PC11 Ch 1 Hand-in Corrected Partial Key

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PC11 Ch 1 Hand-in 2023

PreCalc 11 Chapter 1 Assignment – hand in for completion marks

Name: Key

Complete the following questions showing all work and steps where applicable.

1. Estimate the value of the following and verify, using calculator. Show your method for estimating.

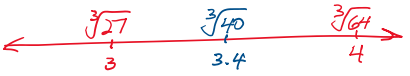
a) $\sqrt{34}$ Look at nearby perfect squares

check: $(5.8)^2 = 33.64$

$\sqrt{34} = 5.83095\ldots$

$\sqrt{34} \approx 5.8$ (approximately equal)

b) $\sqrt[3]{40}$ Look at nearby perfect cubes



check: $(3.4)^3 = 39.304$

$\sqrt[3]{40} = 3.41995\ldots$

$\sqrt[3]{40} \approx 3.4$

2. Evaluate each of the following.

a) $\sqrt{144} = 12$

b) $\sqrt[3]{-343} = -7$

c) $\sqrt{-36}$ = imaginary number

3. Evaluate. Write each answer as a fraction in lowest terms.

a) $\sqrt{\frac{100}{121}}$ No answer given. You can do it!!

b) $\sqrt{\frac{48}{75}} = \sqrt{\frac{48 \div 3}{75 \div 3}}$ ← Reduce the radicand

$= \sqrt{\frac{16}{25}}$

$= \frac{\sqrt{16}}{\sqrt{25}}$

$= \frac{4}{5}$

c) $\sqrt[3]{\frac{216}{125}} = \frac{\sqrt[3]{216}}{\sqrt[3]{125}}$

$= \frac{6}{5}$

4. Identify the sets to which each of the following numbers belongs by marking an "X" in the appropriate boxes.

	Number	Natural Numbers	Whole Numbers	Integers	Rational Numbers	Irrational Numbers
1.	123	X	X	X	X	
2.	−5.24				X	
3.	$\sqrt{13}$					X
4.	$-\frac{35}{5} = -7$			X	X	
5.	π					X
6.	$\sqrt{\frac{1}{25}} = \frac{1}{5}$				X	
7.	0		X	X	X	
8.	$-\sqrt{64} = -8$			X	X	
9.	$5.\overline{23}$				X	
10.	4.23986109...					X

5. Write each mixed radical below as an entire radical:

a) $4\sqrt{3}$

$= \sqrt{4^2 \cdot 3}$

$= \sqrt{16 \cdot 3}$

$= \boxed{\sqrt{48}}$

b) $6\sqrt[3]{2}$

$= \sqrt[3]{6^3 \cdot 2}$

$= \sqrt[3]{216 \cdot 2}$

$= \boxed{\sqrt[3]{432}}$

c) $-9\sqrt{7}$

$= -\sqrt{9^2 \cdot 7}$

$= -\sqrt{81 \cdot 7}$

$= \boxed{-\sqrt{567}}$

even index, negative stays outside of the radical

6. Write each radical below as a mixed radical in simplest form. (Radicand must be as small as possible.)

a) $\sqrt{147}$ No answer given. You can do it!!

b) $3\sqrt{180}$

$= 3\sqrt{2 \cdot 2 \cdot 3 \cdot 3 \cdot 5}$

$= 3 \cdot 2 \cdot 3\sqrt{5}$

$= \boxed{18\sqrt{5}}$

Factor the radicand

180
10 18
2 5 2 9
3 3

$180 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

c) $5\sqrt[3]{56}$ $= 5\sqrt[3]{8 \cdot 7}$

$= 5\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 7}$

$= 5 \cdot 2\sqrt[3]{7} = \boxed{10\sqrt[3]{7}}$

7. Write each radical as a power with rational exponent:

a) $\sqrt[4]{12^5} = 12^{5/4}$ b) $\sqrt[3]{(-8)^7} = (-8)^{7/3}$ c) $\left(\sqrt{\frac{4}{11}}\right)^3 = \left(\frac{4}{11}\right)^{3/2}$

