$$

Multiply

$$x^{\frac{3}{4}} \left(x^{\frac{1}{4}} - x^3 \right) = \left(x^{\frac{3}{4}} \right) \left(x^{\frac{1}{4}} \right) - \left(x^{\frac{3}{4}} \right) \left(x^3 \right)$$

$$= x^{\frac{3}{4} + \frac{1}{4}} - x^{\frac{3}{4} + 3}$$

$$\frac{3}{4} + \frac{3}{1} \cdot \frac{4}{4} = \frac{3+12}{4} = \frac{15}{4}$$

$$= x^1 - x^{\frac{15}{4}}$$

$$7x^{-\frac{1}{3}} - 5x^{\frac{5}{3}}$$

Factor out $x^{-\frac{1}{3}}$

$$= x^{-\frac{1}{3}} \left(7 - 5x^2 \right)$$

$$\frac{7x^{-\frac{1}{3}}}{x^{-\frac{1}{3}}} = 7$$

$$\frac{5x^{\frac{5}{3}}}{x^{-\frac{1}{3}}} = 5x^{\frac{5}{3} - (-\frac{1}{3})}$$

$$= 5x^{\frac{5}{3} + \frac{1}{3}} = 5x^{\frac{6}{3}}$$

$$= 5x^2$$

§ 7.2 #s 1, 5, 9, 10, 11, 15, 17, 19, 21, 23, 24,
29, 33, 39, 41, 45, 49, 53, 57, 61, 65, 67,
71, 73, 77, 85, 89, 93, 97.

Due Wednesday.

Finish 7.2 talk Tuesday.

73 on hasn't been touched.