8. Write each power as a radical, then evaluate. Write your answer in simplest form. ~~Fraction and simplest mixed radical form for radicals.~~

a) $121^{\frac{1}{2}} = \sqrt{121} = \boxed{11}$

b) $\left(\frac{125}{64}\right)^{\frac{1}{3}} = \sqrt[3]{\frac{125}{64}} = \boxed{\frac{5}{4}}$

c) $-16^{\frac{3}{4}} = -\sqrt[4]{16}^3 = -2^3 = \boxed{-8}$

d) $(-27)^{\frac{2}{3}} = \sqrt[3]{-27}^2 = (-3)^2 = \boxed{9}$

e) $(-24)^{\frac{3}{2}} = \sqrt{-24}^3 = \boxed{\text{not a real number}}$

f) $\left(\frac{125}{64}\right)^{\frac{2}{3}} = \sqrt[3]{\frac{125}{64}}^2 = \left(\frac{5}{4}\right)^2 = \boxed{\frac{25}{16}}$

g) $\left(\frac{16}{625}\right)^{-0.75} = \left(\frac{625}{16}\right)^{+0.75} = \left(\frac{625}{16}\right)^{3/4} = \sqrt[4]{\frac{625}{16}}^3 = \left(\frac{5}{2}\right)^3 = \boxed{\frac{125}{8}}$

h) $-0.09^{-\frac{3}{2}} = -\left(\frac{9}{100}\right)^{-3/2} = -\left(\frac{100}{9}\right)^{+3/2} = -\sqrt{\frac{100}{9}}^3 = -\left(\frac{10}{3}\right)^3 = \boxed{-\frac{1000}{27}}$

i) $(400)^{\frac{3}{2}}$ No answer given. You know how to do it!! ☺

Should have been a "9", not 1/9. My bad. ☹

9. Use exponent laws to simplify each expression, then evaluate. Give each answer as a fraction in lowest terms.

a) $\left(\left(\frac{3}{8}\right)^4\right)^5 \cdot \left(\left(\frac{3}{8}\right)^{-2}\right)^{1/9}$

$= \left[\left(\frac{3}{8}\right)^{20} \cdot \left(\frac{3}{8}\right)^{-2}\right]^{1/9}$

$= \left[\frac{3^{20} \cdot 3^{-2}}{8^{20} \cdot 8^{-2}}\right]^{1/9}$

$= \left(3^{18}\right)^{1/9} = 3^2 = \boxed{9}$

b) $\left(27^{\frac{1}{3}} + 25^{-\frac{1}{2}}\right)^2 = \left[\sqrt[3]{27} + \left(\frac{1}{25}\right)^{1/2}\right]^2$

$= \left(3 + \sqrt{\frac{1}{25}}\right)^2$

$= \left(3 + \frac{1}{5}\right)^2$

$= (16)^2$

$\left(\left(\frac{3}{8}\right)^4\right)^5 \cdot \left(\left(\frac{3}{8}\right)^{-2}\right)^9$

$= \left(\frac{3}{8}\right)^{20} \cdot \left(\frac{3}{8}\right)^{-18}$

$= \left(\frac{3}{8}\right)^{20 + -18}$

$= \left(\frac{8^{20} \cdot 8^{-2}}{8^{18}}\right)^{1/9} = \frac{3^2}{8^2} = \frac{9}{64}$

$= \left(3 + \frac{1}{5}\right)^2$

$= \left(\frac{16}{5}\right)^2$

$= \frac{256}{25}$

$= \left(\frac{3}{8}\right)^{20+-18}$

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

$= \frac{9}{64}$

10. Simplify each expression. Do not include negative exponents in your final answer.

a) $2\left(2a^4b^{-2}\right)^3\left(3a^{-2}b^{\frac{5}{2}}\right)^2$

$= 2\left(2^3 a^{12} b^{-6}\right)\left(3^2 a^{-4} b^{10/2}\right)$

$= 2\left(8a^{12}b^{-6}\right)\left(9a^{-4}b^5\right)$

$= 144\, a^{12+-4}\, b^{-6+5}$

$= 144a^8 b^{-1}$

$= \frac{144a^8}{b}$

b) $\frac{\left(4x^{\frac{7}{2}}\right)\left(-2x^{-\frac{5}{4}}\right)}{8x^{-2}}$

$= \frac{4 \cdot -2}{8} \cdot x^{7/2 + -5/4 - -2}$

$= \frac{-8}{8} x^{7/2 - 5/4 + 2}$

$= -1 \, x^{14/4 - 5/4 + 8/4}$

$= -x^{17/4}$

11. The formula to determine the mass of caffeine, C, which remains in the body t hours after 100 mg is ingested is: $C = 100(2)^{-\frac{t}{5}}$

Determine how much caffeine remains in the body after 15 hours. Give answer in reduced fraction form and make sure to include units.

$t = 15$

$C = 100(2)^{-15/5}$

$= 100(2)^{-3}$

$= 100 \cdot \frac{1}{2^3}$

$= \frac{100}{8}$

$= \frac{25}{2}$ mg